



**GOVERNMENT OF ASSAM
KAZIRANGA NATIONAL PARK**

**DETAILED REPORT
ON
ISSUES AND POSSIBLE SOLUTIONS
FOR
LONG TERM PROTECTION
OF
THE GREATER ONE HORNED
RHINOCEROS
IN
KAZIRANGA NATIONAL PARK
PURSUANT TO THE ORDER OF
THE HON'BLE GAUHATI HIGH COURT**

By

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Director
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DT. 5th August, 2014



PREAMBLE

This **Detailed Report on Issues and Possible Solutions for Long Term Protection of the Greater One Horned Rhinoceros in Kaziranga National Park** has been prepared pursuant to the orders of the Hon'ble Gauhati High Court Dt. 4th March, 2014 in the matter of PIL 66/2012 & 67/2012, where in the Hon'ble Court directed, "Today we have heard the views of Mr. M. K. Yadav, Director, Kaziranga National Park, who is present in person... Mr. Yadav, Director, Kaziranga National Park, submitted that sincere steps are being taken to curb poaching at any cost. He also submits that Government be granted around two months time to prepare high quality methodical report to suggest various proposals for curbing poaching on a permanent basis and also on related issues dealing with the Park and to preserve the endangered species Rhino.... We grant two months time to the Director, Kaziranga National Park to submit the detail report on or before the next date of hearing suggesting therein the effective and remedial steps for implementation to curb poaching of rhinos in the Kaziranga National Park. He is at liberty to take help of all stakeholders, organizations, parks all over the world for preparation of report."

In view of the above orders of the Hon'ble Court, an earnest endeavor has been made by the Director, Kaziranga National Park to compile a detailed report on issues and possible solutions for long term protection of rhinos in Kaziranga. Though the Report cannot be termed exhaustive by any means, it is an attempt to bring together factors that may contribute to disappearance of Rhino from Kaziranga, and possible ways to prevent that from happening. ***However, it must be mentioned in the beginning that without prejudice to any other conservation site in the world, Kaziranga is a unique habitat supporting a large number of diverse species, flora and fauna. There is no other conservation site in the world which comes close to Kaziranga National Park in terms of uniqueness and diversity. Long term preservation of this unique site has become the biggest conservation challenge today.*** Poaching of the rhinoceros is only one of the issues plaguing the Park. The other serious concerns are shrinking of the habitat, erosion by the Brahmaputra, siltation of the water bodies, invasion of weeds and encroachment by tree forest over the grasslands, complete lack of protection of the watershed of Kaziranga, lack of corridors around the Park, confinement of the big mammals within the Park. Each of these issues have the potential of wiping out the resident rhinoceros population in silent ways. Almost after 110 years of start of the story of conservation of the rhinoceros in Kaziranga, the growth in wild animal population as well as swelling of human inhabitation have reached levels which call for exercising a very fine balance between conservation and development, making the work of conservation a lot more difficult than it was a century ago. ***The question still remains to be answered whether Kaziranga would see its bi-centenary in 2105 AD.***

It is from this last point that most of the Report draws its strength from. However, implementation of some of the suggested measures would need deeper understanding and a close cooperation among the stakeholders. The issue of requisite financial allocations and fund availability to implement these steps would also be a factor in deciding whether Kaziranga would exist till 2105 AD.

Mahendra Kumar Yadava IFS
Dt. 5th August, 2014

EXECUTIVE SUMMARY

Kaziranga, the home of the Greater One Horned Rhinoceros, faces certain threats which, if not adequately mitigated today, would become the cause of extinction of the rhinoceros in times to come. The Report dwells upon the causes and possible solutions in some details. The factors identified as threat to the survival of the rhinos, other than poaching, are loss and fragmentation of habitat, lack to technology and strategic advantage over poachers, certain lacuna in policy and law and their implementation, challenges of growth and development on the fringes of the Park and possible impacts of climate change and climate variations. The approach to mitigate the threats and ensure long term survival of Kaziranga is multi pronged and multi disciplinary with a series of immediate, short term, medium term and long term measures to be undertaken. Some of the suggested measures include erosion control, habitat improvement, extension of habitat, corridors retrofitting, upscaling of anti poaching infrastructure, security and surveillance in and around the Park, adopting a landscape based approach and constitution of a landscape authority for conservation and development of the areas, adopting a green growth approach for development in the landscape, adopting better management strategies such as organizational restructuring, increased staff strength, staff welfare and creating some key and necessary infrastructure, adopting better policies and strengthening further the legal provisions, and above all creating several secure habitats outside Kaziranga for the rhinos. The Report also identifies the actionables and classifies them into immediate, short term, medium term and long term time frames. A tentative budgetary estimate of the measures suggested is also provided at the end along with possible sources of funding. The Report projects financial estimates for a period of 10 years.

The Report is divided into three parts. Part I of the Report examines the key issues and challenges being faced in rhino protection. It also contains a brief description of the existing set up and provides the background information required for further analysis. Part I is divided into 9 chapters dealing with habitat issues, human interface issues, policy and law, rhino population dynamics, rhino poaching, stakeholders' analysis and in brief about Kaziranga.

Part II of the Report contains the proposed solution framework and consists of 9 chapters. The solution framework is divided into habitat strategies, upscaling anti poaching infrastructure, Kaziranga Landscape Conservation and Development Authority, Management strategies, Kaziranga Landscape

Green Growth Framework, Policy, law, protocols and programme strategies, Time budget, and lastly Budget and finances. It also contains the references, some website links and bibliography along with citations for further reading.

Part III of the Report contains the Annexures such as tables, photo-plates, soft version minutes of various meetings held and comments and suggestions received from various experts and stakeholders, and other annexures.

The Report finds that other than the poaching, there are other threats to the survival of rhino such as lack of adequate and secure habitat which is very badly in need of extension, retrofitting of the existing corridors, introducing SMART GUARD and SMART Communication and a series of technology interventions in short and medium term, green growth and green development opportunities for the fringe villages. On the policy side, it recommends amendments in the Wildlife (Protection) Act, 1972, changes in the ways wildlife crime investigation is handled, organizational modifications, constitution of a Kaziranga Landscape Conservation and Development Authority to manage the entire landscape as a single unit consisting of the core, buffer and all the corridors and watersheds. The Report recommends initiation of the Rhino Range Expansion Project, setting up of key infrastructure and welfare of staff.

The actual implementation of the recommendations would require a series of ground surveys, in depth study, execution of Proof of Concepts, preparation of DPRs and Technical Feasibility Reports. The implementation would largely depend upon how strong is the institutional framework, availability of funds, support of the stakeholders, especially the local stakeholders, and the monitoring and feedback mechanisms put in place.

Abbreviations and Acronyms

AAU	Assam Agricultural University
AB	Armed Branch
AC	Air Conditioning
ACF	Assistant Conservator of Forests
ACS	Assam Civil Service
Addl.	Additional
AEDA	Assam Energy Development Agency
AER	All Electric Range
AFPF	Assam Forest Protection Force
AH&V	Animal Husbandry and Veterinary
ASIF	Activity-Structure-Intensity-Fuels (Model in Transportation Sector)
AK	Automatic Kalashnikov
ANM	Auxiliary Nurse Midwife
AO	Annual Ongoing
ANPR	Automatic Number Plate Reader
APC	Anti Poaching Camp
APCB	Assam Pollution Control Board
APPL	Amalgamated Plantations Private Limited
APTA	American Public Transportation Association
ARPTF	Anti Rhino Poaching Task Force
ARREP	Assam Rhino Range Expansion Project
AR&T	Administrative Reforms & Training
AsRSG	Asian Rhino Specialist Group
ASI	Assistant Sub Inspector
ATM	Automated Teller Machine
ATPPF	Assam Tea Plantations Provident Fund
ATREE	Ashoka Trust for Research in Ecology and the Environment
ATV	All-terrain Vehicle/Advanced Tether Vehicle
AWS	Automatic Weather Station
BEL	Bharat Electronics Limited
BHEL	Bharat Heavy Electricals Limited
BP	Burapahar Range, Bullet Proof
BPL	Below Poverty Line
BPO	Business Process Outsourcing

BR	Black Rhino (The African Black Rhinoceros)
BRREP	Black Rhino Range Expansion Project
B.Sc	Bachelor of Science
BSI	Botanical Survey of India
BTAD	Bodoland Territorial Area District
BWLS	Burhachapori Wildlife Sanctuary
C	Civil
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CAG	Comptroller and Auditor General of India
CAGR	Compound Annual Growth Rate
CARE	Cooperative for American Relief Everywhere
CBI	Central Bureau of Investigation
CBO	Community Based Organization
CC	Climate Change,
CCF	Chief Conservator of Forests
CCTV	Closed Circuit Television
CD	Compact Disc
CEM	Chief Executive Member
CEO	Chief Executive Officer
CF	Conservator of Forests
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Development
CISF	Central Industrial Security Force
CITES	Convention on International Trade in endangered Species
CJ	Chief Justice
CODIS	Combined DNA Index System
CPF	Core Project Fund
CR	Central Range
CrPC	Code of Criminal Procedure
CS	Chief Secretary
CSA	Climate-Smart Agriculture
CSR	Corporate Social Responsibility; Central Strong Room
CSV	Comma Separated Value
CTMR	Camera Trap Mark Recapture
CT Scan	Computed Tomography Scan

CWLW	Chief Wildlife Warden
CWRC	Center for Wildlife Rehabilitation and Conservation
CZA	Central Zoo Authority
DAkKS	Deutsche Akkreditierungsstelle GmbH
DBBL	Double Barrel Gun
DC	Deputy Commissioner
DCF	Deputy Conservator of Forests
DCRF	District Council Reserve Forest
DDO	Drawing & Disbursing Officer
DFID	Department for International Development
DFMD	Door Frame Metal Detector
DFO	Divisional Forest Officer
DGP	Director General of Police
DIG	Deputy Inspector General
DLR	German Aerospace Center, Deutsches Zentrum Luft Raumfahrt
DNA	Deoxyribonucleic Acid
DPR	Detailed Project Report
DSMD	Deep Search Metal Detector
DSWF	David Shepherd Wildlife Foundation
DTH	Direct To Home
DTP	Desk Top Publishing
Dy.	Deputy
EAWL	Eastern Assam Wildlife
ECC	Ecological Carrying Capacity
ECP	Erosion Control Programme
ECS	Electronics Clearance Service
EDC	Eco Development Committee
EDP	Electronic Data Processing
EE	Electronic Eye, Executive Engineer
ER	Eastern Range; Elephant Reserve
ESZ	Eco Sensitive Zone
EU	European Union
EV	Electric Vehicle
E-W	East-West

FAR	Floor Area Ratio (Floor Area Index)
FBI	Federal Bureau of Investigation
FD	Field Director, Forest Department
FDA	Forest Development Agency
Fgd	Forest Guard
FIR	First Information Report
FLIR	FLIR Systems Inc.
FOCD	Forest Offence Case Diary
FOSS	Free and Open Source Software
FR	Forest Ranger
FREMAA	Flood & Riverbank Erosion Management Agency of Assam
Frl	Forester Grade I
FRP	Fibre Reinforced Plastic
FVO	Field Veterinary Officer
g/HP-hr	Gram per horse-power hour
GAIL	Gas Authority of India Ltd.
GARIIASI	GIS and Remote Sensing Integrated Initiative for Administrative and Social Infrastructure
GDP	Gross Domestic Product
GHG	Green House Gases
GHP	Good Hygiene Practices
GIS	Geographic Information System
GMP	Good Manufacturing Practices
GOH	(The) Greater One Horned (Rhinoceros)
GoPro	GoPro Inc.
GP	Gram Panchayat
GPS	Global Positioning System
GRIHA	Green Rating for Integrated Habitat Assessment
GRP	Government Railway Police
GSI	Geological Survey of India
GSM	Groupe Spécial Mobile, Global System for Mobile
GSR	Ground Surveillance Radar
Ha	Hectare
HELP	Human Elephant Learning Programme
HEP	Habitat Extension Program

HHMD	Hand held Metal Detector
HIP	Habitat Improvement Programme
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immuno Deficiency Syndrome
HoFF	Head of Forest Force
HP	Hindustan Petroleum
HR	Human Resource
HSD	High Speed Diesel
HSLC	High School Leaving Certificate
HSSLC	High Secondary School Leaving Certificate
HQ	Head Quarter
iMiEV	i-Mitsubishi Innovative Electric Vehicle
IAS	Indian Administrative Service
IB	Inspection Bungalow, Intelligence Bureau
IBA	Important Bird Area
ICCT	International Council on Clean Transportation
ICDP	Integrated Conservation and Development Project
ID	Identity
IEC	Information, Education and Communication
IFAW	International Fund for Animal Welfare
IFOAM	International Federation of Organic Agriculture Movements
IFS	Indian Forest Service
IG	Inspector General
IGF	Inspector General of Forests,
IIITA	Indian Institute of Information Technology, Allahabad
IIT	Indian Institute of Technology
IM	Immediate
IMR	Infant Mortality Rate
IMAX 3D	Image MAXimum 3 Dimensional
INDOCERT	Indian Organic Certification Agency
INR	Indian Rupee
IOC	Indian Oil Corporation Ltd
IPC	Indian Penal Code
IPCC	Intergovernmental Panel on Climate Change
IPS	Indian Police Service

IR	Indian Rhino; Infra-Red
IRC	Indian Rhino Congress
IRF	International Rhino Foundation
IRV	Indian Rhino Vision
IS	Indian Standards, Immediate to Short Term
IT	Information Technology
ITS	Intelligent Traffic System
IUCN	International Union for Conservation of Nature
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
K	Kilo, 10 ³
KA	Karbi Anglong
KAADC	Karbi Anglong Autonomous District Council
KBCDC	Kaziranga Bio-Diversity Conservation and Development Committee
KCCC	Kaziranga Centenary Convention Center
KEZ	Kaziranga Eco-Sensitive Zone
KLCDA	Kaziranga Landscape Conservation and Development Authority
KLGGF	Kaziranga Landscape Green Growth Framework
KM	Kilo Meter
KMDC	Kaziranga Mini Data Center
KNP	Kaziranga National Park
KNPSWS	Kaziranga National Park Staff Welfare Society
KPLT	Karbi People's Liberation Tiger
KR	Kaziranga Range
KTCF	Kaziranga Tiger Conservation Foundation
KTR	Kaziranga Tiger Reserve
L1	Level 1
LAC	Local Advisory Committee
LCA	Life Cycle Assessment
LEED	Leadership in Energy and Environmental Design
LED	Light Emitting Diode
LPG	Liquefied Petroleum Gas
LPS	Local Protection Squads
LT	Long Term
LWLS	Laokhowa Wildlife Sanctuary

M	Million, Mega, 10 ⁶
Mbps	Mega bits per second
MDC	Mini Data Center
MDG	Millennium Development Goals
MIS	Management Information System
ML	Medium Term to Long Term
MLA	Member of Legislative Assembly
MoD	Ministry of Defence
MoEF	Ministry of Environment and Forests
MMR	Maternal Mortality Ratio
MNRE	Ministry of New and Renewable Energy
MSME	Ministry of Small and Medium Enterprises
MT	Metric Tonnes; Medium Term
MVS	Mobile Veterinary Service
MW	Mega Watt
MySQL	My Structured Query Language
NAB	National Accreditation Body
NABCB	National Accreditation Board for Certification Bodies
NABET	National Accreditation Board for Education and Training
NDFB	National Democratic Front of Bodoland
NDZ	No Development Zone
NE	North East
NEHU	North East Hill University
NEIST	North East Institute of Science and Technology
NER	North Eastern Region
NERIWALM	North East Regional Institute of Water and Land Management
NESAC	North East Space Application Centre
NGO	Non-Governmental Organisation
NGT	National Green Tribunal
NH	National Highway
NHAI	National Highway Authority of India
NHPC	National Hydro Power Corporation Ltd.
NOC	No Object Certificate
NP	National Park

NR	Northern Range
NRHM	National Rural Health Mission
NTCA	National Tiger Conservation Authority
NTFP	Non Timber Forest Produce
NTPC	National Thermal Power Corporation Ltd.
NPOP	National Programme for Organic Production
NRL	Numaligarh Refinery Ltd.
NRLM	National Rural Livelihood Mission
NVD	Night Vision Device
NVEQF	National Vocational Education Qualification Framework
NVQF	National Vocational Qualification Framework
NWDFDA	Nagaon Wildlife Divisional Forest Development Agency
OA	Original Application
OGS	Organic Guarantee System
OIL	Oil India Limited
ONGC	Oil and Natural Gas Corporation Ltd
OSU	Ohio State University
OCV	OTG Communities and Villages
OTG	Off-The-Grid
PA	Protected Area
PAN	Protected Area Network
PCCF	Principal Chief Conservator of Forests
P&D	Planning and Development
PDR	Pulse Doppler Radar
PF	Provident Fund
PGCIL	Power Grid Corporation of India Ltd.
PIL	Public Interest Litigation
PGR	Public Grazing Reserve
PIR	Passive Infra Red
PMGSY	Pradhan Mantri Gram Sadak Yojna
PMU	Project Monitoring Unit
PO	Place of Occurrence
PoC	Proof of Concept
ppm	parts per million

PPP	Public Private Partnership
P&RD	Panchayat & Rural Development
PRA	Participatory Rural Appraisal
PRF	Proposed Reserve Forest
PS	Police Station
PSU	Public Sector Undertaking
PTZ	Pan, Tilt, Zoom
PV	Photo Voltaic
PVR	Priya Village Roadshow
PWD	Public Works Department
QCI	Quality Council of India
RCC	Reinforced Cement Concrete
RCP	Representative Concentration Pathway
R&D	Research & Development
REWP	Research, Education and Working Plan
RF	Reserve Forest
RFRI	Rain Forest Research Institute
RhoDIS	Rhino DNA Index System
RPF	Railway Protection Force
Rs.	(INdian) Rupees
RWH	Rain Water Harvesting
SAIL	Steel Authority of India Ltd.
SBBL	Single Barrel Gun
SCN	Sensor Communication Networks
SDC	State Data Center
SDO	Sub Divisional Officer
SEM	Scanning Electron Microscope
SFM	Sustainable Forest Management
SHG	Self Help Group
SL	Short term to Long Term
SLF	Sustainable Livelihood Framework
SLR	Self Loading Rifle, Self Lens Reflex
SM	Short Term to Medium Term
SMART	Sustain Stamina, Motivated, Action Oriented, Ready to Act, Trained and Tactically Superior; Swift, Meaningful, always On, Reach All, Trouble

	Free; Specific, Measurable, Assignable, Realistic, Time related
SMS	Short Message Service
SOP	Standard Operating Procedures
SP	Superintendent of Police
ST	Short Term
S&T	Science & Technology
STF	Special Task Force
SUV	Sport Utility Vehicle
SWAN	State Wide Area Network
SWOT	Strengths Weaknesses Opportunities Threats
TCP	Tiger Conservation Plan
TE	Tea Estate
TERI	The Energy and Resource Institute
TFR	Technical Feasibility Report
TOD	Transit Oriented Development
TRAFFIC	[Trade Records Analysis of Flora and Fauna in Commerce] Traffic International
UAV	Unmanned Aerial Vehicle
UBI	Unconditional Basic Income
UCF	UBI Corpus Fund
UCS	Union of Concerned Scientists
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USDA	United States Department of Agriculture
USFWS	United States Fish & Wildlife Service
USDE	United States Department of Energy
VDP	Village Defence Party
VGL	Veterinary Genetics Laboratory
VGR	Village Grazing Reserve
W	Watt
WAWL	Western Assam Wildlife
WCCB	Wildlife Crime Control Bureau
WCIO	Wildlife Crime Investigation Officer
WCT	Wildlife Conservation Trust

Wi-fi	Wireless Fidelity
WII	Wildlife Institute of India
WL	Wildlife
WLRO	Wildlife Research Officer
WLS	Wildlife Sanctuary
Wi-Max	Worldwide Interoperability Microwave Access
WPA	Wildlife (Protection) Act, 1972
WP(C)	Writ Petition (Civil)
WPT&BC	Welfare Plains Tribes and Backward Classes
WR	Western Range
WR	White Rhino (The African White or Squaretipped Rhinoceros)
WTI	Wildlife Trust of India
WQ	Water Quality
WWF	World Wildlife Fund, World Wide Fund for Nature
WWT	Wildlife Areas Development and Welfare Trust
YOE	Year of Establishment
YTD	Young Tea Dose

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**GOVERNMENT OF ASSAM
KAZIRANGA NATIONAL PARK**

**DETAILED REPORT
ON
ISSUES AND POSSIBLE SOLUTIONS
FOR
LONG TERM PROTECTION
OF
THE GREATER ONE HORNED
RHINOCEROS
IN
KAZIRANGA NATIONAL PARK
PURSUANT TO THE ORDER OF
THE HON'BLE GAUHATI HIGH COURT**

PART I



CHAPTER 1

1 Background, Methodology and Approach

The present matter arose because of a suo moto PIL registered by the Hon'ble Gauhati High Court PIL No. 66/2012 which was registered at the very direction of the Hon'ble Chief Justice when the news paper reports and media contained too many reports on killings of the rhino in Kaziranga. Later on there were several other cases that were coupled with it, and joint hearing of all the cases started taking place. In course of the hearings, the Director Kaziranga National Park was called for a personal hearing and directed to compile a report on the protection of the rhinos and issues faced by it. This order was issued on the 4th March, 2014. This is the genesis of the Report. The Hon'ble Gauhati High Court vide the order dt. 12th June, 2014 have directed the report to be submitted to the Hon'ble Court on the 5th of August, 2014 along with the views of the Government.

1.1 Judicial Activism and Kaziranga

There are several cases running in the Hon'ble Gauhati High Court such as the PIL 66/2012, PIL 67/2012, the PIL 6/2008.

The PIL 6/2008 was filed by the public charitable trust Human Elephant Learning Programme (HELP) that due to the apathy of the State Forest Department there had been a gradual aggravation of the natural habitat of the wild elephants. This has resulted in frequent human-elephant conflicts. The herds of wild elephants are frequently intruding into the human habitations causing massive damages to property and incidents of killing human beings are also taking place frequently in the State.

The PIL 67/2012 was filed by one Sri Mrinal Saikia regarding encroachment in Kaziranga National Park on 8th October, 2013. The matter was heard along with 66/2012 and on the 8th January, 2013, the following orders were issued, "Learned Additional Advocate General for the State of Assam states that within the Kaziranga National Park there is no encroachment and efforts are being made to remove the encroachment from the area outside the Park which is proposed to be handed over to the National Park. Steps for removing encroachment may be completed as far as possible within three months from today so that such land can be handed over to the Kaziranga National Park. Affidavit of the steps taken in this regard be filed before the next date. The State may also take the help of such NGOs as may be found useful for the purpose. List again on 10.04.2013, as prayed."

1.1.1 Other Cases in the Hon'ble Gauhati High Court on Kaziranga

There is a case No. WP(C) 1186/2008 Tanka Lal Das and Others vs. State of Assam which has been filed by the petitioner being aggrieved of the previous order of the Hon'ble Gauhati High Court. It is the order of the Hon'ble Court in the matter of M/S Chandmari Tea Company Limited -vs- State of Assam and others as appeared in 2003(2) GLT232 is an amalgamation of the matter arising out of the judgment dated, 11.09.2002 by Division Bench of the Hon'ble Court in Writ Appeal No. 269 of 1999 and other connected cases. The said order was issued by the Hon'ble Court on 22.11.2002 in the matter of M/s Chandmari Tea Company Limited -vs-State of Assam and others comprising of Civil Rule No. 923 of 1993, 3683 of 1994, 3685 of 1994, 3845 of 1994, 4167 of 1996 and 2397 of 1998. The Hon'ble Court directed, "----- the matter will

now have to go back to the authority for a de-novo determination." Accordingly pursuant to order of the Hon'ble Court, Government of Assam in the Department of Environment & Forest vide order No. FRS.89/2002/13 dated 22.12.2008 appointed Sri H.M. Cairare, IAS the then Principal Secretary to the Govt. of Assam, Public Enterprise Department, Dispur as Collector to enquire into and determine the existence, the nature and extent of any rights/claims alleged to exist in favour of any person or persons in on over any land in the Proposed in 6th Addition to Kaziranga National Park as per procedure laid down in section 19 to 26 A (both exclusive except (C) of sub-section (2) of section 24) of the Wildlife (Protection) Act, 1972, read with section 35 of the said Act. Accordingly, The Collector duly enquired into and determined the existence, the nature and extent of any rights/claims alleged to exist in favour of the petitioners along with other persons, in or over any land within the limit of the proposed 6th Addition to Kaziranga National Park and disposed of the same as "Claim for Land Rejected and Additional Claim based on Cattle Grazing also Rejected" which form Annexure- IX of the Report of the Collector. It may be seen in the said Annexure that name of the petitioners i.e. Tanka Lal Das of Talengania appears at Serial No. 7 having case No. KNP VI/633/2009. Therefore, the petitioner does not have any rights and claims over any land within the limit of the proposed 6th Addition to Kaziranga National Park as determined by the Collector duly appointed under law pursuant to the order of the Hon'ble Court dated, 22.11.2002 in the matter of M/s Chandmari Tea Company Limited -vs- State of Assam and others. The Claim of the petitioners along with all other person whose rights/claims, if any, have already been extinguished by the Collector duly appointed under Law adhering to all the procedural safe guard, prescribed under section 19 to 26 of the Wildlife (Protection) Act. 1972. Therefore the petition must be rejected forthwith for larger public interest of constitution of the 6th Addition to Kaziranga National Park and other pending additions to Kaziranga National Park.

1.1.2 National Green Tribunal

Similarly, several cases / PIL have been filed in the Hon'ble National Green Tribunal as well. Noted among them are the M.A, No. 687 of 2013, M. A. No. 1070 of 2013 and M.A. No. 142 of 2014 in O.A. No. 174 of 2013, and Application No. 38/2011 in Rohit Choudhury Vs Union of India. A series of orders have been passed in OA No. 38/2011 by the Hon'ble National Green Tribunal concerning Kaziranga where setting up of industries/ polluting units such as brick kilns, stone crusher units, tea factories etc. have been either banned or allowed to operate under certain conditions within the NDZ. The cases also concern the National Highway 37. The orders of the Hon'ble Tribunal in both the matters are briefly touched upon in the following paragraphs. A small write up on NDZ is also provided thereafter to put everything in perspective. The orders are very exhaustive, and it may not be advisable to quote the orders in entirety. The readers are requested to visit the website of the Hon'ble Tribunal <http://www.greentribunal.gov.in> for more details.

Orders under the OA 38/2011:

In the order Dt. 15th February, 2012, the Honble Tribunal said, "... As an interim measure, we direct the Authorities to maintain status-quo till the next date and not to grant permission for any new crusher unit or any other new industrial unit in the demarcated zone. The Authorities shall also not renew the permission granted to Stone Crusher Units or any other unit which are functioning in the vicinity of Kaziranga National Park till the next date."

In the order Dt. 23rd May, 2012, the Hon'ble Tribunal opined, "... it is stated as follows: A total of 64 units, i.e. stone crushers - 26, Brick Kilns - 14, Tea Estates - 12, Miscellaneous units - 12 are existing in this NDZ under reference. A prayer is also made to grant further time for carrying out detailed inspection and to submit a final report by MoEF. .. By Interim order, we had directed all the concerned to maintain status quo with regard to the aforesaid Zone. The said order was clarified by order dated 21st March, 2012. After going through the affidavit, filed by MoEF, wherein it has been clearly stated that 64 units are existing in the NDZ as on date, have no hesitation to direct the Authorities to take necessary action with regard to the functioning of the aforesaid units. However, with regard to the 12 Tea Estates, it is made clear that if there is no processing units or boilers existing, they should be left for the time being. It is further made clear that this order is only for the interregnum period, liberty is granted to all the Respondents / unit holder to file detail counters and pray for modification of the order if exigency arises. MoEF is also directed to file a detailed counter affidavit enclosing the report and all relevant documents and also furnish the names of the units which are operating/existing within the NDZ. MoEF is also further directed to furnish all the names of the units which are operating or within 500 mt. outer periphery of NDZ or are existing in the vicinity, along with the reports as to whether they are complying with the stipulated environmental standards or have flouted any condition imposed on them for safeguard of the environment. The report shall be filed alongwith the relevant documents within 2 months from today. The MoEF is also directed to furnish a list of 26 stone crusher which are existing in NDZ to Learned Counsel for Respondent Nos. 5 to 15 and Respondent No.4 within a period of one week..."

Order Dt. 7th September, 2012:

The Hon'ble Tribunal in the matter 38/2011 opined, in respect of operation of stone crusher units, brick kilns and other units operating in and around NDZ, vide Para No. 33, 34 and 35 which are quoted below:-

"33. Therefore we direct the Authorities to take following actions:

- (a) The **11 (eleven) stone crushers** which according to CPCB report, are located within the NDZ are non-functional at present Since those 11 (eleven) stone crushers have been established/allowed to be established within NDZ in contravention of the 1996 Notification the state Government is directed to take immediate steps to remove all those illegal stone crushers except 1 (one) M/s Assam stone crusher from the NDZ area forthwith.

It appears **M/s Assam Stone Crusher** was installed before 1996 i.e prior to the notification. But then, operation of the said stone crusher unit would cause significant air pollution apart from noise pollution and would lead to adverse impact on the eco-system. The State of Assam is therefore, directed to take steps to relocate the said unit outside the NDZ. In other words, the said unit should not be allowed to operate in its present location with immediate effect.

- (b) The Government shall take appropriate steps not to allow operation of the **23**

(twenty three) stone crusher units existing in the vicinity of NDZ (outside the NDZ) till necessary pollution control equipments and other measures are installed to eradicate the pollution, to the satisfaction of Assam Pollution Control Board and Central Pollution Control Board.

- (c) According to the CPCB report **34 (thirty four) Brick kilns** are operating within NDZ out of which only 1 (one) unit was set up before 1996. Brick Kilns being the main pollution causing units are hazardous to environment. The said **33 (thirty three) Brick Kilns** should be closed down immediately.

So far as 1 (one) Brick kiln which was established before 1996, is concerned steps should be taken to either relocate it outside the demarcated zone or steps should also be taken to insist stricter air pollution control devices. The unit should be inspected by the SPCB, Assam regularly and CPCB occasionally so as to ensure that the pollution level of the unit is within control. No extension shall be granted to the said unit after expiry of its lease or permission at its present location.

- (d) The CPCB report further reveals that 11 (eleven) **miscellaneous industries** are existing within NDZ. Out of them 4 (four) are fuel dispensing stations (petrol pumps), 1 (one) is a saw mill, 1 (one) oil tanker making unit (steel fabrication), 1 (one) is a restaurant (under construction), 1 (one) concrete making unit, 2 (two) mustered oil mills and 1 (one) flour mill.

Out of the aforesaid 11 (eleven) industries, except 4 (four) petrol pumps and the restaurant all other units generated lots of pollution, therefore, they should not be allowed to operate in their present locations and action should be taken to shift them immediately out of NDZ.

- (e) The CPCB report further reveals that there are 25 (twenty five) **Tea Factories** out of which 22 (twenty two) are located within the NDZ and 3 (three) are within 500 m of outer periphery of NDZ. It appears the CPCB could visit only 13 (thirteen) **Tea Leaf processing Factories**, due to flood, situation in Assam. The report reveals that only 1 (one) unit has made arrangements to treat its effluent. The rest 22 (twenty two) tea processing units located within NDZ have installed boilers for which, coal, oil, wood is the main feed stock. They have also not installed any pollution control devices.

The SPCB and other Authorities are directed to ensure that no tea processing units having boiler using fossil fuel operates within the NDZ and take immediate steps to stop their operation.

The 3 (three) tea leaf processing units located within 500 m of the outer periphery of NDZ should be allowed to operate Only if necessary pollution control measures as may be stipulated by SPCB, Assam are adhered to by those units.

Further, all the tea processing units must provide acoustical enclosures in their electrical generators for providing alternative electricity.

These are only some remedial measures, it is open to MoEF, CPCB and SPCB to adopt any other appropriate measure and take any other steps permissible under law to remove all the industrial units from NDZ and prescribe stringent standards to eradicate pollution so far as industrial units situated outside NDZ but in its close proximity, say within 500 meters.

34. The MoEF and the State Government are directed to prepare a Comprehensive Action plan and Monitoring Mechanism for implementation of the conditions stipulated in the 1996 Notification specifying "No Development Zone" and for inspection, verification and monitoring of the prohibitions imposed in the notification referred to above, as well as the provisions of Rule-5 of the Environment (Protection) Act, 1986.

35. After giving the matter a conscious thought and after taking into account all the factors, we are of the opinion that MoEF and the State Government of Assam have totally failed in their duties with respect to implementation of the provisions of the 1996 Notification and due to the callous and indifferent attitude exhibited by the Authorities, number of polluting industries / units were established in and around the No Development Zone of Kaziranga thereby posing immense threat to the biodiversity, eco-sensitive zone, ecology as well as environment. We are, further, satisfied that this is a clear case of infringement of law. We, therefore, have no hesitation to direct the MoEF and the Government of Assam to deposit Rs. 1,00,000/- (Rupees one lakh only) each, with the Director, Kaziranga National Park for conservation and restoration of flora and fauna as well as biodiversity, eco-sensitive zone, ecology and environment of the vicinity of Kaziranga National park in general and within the No Development Zone in particular. The said amount shall be utilized exclusively by the Director, Kaziranga National Park for conservation, protection and restoration as well as for afforestation of suitable trees of the local species in and around the No development Zone."

In view of the above orders of the Hon'ble Tribunal, there have been several review petition cases and Miscellaneous cases arising out of the OA, noted among them being Misc case No. 82/2012 by tea gardens, 78-96/2013 pertaining to brick kilns, 179/2012 pertaining to the Indian Tea Association, 181-200/2012 pertaining to 20 tea gardens, Review Case No. 37/2012 of KBI brick industries,

In case of the review case No. 37/2012, the Hon'ble Tribunal passed the judgement on 10th January, 2013 as, "we are not inclined to review our judgment or directions issued at the instance of the Applicant. The Applicant cannot be permitted to function within the No Development Zone of Kaziranga National Park in the absence of the consent. Liberty is however granted to the Applicant to approach the concerned Authorities for granting consent/permission. If such an attempt is made it should be open to the Authorities to consider the Application strictly in consonance with the Rules. On verification if the Authorities are satisfied that the Applicant's unit is situated beyond the NDZ and is a non-polluting one and does not lead to congestion, they may consider and pass necessary orders stipulating such conditions as would be deemed just and proper for conservation and protection of Kaziranga National Park, of course subject to the conditions imposed in the No Development Zone Notification."

Orders under the OA 174/2013:

The OA 174/2013 concerns the NH37, which according to the one of the conditions of the Environmental Clearance given by the MoEF, is to derecognize the NH37 between Jakhlabandha and Numaligarh, and divert the highway elsewhere within a decade of the setting up of the refinery. On the 9th October, 2013 the Hon'ble Tribunal passed the following orders, *"Prima facie, we are of the considered opinion that NH-37 passing through Jakhlabandha to Bokakhat going through Kaziranga National Park is not only violation of the conditions imposed by Ministry of Environment and Forests while granting permission for this Project but is certainly violation of environment particularly the wildlife. The photographs placed before us show ruthless killings of exceptional species of animals in these zones by heavy and rash traffic. We would have proceeded to pass an Order prohibiting plying of any vehicles on this road. However, Learned counsel appearing for the State of Assam submits that they would come out with a concrete proposal which they would implement forthwith to protect the wildlife and the national sanctuary as well. In view of the above, we grant one week's time to the State of Assam to prepare the complete project report in consultation with Ministry of Environment and Forests (for short 'MoEF') and place the same on record. Further, it should also state as that steps have been taken in furtherance to the Order of the MoEF dated 31st May, 1991 till today. An Affidavit in this regard will be filed by Chief Secretary of State of Assam. In the meanwhile, we restrain the State of Assam from widening and shouldering of the road in question."*

1.1.3 No Development Zone

Recognizing the fact that "Kaziranga National Park with Headquarter at Bokhakat in the State of Assam is the home of three-fourth of the total population of Rhino and contains largest single concentration of endangered species wild animals like swamp-deer, wild-buffalo, elephants, tigers and Gangetic Dolphins and it is the only park of its kind with a viable low land grassland ecosystem in South Asia" and that "a Petroleum Refinery at Numaligarh (East of Kaziranga) and the developmental activities for said refinery is likely to cause tremendous pressure on the natural resources and the wild-life habitat in the Kaziranga National Park and its surroundings" vide Notification dated 5th July, 1996, the Ministry of Environment and Forest, Govt. of India created a No Development Zone around the Numaligarh Refinery by stating "And whereas it is proposed to create a "No Development Zone" within a radius of 15 km around the said refinery site except towards North West where the "No Development Zone" shall extend right up to the eastern boundary of the said park;" and "Now, therefore, in exercise of the powers conferred by sub section (1) and clause (v) of sub section (2) of Section 3 of the Environment (Protection) Act, 1986 (29 of 1986) read with clause (d) of sub clause (3) read with sub rule (4) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby directs that on and from the date of publication of this notification the expansion of industrial area, townships, infrastructure facilities and such other activities which could lead to pollution and congestion shall not be allowed within "No Development Zone" specified in the Appendix to this Notification, except with prior approval of the Central Government emphasis supplied."

The Appendix provides the corners of the NDZ. However, the words "except towards North West where the "No Development Zone" shall extend right up to the eastern boundary of the said park" seems to be escaping attention of all. The interpretation of all, including the

Hon'ble National Green Tribunal is confined to the coordinates given in the appendix. If the intention of the NDZ is to protect the Kaziranga National Park and its surroundings, as mentioned in the notification, then the area covered by the coordinates of the NDZ and the "exception" clause put together only cover a small portion of the Park, as most of the Park lies to the west of the NDZ, and does not seem to be covered. The length of the Kaziranga National Park from its easternmost top point to the end of the southern boundary is more than 85 km in length, of which the NDZ covers less than 15 km on the eastern side. Further, no activities are allowed inside the national Park boundary anyway under the Wildlife (Protection) Act, 1972 making the "exception" clause redundant. Therefore, potentially a polluting industry could be set up very close to the Park, and yet outside the National Park as well as the NDZ, thereby nullifying the very purpose why the NDZ was created in the first place. Therefore, in the opinion of the author, the NDZ does not serve any purpose other than creating a dichotomy in Kaziranga hinterland, unless the boundaries contained in the "exception" clause get modified to something like *"except towards North West where the "No Development Zone" shall extend upto a radius of 15 km all along and right up to the eastern and southern boundary of the said park"*.

1.2 Order Dt. 12th June, 2014 in the PIL 66/2012

The order Dt. 12th June in the PIL 66/2012 in the Division Bench was as follows:
“(A.M. Sapre, C.J.)

Heard Mr. T.J. Mahanta, learned Amicus, Mr. P.N. Choudhury, learned Amicus, Mrs. Rita Boro Bora, learned counsel, Mr. D.P. Chaliha, learned senior counsel assisted by Mr. S. Borthakur, learned counsel, Mr. S. Upadhyay, learned counsel, for the petitioners. Also heard Mr. D. Saikia, learned Additional Advocate General, Assam, for the respondents.

Pursuant to our previous order dated 26.5.2014, Mr. M.K. Yadav, Director, Kaziranga National Park is also present in person. We heard the views of the respective lawyers appearing including Mr. Yadav. According to him, the report, which he is supposed to file, is already underway and would take some more time to submit. He wants a month's time to do the needful to enable him to submit an exhaustive report on all the issues such as conservation and preservation of the most priceless endangered species - 'Rhino' in Kaziranga National Park and its adjacent areas. Having regard to the nature of work to be undertaken and the work already done, we grant one month's time to submit the report, preferably by the next date of hearing, to enable this Court to peruse the same for taking a decision after hearing all the parties concerned.

List these cases on 5th August, 2014.

On the next date of hearing, Mr. M.K. Yadav is to remain personally present.”

1.3 Order Dt. 4th March, 2013

The order Dt. 12th June in the PIL 66/2012 in the Division Bench was as follows, “
(A.M. Sapre, C.J.)

Today we have heard the views of Mr. M. K. Yadav, Director, Kaziranga National Park, who is present in person and also heard the views of several learned counsel appearing for various organizations and stakeholders on the various problems faced by Kaziranga

National Park and in particular with regard to poaching of rhinos which has caused serious concern to all.

Mr. Yadav, Director, Kaziranga National Park, submitted that sincere steps are being taken to curb poaching at any cost. He also submits that Government be granted around two months time to prepare high quality methodical report to suggest various proposals for curbing poaching on a permanent basis and also on related issues dealing with the Park and to preserve the endangered species "Rhino".

We express our serious concern about the incidences of poaching in Kaziranga National Park which have recently taken place and are taking place from time to time, we view it seriously. At any cost, in our view, the same must be stopped at the earliest to save the nature's most priceless and precious endangered species "Rhino". Indeed, it is our duty to preserve this God's gift to this world at any cost.

We grant two months time to the Director, Kaziranga National Park to submit the detail report on or before the next date of hearing suggesting therein the effective and remedial steps for implementation to curb poaching of "rhinos" in the Kaziranga National Park. He is at liberty to take help of all stakeholders, organizations, parks all over the world for preparation of report.

We request Mr. Yadav, Director, Kaziranga National Park, to remain present on every date of hearing to facilitate the hearing on the matter.

List on 26th of May, 2014."

1.4 Methodology

A five pronged strategy was adopted for compilation of the high quality report as directed by the Hon'ble High Court. These were:

1. Holding of stakeholders' meetings
2. Holding of an International Conclave on Kaziranga
3. Preparation of an Approach Paper on Kaziranga
4. Holding discussion with national and international experts and peer review
5. Original survey and data collection

1.4.1 Stakeholders Meetings

The first stakeholders meeting was held at Kohora on the 15th March, 2014 in which 17 different stakeholders participated. Several key decisions were taken and it was also decided to hold a bigger meeting of the stakeholders. Accordingly, on the 27th of April, 2014, the 2nd meeting of the Stakeholders was held at Kohora with a day long programme. It was a national level participation and about 50 members attended the meeting including local stakeholders. It was in this meeting that it was decided to approach the PSUs and other companies for funding through CSR. It was also decided to constitute an authority for better management of the areas around Kaziranga.

Another meeting with the members of the local press and media was organized at Kohora on the 4th May, 2014. The meeting was very fruitful. Another meeting was held with the Karbi Anglong forest authorities on 10th April, 2014 at Kohora. Stress was laid on the

conservation of the watershed to the south of Kaziranga in this meeting. It was followed by another meeting at Diphu on the 9th May, 2014 along with PCCF(WL) and the Addl. PCCF (Admin) to open a wildlife division in Karbi Anglong so that better protection to these areas could be accorded.

1.4.2 International Conclave on Kaziranga

The 3rd meetings with the stakeholders and the International Conclave on Kaziranga was held on the 20th May, 2014 at Guwahati in which the local people and members of press and media also participated. There were several delegates from outside India, some of whom participated through Video Conference. Some of the key experts who participated in the meetings were Dr. Richard Emslie of IUCN, Mr. A. Christie Williams of WWF from Nepal, Dr. Bibhab Talukdar from Indonesia.

It was followed by a seminar on RhoDIS in which two South African Experts namely Dr. Roderick Potter and Dr. Cindy Harper participated. It was followed by a discussion and field visit to Kaziranga. The DDG, Department of National Parks and Wildlife Conservation, Govt. of Nepal, Mr. Tikaram Adhikari also participated. He shared his positive experiences of controlling poaching in Chitwan by conferring magisterial powers to the Chief Warden.

1.4.3 Preparation of Approach Paper on Kaziranga

An "Approach Paper on Issues and Possible Solutions for Protection of the One Horned Rhinoceros in Kaziranga National Park Pursuant to the Order of the Hon'ble Gauhati High Court Dt. 4th April, 2014 in PIL 66/2012" was drafted and widely circulated using the newly created official web portal of the Kaziranga National Park. An advertisement was also inserted in the local press for the people to download and send their opinions. The document was also sent to the Govt. of Assam for wide circulation and eliciting opinion of various Govt. departments. The Approach Paper was highly appreciated, and it generated a lot of discussion among various stakeholders, media and press.

1.4.4 Panel of Experts

A panel of experts from the national and international arena, including local stakeholders and members of media and intellectual class were chosen. Initially a small nucleus of experts was selected which grew quite a bit towards the end. The approach paper was circulated to all of the panel members. Several comments were also received. Based on the inputs, the compilation of report was started. The chapters were circulated for peer review. Each of the members were also asked to share the write up with others so that a wider audience could be reached. In this manner, all the decision making and strategic chapters were circulated. The write ups circulated were Chapters 2 to 7 Part I, and Chapter 11-18 of Part II. The comments and opinions received from various members in this regard are annexed in Part III of the Report.

The panel of experts is provided separately at the end of this Chapter as Acknowledgment.

1.4.5 Original Survey and Data Collection

Another hallmark of this Report is that a lot of effort was put towards generating field level data and primary research. As a result, several new facts emerged, which gave a definitive

direction to the Report. In this regard the help and assistance accorded by the officers and staff of Kaziranga is acknowledged, noted among them being Sri S.K. Sealsarma IFS, DFO, Eastern Assam Wildlife Division, Sri Pankaj Sharma, ACF, Sri Sunnydeo Indradeo Choudhury IFS ACF, Sri Ramen Das, ACF, Sri Rabindra Sharma, Wildlife Research Officer, Sri Tarun Gogoi, Fri who collected quite a lot of field data at short notices. Acknowledgment is also due to the WWF teams, especially Mr. Amit Sharma, Dr. Bibhab Talukdar of Aaranyak, Mr. Rahul Dutta of IRF, Mr. Rathin Barman of WTI, who carried out several original studies by themselves and their expert teams. The following studies were conducted:

1. Corridor survey and mapping
2. Corridor animal Movement Survey by WWF
3. Islands of the river Brahmaputra: The Connecting Corridors" by WWF
4. Corridor Change detection study using satellite data by Dr. Bibhab Talukdar
5. Erosion and Bankline study of Kaziranga using satellite images
6. Socio-economic survey of the EDC villages by WWF
7. Field demonstration of anti poaching technologies
8. Elephant Mortality causes and remedy

Not all of these have been compiled in form of a Report. However, every effort should be made to make this Reports and observation in appropriate scientific documentation formats.

1.4.6 Final Review

The Report is under circulation to various Departments of the Government of Assam for their valuable comments vide Letter No. FRM.270/2012/297 Dt. 23rd July, 2014 of the Environment & Forest Department. The comments are expected anytime. A supplement would be prepared compiling the comments of the various departments.

1.5 Acknowledgment

Special thanks are due to Sri Jitesh Khosla IAS, Chief Secretary, Assam for espousing the cause of Kaziranga and guiding us all the time. He has been very supportive, especially at the times of crises. Hope to continue getting his support for improving conditions in Kaziranga. He has also been the source of inspiration to go for the green growth and low carbon strategies for development in the landscape. Thanks are also due to Sri S.C. Das IAS, Addl CS, Revenue and Disaster Management for always supporting and guiding for sake of Kaziranga. Thanks are due to Sri Davinder Garcha IAS, Principal Secretary to the Govt. of Assam, Department of Environment & Forests, for having encouraged to go ahead and take bold decisions. He took personal initiative and time to visit Kaziranga and understand its myriads of problems and issues. He also deserves to be thanked for taking up the issue of erosion in the Park with the Water resources Department.

The author is thankful to Sri V.K. Vishnoi IFS, Principal Chief Conservator of Forests & the Head of the Forest Force, Assam, for having ignited my mind. Several of the management strategies are output of the fruitful discussions with him. The author is also thankful to Sri R.P. Agarwalla IFS, Principal Chief Conservator of Forests (Wildlife) & The Chief Wildlife Warden, Assam who has been providing rock solid support and guidance all along and also he had been kind enough to spare time to sit through most of the stakeholders' meetings, and the initiatives for securing the watershed of Kaziranga by taking initiatives to create a separate wildlife division in Karbi Anglong.

Thanks are also due to Sri Rajesh Gopal, IFS, Member Secretary, NTCA, Govt. of India for being very positive for Kaziranga. Thanks are also due to his team members Sri D.P. Bankhwal IFS, IG (Regional Office), NTCA and Sri S.P. Yadav IFS, DIG, NTCA, New Delhi for constructive suggestions and management inputs for the Kaziranga Tiger Reserve. Thanks are also due to Sri B.S. Bonal IFS, Member Secretary, Central Zoo Authority of India for participating in the deliberations and providing valuable suggestions to make the Report comprehensive.

Thanks are due to Sri D. Mathur IFS, Addl PCCF (Admin & Vigil), for being alive with the issues plaguing the Park, especially matters of shortage of staff. I am sure with his intervention and good wishes of the PCCF & Hoff, we shall be able to wipe out the long pending staff shortage issues. Thanks are also due to Sri O.P. Pandey IFS, Addl. PCCF (Projects), Sri A.H. Khan Addl. PCCF (IT), Sri A.K. Singh IFS, Addl PCCF (CAMP) for being very supportive of Kaziranga.

Thanks are indeed due to Sri M.G.V.K.Bhanu, IAS, PS to Hon'ble CM for taking the lead to set up the Anti Rhino Poaching Task Force. Thanks are due to Sri R.M. Singh IPS, Addl. DGP(STF) and his team of dedicated officials for leading the ARPTF from the front. Thanks are due to Sri Rajiv Kr. Bora IAS, Principal Secretary, IT Department and Sri Anurag Goel IAS, Commissioner & Secretary, IT Department for allowing registration and hosting of the domain <http://kaziranga.assam.gov.in> at a very short notice and thereby enabling the process of international consultation immediately after the order of the Hon'ble High Court. Thanks are due to Sri G.D. Tripathi IAS, Commissioner & Secretary, Home, for keeping the trouble at bay when it comes to Kaziranga. Thanks are also due to Sri M.C. Boro, Special Commissioner & Secretary, PWD (Roads) and Sri A.C. Bordoloi, Special Commissioner & Secretary, PWD (Building and NH) for espousing the cause of Kaziranga.

Thanks are due to Smt. Nafifa Ahmed IAS, Secretary to the Govt. of Assam, Department of Environment & Forests, for giving due priority to Kaziranga and being responsive to its requirements. Thanks is also due to her entire team in the Department who work tirelessly and are very quick in action when it comes to sorting out issues of Kaziranga.

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Thanks are due to Sri Syed Iftikhar Hussain IAS, Divisional Commissioner, Upper Assam Division and Chairman, Local Advisory Committee, KTR. Thanks are due to Sri Ashok Babu, IAS, DC, Nagaon, Smt. Julie Sonowal IAS, DC, Golaghat, Sri Mrigesh Narayan Baruah, ACS, SDO (Civil) Bokakhat, Sri Arabinda Kalita IPS, SP, Nagaon, Sri S. Chetia

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Thanks are due to Sri D. Saikia, Addl Advocate General, Sri P. N. Choudhury, Amicus Curaie, Sri Sanjay Upadhyaya, Counsel, Sri Gautam Uzir Counsel, Sri Chandra Baruah, Counsel and other counsels of the various stakeholders in the PIL for being part of the stakeholders initiative and giving valuable inputs to make the Report meaningful.

Thanks are to all my colleagues and personnel of Kaziranga who have been working tirelessly all this while and at the same time providing me the valuable inputs for the Report. Thanks are due to Sri M. N. Duara IFS, CF for taking care of the RTI issues. Thanks are due to Sri S.K. Sealsarma IFS, DFO, EAWL for providing valuable inputs and active support all throughout the period from the day of the order of the Hon'ble Court in making the endeavour a great success. Mention is made of Sri Chandan Bora DCF, DFO, Assam State Zoo and his entire team, Sri M.M. Pujari, Principal Consultant, SEMT, IT Department, Govt. of Assam, Sri Gautam Das, Asstt Manager, AMTRON and his team for providing logistic support in holding the International Conclave at Guwahati. Special thanks to the data center and network team of AMTRON for providing constant support in hosting the Kaziranga domain. Special thanks are due to Sri Deepak Goswami, SIO, NIC, Assam Unit and Sri Diganta Barman, Sr. Technical Director, NIC Assam Unit. Thanks are due to Sri Anupam Barman, sr. Systems consultant, AMTRON for being the honorary system administrator of the Kaziranga official portal and maintaining the <http://kaziranga.assam.gov.in> site. Special mention is made of Sri Pradipta Barua, ACF i/c Western Range, Sri Mukul Tamuli, Range officer, Central Range, Sri Salim Ahmed, Range Officer, Eastern Range, Sri J.R. Bordoloi, Range Officer, Burapahar Range, Sri Rupak Bhuyan Frl for providing various inputs and gathering information from the field. Special thanks are due to Sri Munindra Kumar Bordoloi, Jr. Asstt., Sri Binaram Morang, Sr. Asstt, Smt. Gitanjali Kalita, Jr. Asstt, Smt. Arupoma Chetia, Sr. Asstt., Sri Santanu Phukan, Radio Technician Of the office of the Director, KNP, Sri Ajit Sikia, Head Assistant, Sri Dilip Sharma, Frl, Sri Anil Kr. Bora, Sr. Asstt, Sri Ajay Borthakur, Sr. Asstt, Sri Dibya Jyoti Bora of the office of the DFO, EAWL for providing office, secretarial and other assistance in compiling the Report.

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Wildlife Warden, Sri Jitu Sharma Rajkhowa, President, All Assam Journalist Union, Sri Khanjan Nath, President, Kaziranga Suraksha Samiti, Sri Swapan Nath, Local Correspondent, Kaziranga, Sri Kamal gogoi, Aashray Lodge, Kaziranga and Sri Bhaskar Jyoti Baruah, Spokesperson, Tour Operators Association of Assam, among others. Thanks are due to all the Chairmen of the EDCs who participated in the Stakeholders' deliberations and provided valuable inputs. Special thanks are due to Sri Deba Pratim Bora, Member, EDC Bosagaon, Sri Kalidas Upadhyay, Member, Kohora EDC, Sri Dilip Dutta, President, Japaripathar EDC, Sri Jagat Bahadur Chhetry, President, Difalopathar EDC, Sri Mangal Singh Teron, President Natundanga EDC, Sri Dilip Borah, President, Deopani EDC, Sri Deepak Gogoi, President Mohpara EDC, Sri Jayant Rajkhowa, President, Kuthuri EDC, Sri Lambi Ram Ingti, Member, Chilimkhowa EDC, Sri Sashiram Pegu, President Dhanbari EDC.

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"Kaziranga, thou shalt, with thy rhinoceros in thine backyard, liveth for eternity."

[If you want to know about Kaziranga, then, please go to Chapter 9 first]

The Expert Panel & Peer Review Group

SL No	Name	E-mail Address	Brief Introduction
1	A. Christy Williams	acwill69@yahoo.com	He is the Coordinator AREAS, WWF International and is a keen wildlife conservationist. He is vastly experienced in the scientific works and conservation of the Asian Elephants and Rhinos all around Asia. He is also possess a rich experience of working in Assam and North East India.
2	Amit Sharma	amitsharma_ghy@sify.com	He is the Coordinator Rhino Conservation for WWF-India and is based in Assam. He is experienced in wildlife conservation since more than last 10 years and is also trained and experienced in the field of GIS, Remote Sensing and Social works. He is also a member of the Asian Rhino Specialist Group
3	Animesh Saikia	animeshsaikia@yahoo.com	He is the coordinator of the Greater Kaziranga Human Resource and Environment Protection Committee, Bokakhat. He represents the local stakeholders who are fighting for retaining NH 37 Highway.
4	Anupam Barman	barman.anupam@gmail.com	He is Sr Systems Consultant, AMTRON, and is the site administrator for the Kaziranga Portal http://kaziranga.assam.gov.in
5	Arup Jyoti Saikia	arupjyotisaikia@gmail.com arupjyoti@iitg.ernet.in	He is a professor in the HSS department, Indian Institute of Technology, Guwahati and a noted historian on forestry and wildlife conservation. He has several books on forestry and wildlife to his credit.
6	Asad Rahmani	rahmani.asad@gmail.com	He is one of the most famous bird conservationist in India and the Director of BNHS based at Mumbai. He has been advocating the protection of Important Bird and Biodiversity Areas in India.
7	B.S. Bonal	bonalbishian@gmail.com	He is an IFS officer highly experienced in working for the Indian Rhinos. Its conservation and protection. He is also experienced in planning and executing rhino translocations and is currently the Member Secretary of Central Zoo Authority, Govt. of India and also a member of the Asian Rhino Specialist Group. He also has been the former Director of Kaziranga National Park. He has a long standing experience in wildlife management both in in-situ and ex-

8	Beda Brata Bora	bora.beda@gmail.com	<p>situ for more than 27 years that includes more than 7 years in Kaziranga National Park as DFO and Director, as Dy. Field Director in Manas National Park and Director, Assam State Zoo, Guwahati and National Zoological Park, New Delhi. He played a key role as Founder Chief Operating Officer (COO) of Core Committee of Task Force for Rhino Translocation within Assam under IRV 2020.</p>
9	Bhaskar J. Boruah	bhankarjboruah@gmail.com	<p>He is a senior journalist of Assam and at present he is the Executive Editor, Jansadharan Assamese daily at Guwahati.</p> <p>He is an entrepreneur and runs resorts in Agoratoli. He is also the Managing Director, Luit Holidays Joint Secretary & Spokesperson, Tour Operators Association of Assam (TOAA) and Member Local Advisory Committee of Kaziranga Tiger Reserve.</p>
10	Bibhab Talukdar	bibhav@aaranyak.org	<p>He is the SG of Aaranyak and Coordinator Asia Program for IRF. He is highly experienced in rhino conservation and is the current Chair of the Asian Rhino Specialist Group. He is a keen wildlife conservationist and has authored a number of technical documents on rhinos and elephants. He is also a member of IUCN's African Rhino Specialist Group; and co-authored mandated joint IUCN/TRAFFIC reports on Asian and African Rhinos for the last two CITES COP's.</p>
11	Bittu Sahgal	bittu@sanctuaryasia.com	<p>He is the founder editor of Sanctuary Asia, India's premier wildlife and ecology magazine. He is an environmental activist and writer also working at the forefront to protect India from the worst impacts of the climate change.</p>
12	Chandan Bora, DCF	chandanbora21@gmail.com	<p>He is from the Assam Forest Department and at present Director, Assam State Zoo. He has a long working experience in Karbi Anglong District.</p>
13	Chandan Boruah	cndboruah@yahoo.co.in	<p>He is the Standing Counsel for the Govt. of India in the Hon'ble Gauhati High Court.</p>
14	D.P. Bankhwal, IFS	lgntca.ghyt@gmail.com	<p>He is an IFS Officer of Assam Meghalaya Cadre, an avid wildlifer and at Regional NTCA Office at</p>

15	Devajit Saikia	lon1969@yahoo.com	Guwahati. He is the Additional Advocate General, Govt. of Assam and Counsel for the Govt. on the PIL 66/2012
16	Hirdesh Mishra IFS	himplus@gmail.com	He is an IFS Officer and the Conservator of Forests (wildlife) in the office of the PCCF(WL), Assam
17	Jayanta Das	gibbonconservation@yahoo.com	He is an active wildlifer and served for almost decade as the Large Mammal Conservationist under USF&WS projects of the Wildlife Areas Development and Welfare Trust, Guwahati.
18	K. Ramesh	ramesh@wiigov.in	He is senior scientist at the Wildlife Institute of India, Dehradun, and handles UAV and the other associated projects. He was on e of the key members of the UAV team for test flight of UAV at Kaziranga. He is currently undertaking flight trials at Panna Tiger Reserve.
19	Kaushik Barua	assamelephantfoundation@gmail.com	He is an entrepreneur and environmentalist based in Guwahati. He is the Director of Assam Elephant Foundation, highly experienced in working with both domesticated and wild elephants and is also experienced in rhino translocations. He is also a highly experienced persons in handling different breed of dogs and is presently working with the K9 in Assam.
20	Keryn Adcock	keryna@telkomsa.net	She is expert on African rhino and a long standing member of both IUCN's African Rhino Specialist Group and the SADC Rhino Management Group. She is an expert on black rhino population performance, monitoring, habitat suitability assessment and carrying capacity estimation. She previously worked for both the old Natal Parks Board and Bop Parks Board. Since 1995 she has done the analysis for and compiled all the SADC RMG annual black rhino status report synthesis reports.
21	Keshav Kumar IPS	Keshabips86@hotmail.com	He is 1986 batch IPS Officer of Gujarat cadre who has worked for wildlife crime and achieved major break through in wildlife conviction.
22	Keshav Verma	keshavsbarma@gmail.com	He is a retired IAS officer of Gujarat Cadre, served in various capacities, including Program Director at the

23	Kushal K. Sarma	kushalkonwar@gmail.com	World Bank. He headed the Global Tiger Initiative of the World Bank as its Founding Director. He is also honorary member of the Global Tiger Forum
24	M.K. Yadava, IFS	mkyadav@gmail.com	He is the Head, Dept. of Surgery and Radiology in CVSC Khanapara. He is highly experienced in the management and conservation of both domestic and wild elephants. He is also the lead veterinarian of the rhino translocation team.
25	Michael H Knight	mknight@nmmu.ac.za	Director, Kaziranga National Park He is a renowned conservationist and expert on rhino and has been a long standing member and is current Chair of both IUCN's African Rhino Specialist Group and the SADC Rhino Management Group. He is Manager and Head of South African National Parks's Park Planning and Development Unit where he has been involved in numerous park expansion/development projects. He is also responsible for the delivery of SANParks park management plans and the state of biodiversity reporting system.
26	Mrigesh Narayan Baruah, ACS	mrigeshnboruah@gmail.com	He is the SDO (Civil), Bokakhat at present and an important stakeholder in the conservation of Kaziranga.
27	Ms. Krishna Baruah, ACS	Krishnabaruah3240@gmail.com	She is Project Director, DRDA, Golaghat and is involved in the development of livelihood options for the fringe villages of Kaziranga.
28	P. Shivakumar, IFS	sivakumarifs@gmail.com , dfonagaonwl@gmail.com	He is an IFS Officer and holds the post of the DFO, Nagaon Wildlife Division, Nagaon. He is responsible for management of the Burachapori and Laokhowa Wildlife Sanctuaries under the Kaziranga Tiger Reserve.
29	P.C. Bhattacharyya	bhattapc@gmail.com	He is a noted environmentalist and active wildlife expert from Assam. He retired as Prof and Head of the Zoology Department, Gauhati University. He is an Executive Member of the Wildlife Trust of India.
30	P.N. Choudhury	pnchouadvghc@gmail.com	He is the Counsel with the Central Bureau of Investigation, Govt. of India, and Amicus Curiae in the PIL66/2012.
31	Pankaj Sarma	nipusharma@gmail.com	He is the Asstt. Conservator of Forests, Kaziranga National Park. He is also a noted naturalist and an avid birder. He has several papers

			to his credit on avifauna in Kaziranga
32	Prof. Deven Dutta	samudraguptad@gmail.com	He is the former Head of the Department, English, Cotton College. He is a noted personality and speaks for the cause of environment, wildlife and forests.
33	Rabindra Sarma	kazirangaresearch@gmail.com	He is the Wildlife Research Officer of the Kaziranga National Park. He has rich experience in wildlife research and has good knowledge and database on Kaziranga. He is associated with all major research initiatives in the Park/Tiger Reserve.
34	Rachna Yadav	rachnayadav@yahoo.com	With a Masters in Physics pursuing Ph.D. From IIT Guwahati in the area of Ecological Economics. Working in the North East Region in the development sector for nearly two decades. Worked with several Govt, non Govt and international organizations such as CAPART, ICIMOD, UNICEF, UNDP, ADB and NIRD. She also served as Visiting Faculty at NIRD, NERC. Some of her articles are @ Indian Environment Portal.
35	Rahul Dutta	rahulmobile@gmail.com	He is presently working for international Rhino Foundation and is experienced working in the field of wildlife crime and investigations for more than 10 years. He earlier also worked for TRAFFI-WWF program in India.
36	Rajendra Garawad IFS	garawad@gmail.com	He is an IFS Officer and presently Field Director, Nameri Tiger Reserve. He has done considerable primary work on rhino population dynamics during his M.Sc. dissertation as part of his degree in Conservation and Land Management, Bangor University, UK
37	Rajendra P. Agarwalla, IFS	Pccf.wl.assam@gmail.com	He is the PCCF (Wildlife) and the Chief Wildlife Warden, Assam. He has a long standing experience in wildlife affairs and had also served as Field Director, Manas Tiger Reserve, and was one of the persons responsible for turning around Manas in the days of disturbances in nineties. As the Chief Wildlife Warden, he is primarily responsible for administration of all the Protected Areas Network of Assam.
38	Rajesh Gopal, IFS	igntca@gmail.com	He is an IFS Officer and Member Secretary, NTCA, Govt. of India, He

- 39 Ramen C. Das ramendas.afs@gmail.com has championed the cause of tiger conservation in the country and is primary responsible for setting up NTCA and bringing new legislations and Tiger Conservation Plan in the country. He is Asstt. Conservator of Forests, Kaziranga National Park. He has rich experience in community relationship building and also has rich experience in wildlife crime investigation and prosecution.
- 40 Ranjit Borthakur ranjitborthakur@agilisys.co.uk He is founder and chairman of Globally Manged Service. He brings over 35 years of varied experience in managing business and companies. He also supports and works in the field of tourism, technology, environment and conservation. He is the Secretary of the Indian National Association of the prestigious Club of Rome, and a crusader of green growth and low carbon economy. He has authored several books, including one on Kaziranga. He is also the Chairman of the Amalgamated Plantations Pvt. Ltd.
- 41 Raoul Du Toit rduitoit@wwf.panda.org He is a rhino conservationist, and currently Director of the Lowveld Rhino Trust in Zimbabwe. He was awarded the Goldman Environmental Prize in 2011 and IUCN SSC's Sir Peter Scott Medal in 2012 in recognition of his exceptional efforts and successes in the field of African Rhino conservation. Raoul's dedication and technical know-how have contributed significantly to the establishment of effective rhino monitoring systems, community outreach programmes, and improved law enforcement efforts, as well as hugely successful Black Rhino translocation projects. He is a longstanding member of IUCN SSC's African Rhino Specialist Group.
- 42 Rathin Barman rathin@wti.org.in He is the Deputy Director, WTI based at Assam. He is trained wildlife biologist and is working in the field of wildlife conservation including rescue and rehabilitation of rhinos and other animals since more than 10 years.
- 43 Ravi Singh ravisingh@wwfindia.net He is the Secretary General and

44	Richard Emslie	emsleiafrsg@telkomsa.net	<p>CEO of WWF-India based in New Delhi since 2003. He has been a keen nature conservation worker since 1976.</p> <p>He is a long standing member and since 1994 the Scientific Officer of the IUCN SSC African Rhino Specialist Group; and a member of IUCN SSC's Asian Rhino Specialist Group. He is also a long-standing member of the SADC Rhino Management Group and Southern African Rhino and Elephant Security Group/Interpol Environmental Crime Working Group, and is "a Friend of Kaziranga". He co-authored mandated joint IUCN/TRAFFIC reports on Asian and African Rhinos for the last three CITES COP's and has been a member of the CITES Rhino Working Group. In 2012 he was awarded the Harry Messel Award for Conservation Leadership by IUCN SSC in recognition of his scientific leadership and support for rhinoceros conservation in Africa and Asia, and his long service as Scientific Officer of the SSC African Rhino Specialist Group.</p>
45	Rodrick B. Potter	rodpotter@vodamail.co.za	<p>He is an wildlife investigator presently working at Ezemvelo KZN Wildlife. He is an ex-police official and experienced trainer in Crime Scene Management and analysis for about 30 years in South Africa.</p>
46	Ron Chandler	ronchandler@gamil.com	<p>He is a Conservationist and President of Conservation Initiative for the Asian Elephant. Inc.</p>
47	S.P. Yadav, IFS	digntca@gmail.com , spyadavifs@gmail.com	<p>He is an IFS Officer and wildlife expert and at present posted as DIG, NTCA, Govt of India. He is a core member of the think tank of the NTCA and plays seminal role in shaping the conservation strategies for India.</p>
48	S.K. Seal Sarma, IFS,	dfoeawl@gmail.com	<p>He is the DFO, Eastern Assam Wildlife Division, Bokakaht and the key stakeholder in the conservation of rhinos at Kaziranga. He is primarily responsible for all interventions in the Park as DFO.</p>
49	Samudra Gupta Kashyap	sgkashyap@gmail.com	<p>He is a noted senior journalist with the Indian Express.</p>
50	Sanjay Upadhyay	su@vsnl.com	<p>He is an environmental lawyer and pioneer in environmental law activism in India. He is a counsel in</p>

- the Supreme Court of India, and Counsel of certain stakeholders in the PIL 66/2012
- 51** Sonali Ghosh IFS ghoshsonali@gmail.com
 Sonali Ghosh is an Indian Forest Service Officer of Assam-Meghalaya cadre of 2000 batch. she has a dual master's in Wildlife science and Forestry, and a PhD degree in Remote Sensing Technology. Her areas of specialization include species distribution modelling and grassland habitat management. In her career as a field manager of more than 14 years, she has served in 4 Protected Areas in Assam and is currently serving as Deputy Director, Manas Tiger Reserve in the rank of Conservator of Forests. He is 2011 batch IFS Officer and Asstt. Conservator of Forests, Kaziranga National Park
- 52** Sunnydeo I. Choudhury IFS Sun4380@gmail.com
 He is 2011 batch IFS Officer and Asstt. Conservator of Forests, Kaziranga National Park
- 53** Susie Ellis s.ellies@rhinos.org
 She is Executive Director of International Rhino Foundation based in Washington DC. She has been associated with wildlife conservation for more than last 25 years
- 54** Valmik Thapar valmikt@gmail.com
 He is a Natural Historian and foremost among Indian Tiger Conservationist. He is today one of India's most respected wildlife expert and conservationist having produced and narrated documentaries on natural habitats for such medias like National Geographic, BBC, Animal Planet, etc.
- 55** Vivek Menon vivek@wti.org.in
 He is the Executive Director and CEO of WTI based in Delhi. He is a wildlife conservationist and environmentalist with a passion for elephants and wildlife trade issues. He is the author of editor of many best selling books India.
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 He is a noted wildlife scientist at Wildlife Institute of India, Dehradun and is a noted expert on Tiger. He has many publications to his credit.

CHAPTER 2

2 HABITAT ISSUES

2.1 Loss of Habitat: Flood and Erosion

Kaziranga is a very very fragile ecosystem at the mercy of the Brahmaputra river and its underlying forces. A study by J.N. Sharma and S. Acharjee of the Department of Applied Geology, Dibrugarh University in September, 2012 reveals that "It is very likely that Kaziranga area has developed due to tectonic causes by the influence of two major structures. Firstly the Dhansiri lineament diverted the course of the Brahmaputra from its southerly trend toward northwesterly trend on the east of Kaziranga area along the Dhansiri lineament. Secondly the movement along fault in front of Mikir Hills, which trends nearly E-W, might have caused the area to tilt gradually towards the north. Moreover, the Dhansiri lineament develops a scarp with its down thrown block to the NE direction, which might be the major cause of diversion of flow of the Dhansiri river from westerly to northwesterly direction along the lineament." They also calculated bank erosion and built up in the Kaziranga area. According to the same study, "...the Kaziranga National Park is undergoing heavy loss of land, in particular, on the east-north eastern and western sides." They worked out the loss and gain from 1912 to 2008 in three periods namely 1912-1916 to 1972, 1972 to 1998 and 1998 to 2008. Total area eroded in the first period (1912-1916 to 1972) has been estimated at 84.87 sq km, against which only 24.49 sq km was deposited. In the second phase from 1972 to 1998, the total area eroded was 44.769 sq km against accretion of only 29.47 sq km. The total area lost during 1998-2008 was 20.41 sq km, while only 7.89 sq km was gained. In all the Kaziranga habitat loss was a staggering figure of 150.04 sq km from 1912-1916 to 2008. The overall gain in habitation was only 61.86 sq km. It has to be noted that the habitat lost is a well established habitat for the rhinoceros and other animals, whereas the area gained takes considerable time to come to a point when it can support large numbers of wildlife population. The loss of the Kaziranga habitat continues due to floods and erosion.

According to JN Sharma, the loss of habitat is summarized in the Table below:-

Year/ Period	Area Lost (Sq Km)	Area Gained (Sq Km)
1912-1916 to 1972	84.87	24.49
1972 to 1998	44.70	29.47
1998 to 2008	20.41	7.89
TOTAL	149.98	60.85

The habitat loss was also worked out independently from 1914 to 2012 by the author of this Report based on Survey of India Topographic Sheets and satellite Images upto 2012. The summary of findings is given in the Table overleaf:-

Year/ Period	Area Lost (Sq Km)	Area Gained (Sq Km)	Remarks
1914 to 2012	83.385	0	Net Loss only
1974 to 2012	48.887	7.44	Further erosion in 2012 and 2013 floods.

The author also took certain fixed points using GPS/ Survey of India Topographic sheets, and worked out how the bank line of the Brahmaputra river changed from year to year from 1914 to 2012. It is remarkable to note that the Brahmaputra river has taken a swing of about 8 km west of Kukrakata RF. Similarly, the river has swung about 3.75 km north south at the Gajraj View Point. The Arimora IB Point was about 3 km south of the river bank in 1914, but gradually, with some swings in between, today lies completely inside river. Similarly the Debeswari Point, which is the location of the current Anti Poaching Camp site in Eastern Range, had an interesting north and south swing of 500 m to 2 km being outside and inside the river over the entire period. Today, the point is just few meters south of the bank of the river. The current Maklung Ghat point in the Eastern Range shows that the river bank line has migrated almost 7.7 km westward taking away prime area of the Park in course of time from 1914 till 2012.

The image of 2012 pertains to February, 2012. This implies that by 2013, the bank line has shifted further, and Kaziranga has lost more areas. Erosion has been observed to be also severe during 2014.

BRAHMAPUTRA BANKLINE 1914-2012

KUKRAKATA RF WESTERN POINT:

- 1914 – River 8.148 Km north of Kukrakata RF western most Point
- 1974 – River 2.138 Km north of Kukrakata RF western most Point
- 2012 – River 430.26 meters north of Kukrakata western most Point



GAJRAJ POINT:

- 1914 – River 3.76 km north of Gajraj Point
- 1974 – River just below Gajraj Point
- 1987 – River 950 meters north of Gajraj Point
- 2003 – River 4.533 km north of Gajraj Point
- 2012 – River 3.714 km north of Gajraj Point



ARIMORA POINT:

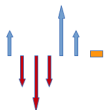
- 1914 – River 3.043 Km north of Arimora Guest House
- 1973 – River 1.484 Km north of Arimora Guest House
- 1974 – River 850 meters north of Arimora Guest House
- 1988 – River 1.40 Km north of Arimora Guest House
- 2000 – River 1.140 Km north of Arimora Guest House
- 2003 – River 1.074 Km north of Arimora Guest House
- 2005 – River 468 meters north of Arimora Guest House
- 2013 – Arimora **gone** in the River



BRAHMAPUTRA BANKLINE 1914-2012

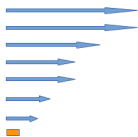
DEBESWARI POINT:

- 1914 – River 522 meters north of Debeswari Point
- 1974 – Debeswari Point 1.308 Km inside the River (On a Char)
- 1991 – Debeswari Point 2.119 Km inside the River (On a Char)
- 2000 – Debeswari Point 1.246 Km inside the River (On a Char)
- 2003 – River 950 meters north of Debeswari Point
- 2005 – River 522 meters north of Debeswari Point
- 2012 – Debeswari Point on the River bank



MAKLUNG GHAT (2013) POINT:

- 1914 – River 7.693 Km east of the present Maklung Ghat
- 1974 – River 7.693 Km east of the present Maklung Ghat
- 1991 – River 4.80 Km east of the present Maklung Ghat
- 2000 – River 4.00 Km east of the present Maklung Ghat
- 2003 – River 4.00 Km east of the present Maklung Ghat
- 2005 – River 2.413 Km east of the present Maklung Ghat
- 2012 – River 2.103 Km east of the present Maklung Ghat
- 2013 – Present Maklung Ghat



(Source: MK Yadava 2014)

2.2 Habitat Fragmentation

With the establishment of Tea Gardens, human habitations and agricultural activities on the periphery of the southern boundary of the park, some of which have been there in the landscape even prior to establishment of the Park, but now need to be relooked at, it has now increasingly become difficult for the wild animals to move across to the Hills during high flood season, and the animals fall easy prey to avarice of poachers. Karbi Anglong and Kaziranga have always been looked as a single landscape by wildlifers since early times. However, sporadic, unplanned and mushrooming growth along the NH37 in this part of the country has today considerably altered the landscape.

[It also needs to be admitted here that in interaction with the local stakeholders, it was emphasized by them that in the present situation, allowing the animals to move to hill side to Karbi Anglong is not safe, as there does not seem to be any protection to the animals beyond the boundaries of Kaziranga. They also expressed apprehension whether all animals actually returned or were poached.]

On the other hand, due to constant erosion along the northern boundary and accretion in the form of chapories (River Islands), the animals moves to the chapories as these constitute extended natural habitat for wildlife. Moreover, over the years the resident population of Rhinoceros as well as other mega herbivores i.e. Elephants and wild Buffaloes of Kaziranga have increased manifold while the landmass of Kaziranga National Park has been reduced considerably by cut bank erosion of the Brahmaputra. With this background during mid

eighties the Government of Assam notified a number of proposed Additions to Kaziranga National Park in order to secure corridors for migration of wild animals, and escape routes in case of high flooding and for extending the Park by inclusion of the chapories of Brahmaputra to compensate for loss of park area due to erosion. In total six proposed Additions have been notified three of which are pending finalization due to legal, administrative and financial reasons. These addition which is proposed to the KNP would serve as an extended habitat for the wildlife. According to the recent census it is seen that the population of the wildlife has increased exponentially and hence it has become imperative to add these land mass to the KNP.

[Some of the local stakeholders expressed their anguish as to why the Department was not able to take over the land of the addition areas, and allowed deliberately encroachment to take place.]

2.2.1 NH 37 in Today's Perspective

The NH37 from Jakhlabandha to Bokakhat/ Numaligarh touches upon the southern boundary at certain places especially from Amguri to Panbari. The NH37 has been the lifeline of the people of this region since the days of the Ahom kings. The highway has a very special significance to Kaziranga as well as the local populations. The highway has been there even prior to declaration of the Kaziranga RF in 1908. Population was then very sparse. Today more than 5.00 lakh people reside in these areas. The highway has become the nerve centre of development leading to opening of shops, markets, road-side dhabas, hotels, institutions, commercial establishments and residential houses. These unplanned and uncontrolled activities have today broken down the Karbi Anglong Kaziranga landscape. There are several important and identified corridors for animal movement on the NH37 which are used by the animals almost all the time. During the flood season, there is a heavy migration of wild animals from the Kaziranga National Park to highlands in the Karbi Anglong through these corridors and some other areas along the NH37. It needs to be mentioned that the corridors on the NH37 from Jakhlabandha to Bokakhat are regularly patrolled by forest personnel of the Kaziranga National Park. The staff posted on the highway often act as "Traffic Police" by halting traffic on either side whenever animals such as elephants and rhinoceros cross the road.

2.2.2 National Green Tribunal and NH37

There has been a case filed in the National Green Tribunal (M.A. No. 687 of 2013, M.A. No. 1070 of 2013 and M.A. No. 142 of 2014 in O.A. no. 174 of 2013, Rohit Choudhury Vs. Union of India and Others), the premise of which is that one of the conditions stipulated in the environmental clearance given by the Ministry of Environment & Forests, Govt. of India, New Delhi for setting up of the Numaligarh Refinery was that the NH37 should be de-notified as a national highway, and secondly that since lot of animals get killed on the highway during the flood season, the highway ought to be closed forthwith. After hearing all the parties, the Hon'ble Tribunal has passed a series of orders including short term and long term measures. The short term measures include methods by which killing of animals on the highway could be avoided totally. Some of the suggested measures include putting of rumble strips for speed control, putting cameras and speed guns etc. The long term measures include diversion of the highway on the north bank of the river by building another bridge over the Brahmaputra river near Numaligarh.

As directed by the Hon'ble National Green Tribunal, rumble strips have been put all along these corridors. However, it is pertinent to mention here that these rumble strips mostly have been put during the month of November, 2013 i.e. after the floods of 2013. Currently dry season is running, and floods would be expected anytime after April, 2014. Therefore, in absence of floods, it is not possible to assess the effectiveness of the methodology. It is during floods when animals get killed by speeding vehicles. Due to alertness of staff, there has been no death on the highway so far. [For the orders of the Hon'ble National Green Tribunal, one can visit <http://www.greentribunal.gov.in> and search for the case Numbers given earlier or "Daily orders" giving the dates of hearing such 21-05-2014. All the orders of the Hon'ble Tribunal can be seen at <http://www.greentribunal.gov.in/e-orders.php?eid=6315>]

The National Tiger Conservation Authority vide its Office Memorandum Mo. 12-5/2013-NTCA, Dated: 18th December 2013 constituted a committee to review the proposal submitted by the Government of Assam in compliance of the Order of the Hon'ble NGT to 'Suggest Mitigation Measures in the Interest of Wildlife Conservation w.r.t National Highway 37. The Committee consisted of Sri D.P. Bankhwal IFS, IGF, Regional Office, NTCA, Guwahati, Dr. Bilal Habib, and Dr. Gautam Talukdar, Scientists, WII, Dehradun. From the Govt. of Assam, the members included sri NN deka, Chief Engineer (NH), Sri S. Bhattacharyya, EE & Nodal Officer, Environment Cell, PWD, and Sri S. Bezbarua, EE (NH Division), Nagaon. The Committee submitted its report to the Ministry in the early part of 2014. The Committee argued that speed breakers are not advisable, as they allow vehicles to be more time on the road, leading to greater risk of accidents. The Committee proposed a series of fly-overs on the NH37.

As the Govt. of Assam has already filed affidavits in this regard, the opinions expressed here are that of the author, and in no way reflect the opinion of the Govt. of Assam or the Forest Department. The opinion of the author has been mentioned here mainly as an academic exercise.

According to the author, the method of speed breakers/ rumble strips does not appear to be scientific in helping the animals cross, as the vehicles now spend more time on the road; and given the increasing volume of traffic, and, therefore, these vehicles virtually make an impregnable wall, due to their proximity and sheer noise levels, which the animals hesitate to cross. This has resulted, on the other hand, to confinement of big animals such as elephants, who have almost become resident in the Park this year. Further the screeching noise caused by speeding vehicles over the rumble strips are heard very far within the National Park boundaries, especially the noise of loaded trucks, that it would frighten any animal and prevent it from crossing the road. Therefore, the rumble strips should be removed. The State Govt. has already placed Interceptor vehicles in this stretch to apprehend and bring to book speeding vehicles.

It must be understood in clear terms that holding back such a large population of resident large mammals such as elephants is fraught with danger, on one hand, as the habitat is being destroyed (meaning its directly threatening the survival of the Greater One Horned Rhinoceros, of which Kaziranga holds the largest population in the world, and on the other hand, as scarcity of elephant food availability is getting acute, there is sharp rise in death of wild elephants in the Park, mainly due to "parasite overload". The confinement of large

mammals have been further aggravated by putting up solar power fencing by the Park authorities to secure the life, property and crop of the fringe village populations. Further due to rampant construction activities along both sides of the NH-37 from Jakhlabandha to Bokakhat, the corridors are virtually getting blocked for good, leading to confinement of large mammals. It is no denying that confinement of large mammals in the Park round the year is very very dangerous to the survival of these mammals, and they must be allowed to move to the Karbi Anglong hills without fear or threat.

Therefore, it is submitted that rumble strips are no solution to the problem at hand, and hence, must be removed. It is suggested that "Wild animal Traffic Light" pairs be put at each of the identified points on the NH-37, and be manned on 24X7 basis in 3 8-hourly shifts. These traffic lights would also hold the cameras for speed monitoring and overloading. "Green" light would mean, no animals in sight on either side of the road, and traffic can move as usual. "Amber" would mean, animals approaching; and may cross; so only emergency vehicles may pass such as ambulances. "Red" light would mean animals about to cross/ crossing, so no traffic to move between the light posts on either side of the corridor. Further, heavy penalty be levied on those jumping the "amber" and "red" lights. Further, entire corridor shall be "No Horn" zone. This would ensure that animal crossings are not only safe, but also the animals have the "First Right of Way". These posts would also be used for automated traffic volume/ number counts, checking of pollution levels, emissions of all the vehicles passing through the corridors. Or alternately instead of traffic lights, gantry structures could be set up at appropriate places with camera on top for 24X7 monitoring and stationing of staff in shifts with communication equipment to ensure safe crossing of animals.

The wildlife traffic light system, in a slightly advanced and automated form has been operational in several parts of the world by the name of "Roadside Animal Detection System", noted among them being the Preaching Canyon cross-wails for the elks. The system consists of thermal scanners with military grade target acquisition software that is "trained" to detect wildlife, but "miss" small animals such as rabbits. Depending upon the status of detection, it displays different messages including silhouette of an elk when the elk comes on road, along with a message "Elk Crossing". The system operates on a 24X7 basis. The proposed traffic lights can also be automated in a similar way using thermal scanners and target acquisition software.

The fine could be at least 10 times the fines for traffic violations in urban / metropolis areas; and the all the amount collected would be deposited in the account of the "Kaziranga Tiger Conservation Foundation".

Construction of Underpasses & Overpasses on NH37:

The Expert Committee has suggested construction of specially designed fly overs along the corridors. The total length would be about 25 km including the approach road on a total road length of about 52 km. The proposed structures would be pre-fabricated, and would take minimum time to build and commission. It is expected that once these fly overs are through, there would be no road kill of wild animals. The estimated cost is about Rs. 2000 crore.

The only issue here is that the most of the corridors are blocked, and construction of flyovers would just solve only one of the problems, i.e. crossing of the road by the wild animals. However, the other vital question i.e. whether animals are in a position to reach the highway, and if they reached and crossed, are they in a position to secure their way to the other side. This question is being raised here as because, development and growth are a continuous process, and in course of time, there would be more and more construction, thereby, blocking the passage of the animals for good, despite the flyovers. Therefore, along with the flyovers, one has to adopt a clear cut policy of "Corridor Retrofitting", especially the areas under the flyover and their connects to Kaziranga and Karbi Anglong Hills. All obstacle would have to be removed, if necessary by removing existing construction, buying of land, including tea garden lands at market prices, relocating buildings etc. *[While interacting with certain local stakeholders, it was apparent in certain areas, such retro-fitting would be possible, especially Amguri, Deosur, Kanchanjuri, Sildubi and Haldibari. It may be difficult in Hatikhuli and Panbari as these are very old habitations]*

[It needs to be mentioned here that if the Bagser RF is taken into the Kaziranga National Park/ Tiger Reserve management fold, it would require creation of three new corridors, one of which Amguri (appears to have been taken care by the Expert Committee), but two more, for which we may have to buy parts of Amguri Tea estate and some private lands, (and these are areas where rhino crossing is very high all the time, and our current strategy to chase them back. Elephants also create havoc frequently during cropping times), one opposite Kathalcham camp and one opposite Rangalu Camp. If so, then we may need two additional fly-overs. This would also need, surely a road skirting the Bagser RF from behind, for keeping the poachers at bay.]

In the personal opinion of the author, further, if the NH37 is allowed to be the way it is now, i.e. the only life-line and means of connectivity between the lower and upper Assam, the volume of traffic would increase many fold in future. Since the conditions of the MoEF which were imposed while giving environmental clearance of the Numaligarh Refinery stipulate that the section of the NH37 between Jakhlabandha and Bokakhat to be denotified, a work around must be thought today for a what if scenario in 2050 AD and beyond.

Assam Needs Ultra Modern Highways and Railways:

The author is of the opinion that the State of Assam, unlike most of the mainland states of the country, has a very poor network of highways, largely because of the linearity of terrain offered naturally by the typical sections of elongated valleys and hill segments totally dominated by the river Brahmaputra. Building more highways with ultra modern technologies which are eco-friendly, green and least damaging to the forests and wildlife, is in the interest of the State, for its future economic growth and prosperity of the State. While preserving the delicate ecosystem called Kaziranga is of utmost importance, the current trends of development around the present NH-37 would make it an island in the sea of concrete and ensure that the rhinoceros become extinct in future (Mathur VB, WII). Therefore, the current NH-37 from Jakhlabandha to Numaligarh should be stopped from becoming the "only life-line" and connectivity between the "Lower" and "Upper" Assam. Instead, modernization of the NH37 in its present state (with possible diversion at places within 500m south of it) to an elevated 4 lane expressway, allowing the existing alignment

to be used as highland for animal as well as for local movement of traffic; and two 4 lane diversions, one on the north (which is already in active consideration of the Govt.), and one additional on the south through the Karbi Anglong may also be explored. [Of course, Kaziranga needs highlands, and NH37 can be strengthened for this sake alone.]

Diversion from Kaliabor would take the Tezpur route, and then join over to Numaligarh by crossing a new bridge over the Brahmaputra. The PWD (NH) has already submitted the proposal for such a bridge over the river Brahmaputra near Numaligarh, having a span of 10.00 km meters and costing Rs. 2750 cr. Heavy traffic, could then, follow this route.

Secondly, building an ultra modern elevated expressway from Jakhlabandha to Bokakhat just by the southern side of the NH37, with some diversions here and there, along with an elevated single loopline light rail, on the lines of metro, are the kind of projects/communication system that ought to be put in place in this part of Assam. Though the suggestion may look unnecessary and high costing, given the least scope of development in the surrounding of Kaziranga, this would open a very fast means of communication with Guwahati/ Nagaon on the west and Jorhat/Dibrugarh on the east and Tezpur on the north, enabling better economic opportunities for the local population on the fringes of Kaziranga who deserve, in the opinion of the author, the best possible development alternatives possible in the world, as Kaziranga is one of its kind of habitat in the world, and it the local population that would play the key role in future in answering whether Kaziranga would celebrate its bicentenary in 2105 AD. To my mind, cost cannot be a consideration while securing the future of Kaziranga and deciding the fate of the fringe population of this world heritage site.

NH37 As a Highland:

As explained in the Chapter on Rhino Population Dynamics, there has been 162 “reported deaths” of rhinos due to floods alone from 1982 till date. Death of other animals due to floods is also very high. One one hand, there is so much concern and public outcry against poaching and road kill, on the other hand, the main killer namely floods do not seem to be in picture at all. Kaziranga needs a large number of well designed highlands inside and on the periphery where animals can take shelter during floods. NH37 is an excellent highland. The strongest argument to make it a 6-10 lane highland, what to speak of 4 lane, is that NH37 has a lot of potential to save the animals during floods. If the highway is broadened beyond 4-lane to 6-10 lane, rest of the width can be used by the animals during floods. However, its an irony that NH37 is doomed to die due to a historical mistake and wildlife activism over-zeal which misunderstands “development” and conservation paradigm.

2.2.3 Fragmentation of Corridors

Though there are recognized six numbers of corridors, they have been further broken down into smaller units here for better understanding of the land use and issues on the corridor. The WWF has very recently prepared a detailed report on the animal corridors of Kaziranga in 2014. The report was based on camera traps results of animal movement. Findings of the report also corroborate mostly the facts and issues mentioned below here.

Amguri Corridor: This has been a very important elephant corridor in the past, but now rendered defunct by human activity. The connect between Bagser RF and Kukrakata RF is

lost due to construction of a series of hotels and dhabas right next to the highway. A proposal may be moved to remove the dhabas and hotels from this corridor.

Ghorakati Corridor: A corridor between 1st Addition and the Chirang Hill, mostly used by elephants. Now stands blocked by the Assam Tourism and GL Resorts. As per records the Chirang Hill (otherwise known as Burapahar) was proposed for reservation as RF in 1979. The entire hill should be resurveyed and made a part of Kaziranga

Deosur Corridor: A very active corridor for all animals especially during floods. Now fully encroached and agricultural activities in full swing. What was a bunch of huts in 1990s, is now today a settled hamlet with shops and electricity connection. Part of the area along the NH37 from the bridge upto Palkhowa seems to be under Bagser RF. Needs urgent eviction (at least the RF part of the area), and the rest of the area must be brought under a "Purchase Plan").

Malani-Burapahar Corridor: This beautiful corridor starts from Maloni Anti Poaching Camp and runs upto the Burapahar Beat Office (which is the old limit of Kaziranga and from where the 1st Addition areas start). It faces the Burapahar Tea Garden immediately on the other side of the highway. The Tea Garden authorities have fenced up the area with barbed wire, rendering the corridor fruitless in places. There are three Tea gardens in the area namely Burapahar TE, Jagdamba TE and Sag Motee TE. These three gardens may be proposed for immediate purchase at market rates.

Kanchanjuri Corridor: This is a vital corridor where to the south the 4th Addition to KNP is located. The corridor starts from the bridge over Deopani river on NH37 and ends on the west to the end of the 4th Addition area. The corridor, barring the 4th Addition area, is completely fragmented on the south of NH37.

Harmoti Corridor: This once was a very active corridor. However, due to several construction/ buildings on the south of NH37 on Karbi Anglong side, it is now almost abandoned by wild animals.

Sildubi Corridor: This is the area comprising of the proposed 5th Addition and the south of NH37. The 5th Addition areas were encroached as late as 2013 by making makeshift camps by certain motivated groups. On the south there is extensive Jhumming. This also the northern part of the proposed North Karbi Anglong Wildlife Sanctuary. Of late Hotels and habitation have come up to the south of the NH37.

Haldibari Corridor: Currently this is one of the two functional and largely undisturbed corridors. To the north of the NH37 and eastward lies the part of the proposed 2nd Addition to KNP, which so far has not been handed over to Forest Department. To the east of the Corridor is Hatikhuli TE, part of which may be purchased at market rates to make the corridor more robust.

Panbari Corridor: This corridor is the second corridor and only one existing today for wild animals on the eastern side of the Park and measures about 4.30 km in length along the NH37. North side of the corridor, excepting the 3rd Addition areas (measuring 900 m in

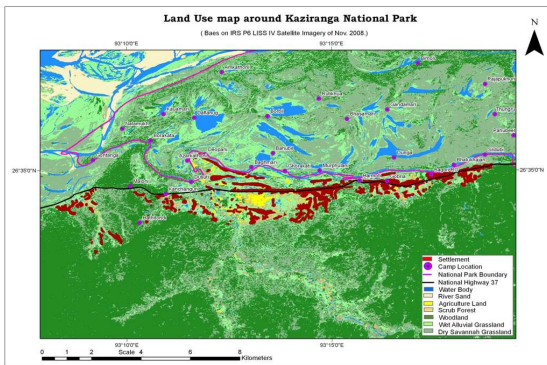
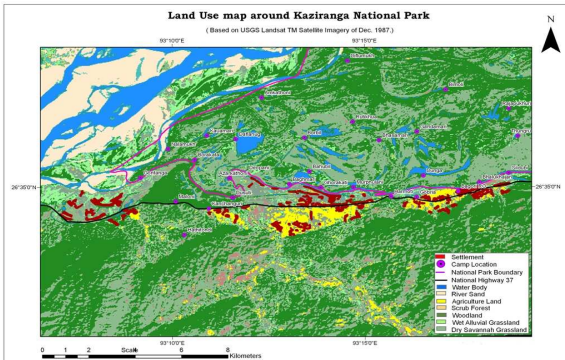
length along the NH37), are quite thickly inhabited. On the south side, its broken at several places with Tea gardens and human inhabitation. Between the Kaziranga National Park, and Panbari, there is thick habitation upto 500-800 m on the north of NH37, barring the proposed 3rd Addition to KNP. Methoni TE, its factory and labour lines break the corridor at different points. The Tea Garden areas falling between the Panbari RF and the NH37, and those falling to the north of the RF may be proposed for purchase at market rates. Since Panbari is the last corridor on the eastern side providing safe passage to wild animals of the Eastern and central ranges, this corridor needs a very special retrofitting attention.

2.2.4 Barrier Effect

The NH-37 which runs on the south of the Kaziranga National Park, has of late, become a zone of mushrooming developmental activities such as hotels, dhabas, shops and commercial space for use of the local population as well as the tourists coming from the outside. The traffic on the highway has also increased many fold. There are several identified corridors for animal movement, which have become almost dis-functional due to anthropogenic activities. Further, several of the villages have demanded installation of power fencing along the Park boundaries. This has also led to restriction in the movement of the large mammals such as the rhinoceros, elephants, buffalo, tigers, leopards and deer species. This has led to confinement of the large mammals inside the Park for longer durations further leading to destruction of the habitat, especially the tall grasses.

2.3 Satellite Imagery Evidence of the Corridor Fragmentation

Map showing Settlements around NH37 in 1987 and 2008, It is clear that there is no way the animals can move anywhere. The situation would be more alarming now. The imageries [Courtesy: Bibhab Talukdar] clearly show that animals from the Park would find it difficult to move to Karbi Anglong. Look at the less and less of "Yellow" in the second images. How agriculture is being converted to commercial and constructions, is very much evident from the two images.



2.3.1 Conservation vs Development Paradox

After 100 years of successful conservation history, Kaziranga seems to have reached the point of the classical debate, as to how much development is to be allowed and how much space for conservation. The questions that one needs to answer today are:-

1. Should the Rhino population in Kaziranga be managed at 2500 levels for all times to come now?
2. If so, what would happen to about 100-125 fresh additions that happen each year? Where are such safe and productive areas in Assam or in India or abroad where new populations can be translocated?
3. If no, then where from we make available additional areas which may range from 1000-2000 sq km for the population to reach about 3500+ levels?

Question No.	Answer	Conservation	Development
1	YES	Low Priority	High Priority
2	Don't Know	Low Priority	High Priority
3	Don't Know	Low Priority	High Priority

It is clear from the above matrix that conservation is not possible, if we do not know the answers to Question No. 2 and 3. The Question 1 would again arise once we achieve the 3500 population levels, and so on and so forth.

The other two scenarios are also depicted here:

Question No.	Answer	Conservation	Development
1	YES	Low Priority	High Priority
2	Yes, we have secure habitats elsewhere already identified	Balanced	Balanced
3	Does not arise		

In the above scenario, there is already identified habitats elsewhere which would fully support another population if certain numbers of "gains" in rhino each year are "removed" from the mother habitat and translocated to the new destinations, allowing good growth in original habitat, without extending the area.

Question No.	Answer	Conservation	Development
1	NO	High Priority	Must be balanced
2	Are in process of securing other areas	High Priority	Must be balanced
3	Extension of habitat is required to be undertaken	High Priority	Must be balanced

[As a conscious society and responsible citizens of Assam, we all feel the pain and anguish, and express our deep concern, even anger at the poaching of every single rhino in Kaziranga National Park. Having said that let us assume a scenario, which would surely

materialize shortly and would continue to hold true for long hopefully, where the rhino poaching stopped totally. Given the current confines of the animal and the biological carrying capacity of the Kaziranga National Park, say the net gain of 35 rhinos every year, if not removed to other secure locations, would mean the net gain would slowly decrease, say it may become 30 followed by 25, followed by 20 and so on and so forth. Now the question is "Due to our inability as a conscious society to give more space to the rhinoceros, especially when human needs dominate every thing else on this planet, and we have surely hijacked it from the possession of other species, are we not equally responsible and guilty of a crime as heinous as rhino poaching, as our inaction is directly responsible for loss of rhinos, as because a rhino lost is a rhino lost for ever whether due to poaching or not having been born due to biotic constraints of habitat loss and degradation?".]

In this scenario, which is actually desirable, extension of the original habitat is undertaken so that the original population can grow further for few decades. Thereafter, one can start translocating "gains" to new areas to establish more populations.

In case of Assam, we need to do both i.e. undertake identifying and securing new areas/ habitats, and at the same time undertake an enterprise to extend the existing habitat to allow more space for growth till the new areas are fully ready to accept "gains".

Therefore, it is high time that we develop a long term **Assam Rhino Range Expansion Program** which addresses these issues right at the very beginning. In Assam, land is scarce and highly competed for. People have a propensity to occupy government land and occupy it for housing or agriculture in the hope that sometime down the line the same would be regularized. In Kaziranga already this fierce competition can be witnessed. Local populations must be taken into confidence, before further expansion of area is thought of.

It is also true that if adequate space for development and growth opportunities to the local and fringe populations is not provided, conservation would be difficult to achieve. Kaziranga today presents a typical case in this regard. On one hand, due to No Development Zone (NDZ) declared around 15 km of Numaligarh, industrial and entrepreneurial activities would come to halt. On declaration of Eco Sensitive Zone (ESZ), there would be further brake on development activities. The problem could become acute, as there is a very narrow stretch of land between Kaziranga and Karbi Anglong for growth and expansion of economic activities. Due to reasons that there are several Reserved Forests and wildlife sanctuaries in North Karbi Anglong, even these areas would become ESZ in times to come. Therefore, one needs to find out new opportunities, employment avenues and economic growth models for these populations.

There is no doubt that development of the region surrounding Kaziranga merits further attention and in depth study.

2.4 Degradation of Habitat

The habitat of the Kaziranga National Park is undergoing a slow degradation process under the influence of various biotic and abiotic pressures. Some of these are briefly described below:

2.4.1 Invasive Weeds:

The *Mimosa invisa* species was imported from the South-east Asian countries by the tea gardens on the periphery of the Kaziranga National Park to suppress the *Imperata cylindrica* in the prospective tea garden areas meant for expansion and also to supplement nitrogen fixation in the degraded soils. As all the water channels in the surrounding gardens run into the Park, the seeds of *Mimosa* spp entered the Park, and invaded the grasslands. So far about 170 Hectares of tall grass land is affected by the invasive weeds. This is destroying the prime habitat of the rhinoceros. Due to its thick growth and thorny growth, animals cannot move through the mimosa vegetation, leading to blocking animal movements inside the Park. As no chemicals can be applied inside the Park, only manual methods of physical uprooting is resorted to. Its not only costly but also time consuming.

[Comments from Richard Emslie: Agree - Aliens are a costly problem and can significantly affect habitats for rhino. WHY? Everything is made of "chemicals". Need to put things into perspective. What is better - good habitat lost to aliens or effective clearing and retreatment of aliens to secure areas of good habitat. Why not consider changing your rules to allow the use of biodegradable herbicides that breakdown quickly and don't have a long term residual effect?]

Next to *Mimosa invisa*, a wild *Rosa* is one of the most trouble giving weeds – more particularly in the moist grazing lands. Large thickets of this thorny straggling shrub has made passing through impossible even for large animals like elephants, buffalos and rhinoceros. The effect of increasing population of this wild rose has basically damaged the swamplands, reduced drastically the diversity of other plant species, destroyed habitats and grazing areas of animals and several birds.

It is to be noted that the Kenyan Act on wildlife, as discussed in Chapter 5, provides for and recognizes "invasive species", and its introduction in a wildlife conservation area is an offence leading to fine and imprisonment or both.

It is suggested all the tea gardens surrounding the Kaziranga National Park must be purchased at market rates, and made a part of the Park. A tea garden would typically cost anything from 7 crore to 25 crore only. There are about 10 gardens surrounding the Park. The total cost, including a very very handsome rehabilitation package for the tea garden labourers should not cost the Govt more than 400-500 crores. This is an investment worth making to secure the future of the rhinoceros and the Kaziranga. However, it is easily said than done. It has been discussed in some more details in Part II of the Report.

[Comments of Richard Emslie: EXCELLENT PLAN as presumably this would help secure some corridor routes into the higher areas during floods. Perhaps there are opportunities for peripheral tourist developments at the edge of such areas that can hopefully provide some jobs for local communities.] It must be mentioned, and as further elucidated in Chapter 5, the Kenya has a special provision in its wildlife regulation for conflicting punishment on

whose who are found responsible for invasive weed injection in conservation areas. It would also not be out of place to mention here that the problem of invasive weeds is so extreme in US Forests that the US Fish and Wildlife Service maintains special station on the border of the conservation areas, where the vehicles entering and leaving are sanitized for invasive weeds.

2.4.2 Siltation of the Water Bodies

Kaziranga is very rich in water bodies, locally called as Beels. The water-bodies form about 5.96% of the total Park area. There are 92 perennial water bodies and more than 250 seasonal water bodies. The Brahmaputra carries a lot of silt load every year, which gets deposited, reducing the effective area of the water bodies. These water bodies play important ecological roles such as:

- Important breeding ground and nurseries for numerous Fish population.
- Prime habitat for most endangered species *Rhinoceros unicornis*.
- Harbour Swamp deer, Asiatic Wild buffalo, elephants etc.
- Act as roosting and nesting ground for migratory and indigenous water birds.

This unique wetland eco-system is confronted with numerous of problems such as shrinkage in size and depth of the water bodies due to deposition of heavy silt carried in by the Brahmaputra and its tributaries and choking of water bodies by water hyacinths. Almost all water bodies are connected through channels/nullahs. These may be described as arteries and veins of Kaziranga. Desiltation/ clearance of water channels is of paramount importance to maintain and restore ecological systems.

2.4.3 Shrinking of Grasslands

In several parts of Central Range, Western Range, Burapahar Range and Eastern Range, there has been mass regeneration of Simul (*Bombax Ceiba*) which is encroaching upon the grasslands and destroying the habitat. Attempts have been made in the past in some of the ranges to manually cut down Simul trees by engaging labour. It has been observed that Simul is coming back prolifically through natural regeneration of seeds scattered all across the grassland, as well as coppice from the cut trees.

Similarly wild rose is also spreading in several areas, especially in areas which seem to be overgrazed.

2.4.4 Overgrazing

Kaziranga National park has only 3% of area covered with palatable short grasses. Out of this 1440 ha area is clearly in disturbed state due to overgrazing by wild buffalo/feral buffalo live stock as well as wild herbivores. This poses many fold problem for management like competition for palatable grasses and spread of diseases from live stock to wild animals. During February – March, when fodder becomes scarce for the livestock because of prevailing dry weather the villagers often push their livestock into the Park area for grazing. Annual burning during the period also results in the growth of new shoot and the livestock relish such vegetation. Besides, competing for fodder with wildlife, such intrusion increases the risk of spread of epidemic as the livestock are not always properly immunized. Grazing of domestic livestock should be prevented by effective enforcement by the staff and through EDC activities.

If one looks at rhino as flagship species, then wild buffalo and elephants can be attributed to also considerably cause overgrazing and damaging valuable rhino habitat in the interior of the Park. Several areas have been reduce to short grasses by overgrazing by wild buffalo and feral buffaloes.

2.4.5 Water Scarcity

Water scarcity is a new issue which may come up in a big way in the times to come. This year during march, April, 2014 it was observed that virtually drought like conditions prevailed in the Park. Currently there is no mechanism to hold water inside the Park after the floods recede. For future, the planning is experiment with causeways with good foundation which can withstand the force of incoming flood waters, that may be in a position to retain some water in the Park for longer periods.

2.5 Migration of Wild Animals

Kaziranga is biologically a very productive habitat, and acts as source for the surrounding landscape. Despite fragmented corridors, considerable migrations still happen due to the islands of the Brahmaputra river. WWF is preparing a comprehensive report on the islands of the river in the Kaziranga landscape to study the migration pattern and routes taken by the wild animals using camera traps. The report is likely to be out shortly. Meanwhile GPS recordings of various spotting of rhinoceros in the riverine areas between Kaliabhomora bridge and Laokhowa-Burachapori WLS for several years show that rhinoceros have been regularly moving to and fro in the landscape.

Given the high risks of poaching, efforts are made by the Park authorities to drive back the rhino if it crosses the boundaries of the Park and information is received. Once the entire corridor is secured, and the whole of the 6th Addition is made safe for the rhinos to stray and move on, and the Laokhowa and Burachapori are made fully secure, there may not be any need of any translocation of these animals. It is, however, to be seen how much time would it take to secure the territories of the rhinoceros in the Kaziranga landscape.

2.6 Conclusions

The following conclusions are being drawn based on the facts and analysis presented above:

1. Kaziranga National Park has already lost a net land area of 83.385 sq km to erosion by the Brahmaputra river.
2. The bank line of the river Brahmaputra is shifting westward in the Eastern Range, and southward all along the southern bank line from Eastern Range to Western Range.
3. The habitat in Kaziranga National Park is getting fragmented, especially the corridors connecting to the Karbi Anglong hills; and may be permanently lost, if steps for restoration are not taken now.
4. The NH37 needs a very special and multi pronged strategy, though the cost involved could be very high.
5. Though Ecological Carrying Capacity (ECC) exercise has not been carried out, indications are clear that Kaziranga National Park is reaching its ECC limits in a short span of time. This would mean that either one needs to translocate rhinos out

- of the park to other safe areas, or expand the area of the Park to increase the ECC limit. If none of the two are done, rhinos run the risk of being lost.
6. A rhino lost is a rhino lost for ever, whether due to poaching or a rhino not having been born due to biotic constraints of habitat loss or degradation.
 7. The habitat of Kaziranga National Park is degrading gradually due to invasive weeds, siltation of water-bodies, shrinking of grass-lands, overgrazing due to domestic livestock as well as other larger mammals such as elephants and wild buffaloes. There are also possibilities of water scarcity in future, if appropriate measures are not taken.
 8. Animals such as rhinos migrate from Kaziranga to near by areas from Majuli to Orang. Every effort must be made to secure and manage the corridors.

CHAPTER 3

3 The Existing Protection Framework of Kaziranga Tiger Reserve

This Chapter deals with in brief the front line staff and Park logistics that exists as of now for the protection of Kaziranga. It is to be mentioned here that Kaziranga as a word is being used to represent several entities. Firstly, Kaziranga is Kaziranga National Park with its notified areas and Additions to the Kaziranga National Park, administered by the Divisional Forest Officer, Eastern Assam Wildlife Division, Bokakhat. The next immediate authority vested with powers for Park management is the Director, Kaziranga National Park. Secondly, the other legal entity is the Kaziranga Tiger Reserve notified in 2007 under the Wildlife (Protection) Act, 1972. The Kaziranga Tiger Reserve (KTR) comprises of the Kaziranga National Park, all the Additions of the Kaziranga National Park, Kukrakata RF and Panbari RF (all of which is in control of the DFO, EAWL); and the Burachapori and Laokhowa wildlife sanctuaries falling under the jurisdiction of the Divisional Forest Officer, Nagaon Wildlife Division, Nagaon. Kaziranga Tiger Reserve has a notified area of 1100 sq km, as against only 884.44 sq km of the Kaziranga National Park. The territorial jurisdiction over the Kaziranga Tiger Reserve is exercised by the Filed Director (who is the same person as the Director) through the two DFOs namely DFO, EAWL and DFO, Nagaon Wildlife Division. The report often talks of Park/ Tiger Reserve.

There are certain aspects which are only applicable for the Park, and certain other to the Park/ Tiger Reserve. The Report mostly confines itself to the issues pertaining to the Park. Nevertheless, wherever it is felt that Park/ Tiger Reserve must be taken account, it has been done so. Especially, the new management/ technology inputs shall be naturally extended to the whole of the Kaziranga Tiger Reserve, as the entire area has originally been rhino bearing, and potential of rhino residency outside the Park and within the Tiger Reserve is very high. The short term goal should be to secure the entire Tiger Reserve and ensure that the rhinos are safe anywhere within the limits of the Tiger Reserve. Having said that, the infrastructure and support system of Nagaon Wildlife Division is very small, as of now. A brief description about this division has been included at the end of this Chapter.

In the proposed Kaziranga Landscape, as in Part II of the Report, the area of Kaziranga would get further extended by another 300-400 sq km along the Brahmaputra river. It is proposed to include Orang National Park also into the fold of the landscape, which already has 105 rhinos over an area of 78.91 sq km. The per capita land availability in Orang comes to 0.75 sq km, which is more than 3 times that of Kaziranga National Park. Orang seems to have the ideal population of rhinos in Assam.

The final goal would be to secure fully the entire landscape so that the rhino can roam freely and without any threat of poaching from west of Majuli to Orang.

3.1 The Sentinels of Kaziranga

The Kaziranga National Park has a sanctioned strength of 506 front line staff including Deputy Rangers, Forester Grade I, Forest Guard, Game Watcher, Mahut, Grass Cutter and Boatman. There are about 450 men in position. They are the sentinels of the Park who have successfully charted the course of one of the most exemplary case of conservation of the Greater One Horned Rhinoceros virtually from the brink of extinction. However, all is not well

with the sentinels of Kaziranga. They are one of the most neglected lot. Its sheer love of wildlife and Kaziranga that keeps them going and they continue fighting and protecting the rhinoceros and other wildlife despite several odds. As many as 100 staff have lost their lives or received grave injuries while on duty. The staff is ill equipped and lacks modern gadgets. They have to constantly fight two enemies, one without i.e. the poachers; and one within, i.e. the wildlife that they are protecting. Therefore, the task of a guard in Kaziranga is many times more challenging than that of security forces. The front-line staff is mostly armed with .303, .315 guns.

3.1.1 Staff Strength

The snapshot of staff strength from 1957 to 2001 can be seen in the table below. Kaziranga has grown from single strength in 1957 to 562 in 2001.

raising the 3rd Battalion as well. Of the two Battalions, the Kaziranga has got about 430 no of personnel deployed along with the front-line staff. Most of the personnel are armed with .303 rifles. However, now a good number of SLRs and carbines have been inducted. The department is in the process of acquiring AK series rifles as well to match the fire power of the poachers who often have been found to use a mix of .303 with silencer and AK 47/ 56 rifles among other weapons. The actual strength deployed varies from time to time.

An additional manpower strength of about 70 personnel was deployed on 2nd May, 2014 with a reserve of 30 personnel at Secconee, the HQ of the 2nd Battalion. It is to be mentioned that AFPF personnel also sustain injuries while on duty. However, the advantage here is that all such persons are retrenched to the HQ and replacement is provided in most of the cases.

3.1.3 Home Guards

Despite deploying front-line staff and AFPF, there is still serious shortage of staff to secure almost 1000 sq. km of thickly forested area with a very high animal population. Therefore, the Park authorities also deploy considerable number of armed Home Guards. The deployment of home guards was started in 1986. Till march, 2014 there were 129 nos of Armed Home Guards deployed in the Park. The current deployment is only 117. The actual strength deployed varies from time to time.

3.1.4 Participatory Protection

In order to bridge the gap between the front-line staff and the population living on the fringes of the Park, a strategy to deploy local manpower from these villages as casual workers, field informants and camp boys is adopted. These boys work in close coordination with the front-line staff. Several of the local boys have been trained as Tourist Guides. The Tourist Guides take the tourists inside the Park during visiting hours and thereafter carry out protection duty along with the front-line staff. As of now a total of 163 nos of casual workers and 25 numbers of tourists guides have been deployed. Additionally to guard the areas outside the Park from potential intruders and also to keep watch on large mammals crossing over to the human habitations and tea gardens, Village Defence Parties (VDP) of a group of 7-10 youth are organized in some of the villages. They are given basic facilities such as torches, batteries, extra kerosene oil, crackers etc. to keep watch and ward during the night time on the fringe of the Park. During the flood season, volunteers are recruited from the villages along the NH37 to guard the highway so that there are no casualties happen on the road. They also keep a watch on the straying rhinoceros. Number of such volunteers cross 100 during peak floods. Additionally, staff from neighbouring divisions are also deployed for flood duty temporarily for a period of three to six months. This time it is proposed to keep the volunteers for a longer duration beyond flood in order to secure the porous border of the Park/ Tiger Reserve.

3.1.5 Present Administrative Set Up and Anti Poaching Infrastructure

The Kaziranga National Park was declared in 2007 a Tiger Reserve, known as Kaziranga Tiger Reserve (KTR). The Director of the park has been notified additionally as Field Director, and the DFO, Eastern Assam Wildlife Division as Deputy Field Director, KTR. As per the Wildlife (Protection) Act, 1972, a foundation in the name and style of Kaziranga Tiger Conservation Foundation (KTCF) have been formed in 2007. All the tourists earning and other proceeds go to this foundation.

The Director/ Field Director has the overall superintendence and control over the management of the Park/ Tiger Reserve. He is assisted by a Conservator of Forests (CF) and one Divisional Forest Officer, Eastern Assam Wildlife Division, also known as Deputy Field Director, KTR, who implements the management decisions. The DFO, in turn, is assisted by two Assistant Conservator of Forests, and Range Forest Officers who are in charge of the Ranges. There is one Wildlife Research Officer who looks after research & development and coordinates with various NGOs and wildlife research institutions including the Wildlife Institute of India, Dehradun.

Ranges Of Kaziranga National Park

Originally the Park had three ranges namely Eastern Range with its HQ at Agaratoli, Central Range with its HQ at Kohora and the Western Range with its HQ at Bagori. In the year 1990, the 1st Addition area was constituted into Burapahar Range with its HQ at Ghorakati. Kukrakata RF was brought to the park in 2002 under the Burapahar Range. Northern Range was established in 2010 to provide protection to the riverine areas of the Brahmaputra river, in principle covering all the 6th Addition areas to the National Park. The Central Range, also known as Kaziranga Range of Kaziranga, is the oldest range established on the 1st April, 1949.

Beats And Anti-Poaching Camps

There are two notified account beats in the EAWL Division namely the Burapahar Beat under Bagori Range and the Bokakhat Beat at the Divisional HQ. Additionally there are a number of beats/ sub beats under whom a large number of anti poaching camps function. In 1980, there were only 45 anti poaching camps. Due to increase in incidence of poaching, the number of camps were steadily increased. In 2001, there were 212 anti poaching camps. In 2003, there were 125 camps, and the number increased to 160 at the end of 2013. The current number of anti poaching camps is 174 including 9 floating camps. This number is likely to increase further. The park has 9 nos. of floating camps, along with several speed boats and many country boats, to carry out patrolling duty on the Brahmaputra river.

The anti poaching camps have grown over a long period of time in consonance with poaching practices prevalent during that period. As a result, the Park is not uniformly covered by the camps. At several places, the camps appear very closely, and yet at many places, there is more than 5 km distance between two camps. Given the current trends of poaching, it is now felt that there is a need for large number of camps and watch towers on the periphery of the Park. While increasing the camps would be the easiest thing to achieve, placement of well trained and motivated staff in adequate numbers remains the key issue. Some camps are running with home-guards and casual workers alone, a situation which needs to be remedied fast.

Further, as a piece of infrastructure, the anti poaching camps, as some of them are really very old, need a new thinking. Several of the camps are old and dilapidated and unfit for human habitation. Several of the new camps, though full RCC, do not seem to be well designed resulting in poor performance of the staff. The concept of watch tower cum camp is relatively new in Kaziranga. There is also no established system of "watch post" or "sentry post" which is manned 24X7. Probably, the earlier poaching practices and patrolling duty patterns did not warrant such a system.

When one objectively analyses the anti poaching infrastructure in the light of the current poaching pressures (which is the highest ever in Kaziranga in terms of number of attempts happening daily and attempts converted into successful poaching), it is seen that all the current anti poaching camps must be rebuilt in next 1-3 years, so that new strategies of protection could be effectively implemented. Further, there is a demand to increase the number of staff. If so, the existing design of the anti poaching camps would not be able to take the manpower load. In each range, we may have to develop a centralized infrastructure at two or three places, so that they can act as "base camp". While the regular camps can continue to do "regular" patrolling and management works", the base camps can add the surprise element, and sustain 24X7 surveillance which is currently not possible to be implemented in the Park within the given resources.

3.1.6 Roads and Bridges

The road network inside the Park consist of a Central Path, in each range (barring the Northern Range), fair weather paths (which are motorable) and patrolling paths (which are foot path). Vehicles (4 wheel drive light vehicle such as Maruti Gypsy) can ply only on Central paths and the fair weather paths during fair weather. The total length of the Central path is 95 km combining all the four ranges on the south side. The fair weather paths measure about 210 km in length. There are about 350 km of patrolling path. During floods, limited communication happens through boats etc. The Park maintains about 65 km of critical paths called "Boat lines". Since Kaziranga is nourished by flood waters of the Brahmaputra river annually, and water flows during floods, east-west or west-east, building roads in the south-north directions is fraught with ecological disasters. Therefore, the practice followed in the Park is to make roads only as per ground terrain so that either it can be washed away during floods, or can easily allow passage of water. If east-west flowing flood water happens to strike a resistance in the north-south direction, the silt gets dropped leading to heavy siltation of water bodies and, thus, loss of critical habitat. Another critical factor in road alignment is the existence of a large number of water bodies and streams. While several streams have been bridged, and a lot more need to be bridged further, the beels are sensitive to construction, as chances of silt deposition become high as soon as a column/ structure is placed therein. Several beels have got silted up due to certain short sighted attempts in the past to create man-made engineering structures inside. So far long span column-less suspension bridges have not been tried due to high costs.

Therefore, roads cannot be built everywhere in the Park, and also they do not seem to have much chance of becoming smooth and fast to vehicle plying. This has a major impact on poaching, as the reaction time for the staff to reach the place of occurrence is very high. As the geo-spatial configuration of the park is interspersed with large number of water bodies, it is also not possible to make a regular grid inside the Park.

After the floods subside, road opening exercises are undertaken annually which is time consuming, again giving advantage to the Poachers for atleast three to four months after the rains have stopped. Several streams and nallah remain un-openable as late as January-February. The possible solution to these seem to rebuild suspension bridges over all major streams (and this number could be as high as 50 or more), and also build causeways in all minor streams along the alignments. Only this can ensure that

communication can be established immediately after the water subsides in the Brahmaputra.

3.1.7 Wireless Communication System

The wireless communication system was set up in Kaziranga as early as 1987 with the assistance of Webel, a Govt. of West Bengal enterprise. The network was revamped in 1990 with financial assistance from Aaranyak-DSWF. Currently there are 266 handsets, 9 vehicular sets, 37 base stations and no repeater stations. The system is analog in nature and mainly due to low height of the towers, does not adequately cover the Park. There are several shadow areas. There are also challenges in maintenance of the handsets. The current position of the wireless systems is shown below:

SI No.	Wireless Equipment	In Service	In need of Repairs	Total
1	Handsets	145	121	266
2	Base Stations	30	7	37
3	Vehicular Sets	9	0	9

3.1.8 Weaponry

The Park has a mix of arms and weapons such as rifles (0.315 and 0.303), .32 Revolver, Double Barrel Guns (DBBL), Single Barrel Guns (SBBL) and Tranquilizing Guns (.22, 0.243, 0.470, 0.404). The total no of arms owned by the Park authorities is as shown below:

SI No.	Weapon	Quantity
1	0.315	498
2	0.303	200
3	0.32	12
4	DBBL	65
5	SBBL	33
	TOTAL	808

The AFPF forces deployed in the Park have the following arms:

SI No.	Weapon	Quantity
1	0.303	316
2	SLR	166
3	Carbine	20
	TOTAL	502

There are 129 Home Guards currently deployed. Their number keeps on fluctuating depending upon their retrenchment and new appointments. The Home Guards carry 0.303 rifles.

3.1.9 Other Anti Poaching Infrastructure, Gears and Logistics

Uniform:

To maintain discipline and enforce effective patrolling and protection duties uniform plays a vital role. However, it has been observed that uniform supply from the Govt. sources has been erratic. In the past, the Park had to depend upon NGO sources for supply of uniform. The Wildlife Areas Development and Welfare Trust (WWT) also supplied uniform in the past. After the Kaziranga Staff Welfare Society was formed in 1990, the uniform was also given from the society. These efforts have been piecemeal and partial in nature. Every year the staff should get two sets of uniform including one set of rain coat and one set of woolen jersey and inner thermals.

Anti-Riot Gears:

Of late, there have been several instances of organized fishing wherein hundreds of individuals and groups come from adjoining areas to fish inside the water bodies of the Park along the NH37. There had been atleast 3 such incidents in past 4 months. The staff had to come to blows with the public, leading to injuries on both sides and also blocking of highway NH37 and public resorting to burning of camps. The staff did not have any gears to deal with large mobs. Therefore, the following equipment were recently procured by the Park authorities:

1. 100 nos of Polycarbonate Lathis
2. 100 nos of FRP Helmets
3. 100 nos of Half Body Protectors
4. 100 nos of Polycarbonate Shield

Torches and Other Gears:

The Park authorities have been providing logistic support such as torches (two per camp) with consumables such as battery and bulb, water filter, kerosene oil for illumination, solar lantern, solar chargers etc. However, some of the basic amenities such as camp cots have been mostly improvised by the field staff using local materials. It is also to be noted that currently none of the camps have binoculars, what to speak of night vision devices.

Floating Camps:

There are 6 floating camps namely Unicornis, Tigris, Luit, King Fisher, Samrat and Hawk Float on the Brahmaputra river. The biggest of them is the Unicornis and can house 4-8 persons. These vessels need regular maintenance and repairs.

Speed Boats and Other Boats:

The Park has currently 11 number of speed boats including 4 modern semi automatic front drive speed boats procured in 2013-14, two rubber boats. There are 3 nos. of mechanized boats (*Bhutbhuti*), and 3 nos are under construction. These are likely to be pressed in service by end of July, 2014. There are more than 150 country boats. Almost every camp has been provided with country boats.

Vehicles:

There are a total of 41 vehicles in Kaziranga, of which only 29 are in running condition; and 12 nos are beyond economic repair. Out of this, there are 16 nos of Maruti Gypsies, of which 12 are in running condition and 4 nos beyond repair.

Manpower Training:

There are 23 trained Forester I against in harness 31, and 110 trained Forest Guards against deployed 198. It is not possible to send large batches for training outside the Park. During 2014, training sessions are being organized in batches of 20 at Seconee, the HQ of the 2nd AFPP. Already one batch has received training. Another recent training initiative was for imparting 10 day training on wildlife crime investigation to the field officers in the month of June, 2014. Another international exposure on wildlife crime scene investigation was provided to field staff on the 29th May, 2014 at Kohora by the visiting experts from South Africa on Rhodis. Brief about Rhodis is being provided separately in Chapter 5.

The staff require a lot of target practice. It is planned to hold target practice in the Police Training College, Dergaon shooting range. The terrain of Kaziranga is physically very challenging, and regular trainings and physical fitness camps are required to be held.

3.1.10 Departmental Elephants

The anti poaching story of Kaziranga cannot be complete without mention of the departmental elephants. It deserves actually a special chapter for the yeoman services rendered by them in protection of the rhinoceros and maintenance of all round vigil in the Park. The Kaziranga National Park has 55 elephants. The range wise break up of elephants is given below:

Sl. No	Range	Male	Female	Calf	Total
1.	Eastern Range	6	3	2♀	11
2.	Kaziranga Range	16	14	2♀ 1♂	33
3.	Western Range	1	8	1♀ 1♂	11
	TOTAL	23	25	5♀ 2♂	55

Some of the legendary elephants of Kaziranga are Akbar (born 1886) inducted in the Department on 13th April, 1942, and Shahjahan (born 1931) inducted in the Department on 23rd November, 1976. Akbar, who died on the 6th July, 1956.. Joyraj (born 1952) was inducted in the Department on 9th April, 1967. He died retired in 2013. The other legendary elephants include Gadapani, Joydhwaj, Padmini etc. One of them had the fortune of carrying Pundit Jawaharlal Nehru on his back during the latter's visit to Kaziranga in 1956. The Kaziranga elephants have been the charm of morning safari which draws tourists from across the world. However, there was a time during 1995-96 when there was even no fund to feed the elephants. It was the Department contributed, every one from the then Minister, Commissioner & Secretary, PCCF down to Forest guard, one day's salary and formed the Wildlife Areas Development and Welfare Fund (WWT) on the 17th September, 1996 at the Assam State Zoo, Guwahti. This Trust contributed significantly towards welfare of the elephants (including feeds, medicine and health check up) and welfare of staff, and building of new camps etc in Kaziranga and getting new speed boats and vehicles. [The author along with Sri H.K. Choudhury IFS (Retd) used to work for the

Trust and Kaziranga as Asstt Secretary of the Trust when posted as Working Plan Officer Upper Assam Circle, Jorhat]. Today, the 1995-96 kind of financial crisis is not there, but it is felt that better care better feed and better amenities need to be provided to the departmental elephants and the mahouts. As of now 9 (nine) posts of mahout are vacant, and the gap is filled by casual workers. The total number of posts of mahout is only 37, against 55 elephants.

3.1.11 Staff Welfare

There are several issues pertaining to staff welfare such as ration, housing medical care, education of children etc. Ration allowance was given from the year 2006-07 to front-line staff in form of an allowance of Rs. 500 per month upto Dy Ranger. Some family dwelling units were also constructed in 2005. However, a lot more is required to be done.

The Staff welfare activities were first started systematically with the establishment of the Wildlife Areas Development and Welfare Trust (WWT) under the Chairmanship of Sri H.K. Choundhury IFS (Retd.), former PCCF, Assam, [*who still continues to be actively involved in the Trust activities as its Chairman*]. The first set of quality uniforms to all the staff along with shoes were provided by the Trust towards the end of 1996 [*and the author personally did the purchases for the staff*]. The Trust initiated ex-gratia grant for the staff either killed or injured on duty. Encouraged by the works of the Trust, the Park authorities, under the active leadership of Sri B. S. Bonal IFS, the then Director, Kaziranga National Park, constituted a society for welfare of the staff in the name and style of Kaziranga National Park Staff Welfare Society in 1999. The Society has been giving grants for medical treatment of staff injured while on duty; and also loan to the needy staff. The Society is chaired by the Director, Kaziranga National Park and DFO, EAWL, Bokakhat as member Secretary.

Financial assistance paid to the staff members of the Kaziranga National Park for treatment of injuries sustained while on duty and to the inhabitants of the fringe villages for treatment of injuries sustained from wild animal attacks and domestic cattle killed by tiger etc. from 2013 to 2013 comes to Rs. 26.00 lakh touching 237 beneficiaries. Similarly the staff members and their family members are given loan for medical treatment from the Society. So far since 2003 to 2013, 161 number of staff have been benefited and Rs. 11.73 lakh has been disbursed as loan assistance.

3.1.12 The Role of AFPP HQ:

The shifting of the HQ of the 2nd AFPP from Guwahati to Seconee, in the opinion of the author, in the month of March, 2014 has had a very positive impact on the anti poaching strategies in the Park. If the Government establishes two more battalions of the AFPP, their HQ should be located near Nagaon (anywhere after Kalia Bhomora bridge, and before Laokhowa), and secondly somewhere near Numaligarh. This would ensure a very good protection to the proposed Kaziranga landscape.

3.2 Nagaon Wildlife Division

The Laokhowa and Burhachapori Wildlife Sanctuaries (LBWLS) are two important protected areas of Central Assam, administered by the Nagaon Wildlife Division, Kaziranga Tiger Reserve. Laokhowa WLS (LWLS) is located between latitudes

26°28'31.85"N to 26°32'13.95"N and longitudes 92°37'57.91"E to 92°47'23.27"E having a total area of 70.1 sq.km in Nagaon district. Burhachapori WLS (BWLS) is located between the latitudes 26°30'34.16"N to 26°33'48.96"N and longitudes 92°34'27.31"E to 92°46'10.667"E with a total area of 44.06 sq.km in Sonitpur district. The total area of the two sanctuaries is 114.16 sq.km and are contiguous to each other. Both the PAs along with the adjacent Brahmaputra riverine tract act as migratory corridor for wild animals of Kaziranga and Orang NPs. They have, therefore, been notified as buffer zones of the Kaziranga Tiger Reserve (KTR). Further, the Kochmara Reserve Forest, having a total area of 21.55 sq.km. in Sonitpur district, is also administered by the Nagaon Wildlife Division.

The Laokhowa WLS was declared as a Reserve Forest in the year 1907, Game Sanctuary in 1916, Wildlife Sanctuary in 1979 and brought under the administration of the Kaziranga Tiger Reserve in the year 2007. Burhachapori WLS was declared as a Reserve Forest in 1974 (prior to that, it was a Professional grazing Reserve), Wildlife Sanctuary in 1995 and brought under the administration of the Kaziranga Tiger Reserve in the year 2007.

Towards North of the Burhachapori WLS, flows the mighty Brahmaputra River which creates numerous river islands locally known as chars. A number of these river islands are under the occupation of migrant people from different parts of the states. Some of the islands are occupied by the khutti (dairy farm) dwellers. A few river islands are still unoccupied. The habitat of these islands may be the ideal home of several herbivorous animals and different grassland bird species. Therefore, the islands are to be regarded as both the habitat and corridor of the wild animals from the nearby PAs.

It is important that the Kaziranga - Laokhowa & Burhachapori - Orang Brahmaputra riverine corridor is secured so as to ensure the healthy genetic exchange of wildlife. Otherwise wildlife of the adjacent protected areas would not be able to sustain in the long run. Further, the islands in the region are home to many antisocial elements, some of which have been found to be directly associated with rhino poaching in Kaziranga and Oranga NPs. To avoid such a situation, the region between the Koliabhomora Bridge and the Majarwali Chapori, should be immediately brought under the administrative control of the Burhachapori WLS. In the longer run, the entire stretch of 250 sq. km. right from the Koliabhomora Bridge up to the Singri hills in Sonitpur district must be added to the Burhachapori WLS as its 1st Addition. This would ensure a contiguous wildlife migratory corridor within the PA landscape in question. A proposal in this regard already submitted to the Deputy Commissioner, Sonitpur.

3.2.1 Manpower

The Nagaon Wildlife Division has a sanctioned strength of 186 personnel, including DFO, ACF, Range Officers, Deputy Rangers, Forester Grade I, Forester Grade II, Forest Guard, Game Watcher, Mahut, Grass Cutter and Boatman. The front-line staff is mostly armed with .315 guns. The staff also use DBBL guns to handle man-animal conflict.

The snapshot of staff strength from 1990 to 2012 can be seen in the table below. The Pabitora Wildlife Sanctuary was under control of Nagaon Wildlife Division till 2006. In the year 2007 Pabitora WLS brought under administrative control of Guwahati WL Division and Burhachapori brought under the administrative control of Nagaon WL division from the Western Assam WL Division.

Sl.No	Post	Year			
		1990	2004	2007	2012
1	D.C.F.	1	1	1	1
2	A.C.F	0	0	0	1
3	Forest Ranger	3	2	4	4
4	Deputy Ranger	3	3	3	3
5	Accountant	1	1	1	1
6	Sr. Assistant.	2	2	2	2
7	Jr. Assistant.	4	4	4	4
8	Range Asstt.	2	2	2	2
9	Forester-I	26	26	22	22
10	Forester- II	18	18	15	15
11	Forest Guard	108	108	86	86
12	Game Watcher	27	27	17	17
13	Boat- Man	17	17	14	14
14	Driver	8	8	5	5
15	O.B.M. Driver	1	1	1	1
16	Grass - Cutter	5	5	2	2
17	Mahut	5	5	1	1
18	Chowkidar	4	4	3	3
19	Office Peon	2	2	2	2
20	School Teacher	1	1	1	1
Total		238	237	186	187

Of the above sanctioned strength, the men in harness are only 149. There are 38 nos of vacancies: Forest Ranger 2, dy Ranger 1, Fr I 5, fr II 8, Forest Guard 11, game Watcher 7, Driver 3, and Office Peon 1.

AFPF Deployment:

The Nagaon Wildlife Division has one section of Assam Forest Protection Force (AFPF) personnel stationed at the Burhachapori WLS. Most of the personnel are armed with .303 rifles. The primary duty of the AFPF personnel is River Patrolling in between the western boundary of the Kaziranga National Park (Koliabhomora Bridge) till the eastern boundary of Orang National Park (Pachnoimukh).

Participatory Protection:

The Nagaon Wildlife Division has constituted two 'Local Protection Squads' comprising of motivated youths and they are being engaged in active patrolling duties with the frontline staff and two such squads consisting of 24 members is actively working with the frontline staff of these two PAs. The youths are being paid monthly stipend by the Nagaon Wildlife Division under the Project Tiger. Eco-development committees (EDC) in the fringe and forest villages of the Laokhowa and Burhachapori WLSs were formed under the Joint (people's participation) Forest Management Rules – 1998, under Nagaon Wildlife Division, Nagaon under the jurisdiction of the Kaziranga Tiger Reserve. As of today, there are 28

registered numbers of EDCs and 10 proposed EDCs in the fringe and forest villages of the buffer area constituted within the Nagaon Wildlife Divisional Forest Development Agency (NWFDA). All the Executive Body members of the EDCs are being constantly trained and oriented towards the process of participatory management of protected areas.

A number of entry point activities in the fringe and forest villages through the EDCs are being undertaken such as repairing of village road, construction of school buildings; community halls; temples and mosques, providing school uniforms and reading and writing materials, organising free health camps, providing solar mobile charging facilities along with television sets with DTH facilities in the community halls among others.

3.2.2 Present Administrative Set Up and Anti Poaching Infrastructure

The Nagaon Wildlife Division, which is having two WLSs and one R.F. under its administration, is directly controlled by the P.C.C.F., Wildlife. The Kaziranga Tiger Reserve Area (comprising of the two WLSs) is administered by the Director, Kaziranga Tiger Reserve. The Director has the overall superintendence and control over the management of the Tiger Reserve area under Nagaon Wildlife Division. He is assisted by one Divisional Forest Officer, Nagaon Wildlife Division who implements the management decisions. The DFO, in turn, is assisted by one Assistant Conservator of Forests, and two Range Forest Officers who are in charge of the Ranges.

Ranges of Laokhowa & Burhachapori WLS:

Laokhowa WLS: Prior to 1979, the Gorajan was a Beat under the Northern Range, Salonah, under Nagaon Territorial Division. After Laokhowa was notified as a WLS, it was upgraded into Range in 1979. Up to 1986, Laokhowa was administered by the Western Assam Wildlife Division, Tezpur and in the year 1990, it was brought under the administration of the newly created Nagaon Wildlife Division.

Burhachapori WLS: In 1974, the Burhachapori RF was under Dhanias Sub-Beat under Sadar Account Beat, Tezpur, Darrang Division. In 1987, the Burhachapori RF was brought under the administrative control of the Divisional Forest Officer, Western Assam Wildlife Division, Tezpur from Darrang Division. Burhachapori RF was handed over to the administrative control of newly created Nagaon Wildlife Division, Nagaon in the year 1990. The RF was handed back to Western Assam Wildlife Division, Tezpur in 1992. The Dhanias Beat was upgraded to the status of Range in July 1993. In 2007 the Burhachapori WLS was brought under the administrative control of Nagaon Wildlife Division.

Beats and Anti-Poaching Camps:

There are three notified beats in the Nagaon Wildlife Division namely the Sadar Beat at the Divisional HQ., Laokhowa and Sutirpar Beats under Gorajan Range, Laokhowa WLS. Apart from the beats, there are a number of anti poaching camps in both the WLSs. The current number of anti poaching camps is 33 (including 2 watchtowers) in addition to one floating camp. A number of anti poaching camps, which have grown old over a long period of time have been renovated. At several places, the camps appear very closely, with an average distance of about 2 km between camps. There is a need to increase the number of floating camps in the Brahmaputra riverine tract adjoining the Burhachapori WLS manned by well trained and motivated staff in adequate numbers. With the upcoming translocation of rhinos to the Laokhowa-Burhachapori WLS complex, the existing camp

infrastructure needs to be upgraded further. While the regular camps can continue to do "regular" patrolling and management works", designated base camps can add the surprise element, and sustain 24X7 surveillance and "Tongis" are to be constructed at strategic points.

Roads & Bridges: There are 2 Central Roads in both Laokhowa and Burhachapori WLSs. The total length of the motorable roads is 65 km and non-motorable roads is 41 km. Burhachapori has 7 culverts while Laokhowa has 6 culverts. Almost all the roads become un-motorable during floods. After the floods subside, road opening exercises are undertaken annually. There is a need to construct at least two small bridges over the Dhania Suti to ensure connectivity between the Laokhowa and Burhachapori WLSs as well as build causeways in all minor streams along the desirable alignments.

Wireless Communication System: Currently there are 34 working handsets and 10 base stations (including vehicular sets). The system is analog in nature and mainly due to low height of the towers, there are some shadow areas.

Sl. No.	Wireless Equipment	In Service	In need of Repairs	Total
1	Handsets	34	20	54
2	Base Stations	10	05	15

Weaponry : The Nagaon Wildlife Division has a mix of arms and weapons such as rifles (0.315), .32 Revolver, Double Barrel Guns (DBBL) and Sporting Rifle. The total nos. of arms owned by the Division is as shown below:

Sl No.	Weapon	Quantity
1	0.315	36
2	Sporting Rifle	01
3	Revolver	02
4	DBBL	28
	TOTAL	67

The AFPF forces have 10 nos of 0.303 rifles.

3.2.3 Other Anti Poaching Infrastructure, Gears and Logistics

Uniform: To maintain discipline and enforce effective patrolling and protection duties uniform plays a vital role. The Department supplies the forest staff with uniforms. Organisations such as the WWF have been providing the staff with sweaters, shoes, raincoats etc.

Torches and Other Gears: The Nagaon Wildlife Division and organisations such as WWF have been providing logistic support such as torches (39 nos.) with consumables such as battery and bulb, dragon lights (35 nos.), solar search lights (40 nos.) water filter, kerosene oil for illumination, solar lantern (55 nos.), solar chargers (35 nos.), GPS (18 nos.), binoculars (7 nos.), digital cameras (5 nos.), motorcycles (3 nos.), bicycles (65 nos.), etc.

Floating Camps: There is 1 floating camp namely Dolphin, on the Brahmaputra river which can house 4-6 persons. This vessel need regular maintenance and repairs. Two more floating camps have been proposed under the IRV programme.

Speed Boats and Other Boats: The Burhachapori WLS has 3 speed boats, 1 mechanised boats ('bhutbuthi') and 13 country boats. Laokhowa WLS has 15 country boats.

Vehicles: There are a total of 7 vehicles in Nagaon Wildlife Division, of which 6 are in running condition; and 1 nos is beyond repair. Out of this, there are 4 nos of Maruti Gypsies, of which 3 are in running condition and 1 nos beyond repair.

Manpower Training: There are 15 (out of 16) trained Forester I, 5 (out of 7) trained Forester II and 63 (out of 76) trained Forest Guards.

3.2.4 Staff Welfare:

Since the year 2006-07 the front-line staff receiving Rs 500 in form of ration allowance every month upto the rank of Deputy Ranger. In addition to that, the Project Tiger allowance is also given to the frontline staff on monthly basis. A society for welfare of the staff has been proposed by the Nagaon Wildlife Division.

3.3 Other Stakeholding Managers

Currently, the peripheral wildlife activities are supported by the adjoining territorial divisions such as Golaghat, Jorhat and Nagaon Forest Divisions on the south and Lakhimpur Forest Division, Sonitpur (East) Forest Division, Sonitpur (West) Forest Division on the north bank, and the Karbi Anglong (East) Forest Division in the Council areas. These are the forest divisions neighbouring Kaziranga, whose support often become very crucial in effective management of man-animal interactions, straying of rhinos beyond Kaziranga and elephant depredation. As of now, very little support is provided by the Park/ Tiger Reserve authorities to these divisions. However, there is a need to strengthen these divisions on the lines of wildlife for better management in the landscape.

3.4 Conclusion

The following, in brief, are the key protection related facts and figures:-

1. The sanctioned staff strength of EAWL Division has remained practically stagnant since 1987. From 1987 to 2001 only 24 posts have been added, raising the tally to 562 which continues till date, against the area undertaken for protection has doubled since 1987.
2. Of the 562 sanctioned strength, there are 97 vacancies till date.
3. There are 41 number of invalid staff of the 465 men in position.
4. The AFPF force deployment has increased considerably in last few years. The Park deploys as of now 447 nos of AFPF personnel.
5. There are 129 home guards, 163 nos of casual workers and 25 nos of Tourist Guides deployed in the Park.
6. In 2003 there were 125 anti poaching camps and today the number is 174 including 9 floating camps
7. The total length of the central paths measure 95 km, and 210 km of fair weather paths.
8. 46% of the wireless handsets are out of order.

9. The Park has about 800 arms consisting of 0.315, 0.303 and other weapons. The AFPF and Home Guards have their own weapons.
10. There are 41 vehicles of which only 29 are in running condition.
11. There are 55 Departmental Elephants in Kaziranga.
12. The Nagaon Wildlife Division has sanctioned strength of 187 staff, of which 38 are vacant.
13. There are 34 number of anti poaching camps in the Division.
14. The motorable road network is of 65 km length.
15. 37% of the wireless handsets are out of order.
16. There are 7 vehicles of which 1 is not in working condition

CHAPTER 4

4 People and Development Issues

4.1 People on the Fringe of Kaziranga

Kaziranga is surrounded by population on all the sides. Noted are the townships of Bokakhat and Jakhlabandha on the south and Biswanath Ghat on the north. Kohora and Bagori are largely tourist townships on the south side. NH37 predominantly defines the landscape. The Park falls in three districts namely Golaghat, Nagaon and Sonitpur and borders Karbi Anglong district. The two civil sub divisions namely Bokakhat and Kaliabor and two Police Stations namely Bokakhat and Jakhlabandha control the whole civil area falling south of the Park boundary. On the north, the civil jurisdiction belongs to the Biswanath Sub Division, and there are seven Police Stations namely Gohpur, Helem, Behali, Gingia, Biswanath, Sootea and Jamuguri.

Since 6th Addition has not formally been handed over, the rest of the discussion shall be confined to the south bank only.

Within Kaliabor sub-division, there are a total of 225 number of villages with 40,882 households and a population of 1,95,713 as per 2011 census. Of these, there are 34 villages in the Kaliabor Revenue Circle in the proximity of the Kaziranga National Park, with a population of 19,947. In Bokakhat sub division, if we take only the Bokakhat Revenue Circle alone which has relevance for Kaziranga, there are 40 villages with 9568 families and a population of 46,572 persons. The demographic constitution on Bokakhat side is mainly Assamese, Missing, Muslim, Bengali, Hindi Speaking and Tea tribes. The demography on Kaliabor side is also similar with addition of Karbi tribes.

4.1.1 Eco-Development Committees (EDCs)

EDCs are formed to provide sustainable development to the villages from the fringed villages, thereby reducing their dependency on the forest resources. This is likely to improve their basic economic condition and level of sustenance. This will also result in bringing awareness among the villagers about the necessities of the forest and the forest resources which will make them stand for the protection of Kaziranga. EDCs are typically formed from the fringe village population which could be within 1-3 km of the boundary of the Park.

To constitute an EDC, first of all at least 50% inhabitants must agree to do so. The EDC consists of one person from the village as president, forest official as a member secretary, few executive members of about 7 to 9 person comprising of male and female in the 3:2 ratio. Household is taken as unit of the EDC and all the house holds of the village in that EDC become the general members. At present there are 33 registered EDC under the Eastern Assam Wildlife Division and 26 proposed EDC which falls under Golaghat district and Koliabor sub-division. Joint Bank account has been opened in the name of president and member secretary. As of now microplan of 10 EDC's is in the process of completion. EDCs work under overall administration of the Forest Development Agency (FDA). The FDA for Kaziranga was registered on 24th July, 2011.

The EDCs so far could not function smoothly due to mainly issues in registration and preparation of the micro-plans, collection of baseline data etc. Some of these works have now been initiated and it is expected that EDCs will take shape by the end of the calendar year, 2014.

The names of the already registered and proposed EDCs are given in the Tables below:-

LIST OF EXISTING EDCs

Sl. No	Name of EDC	Name of Revenue Village	House hold	Population	Remarks
1	Sildubi-Haldhibari	No.1 Sildubi	126	596	
		No.2 Sildubi	111	624	
		Haldhibari	85	397	
2	Hatikholi-Amguri-Holmora	Hatikholi T.G.	965	4624	
3	No.1 Kohora	No.1 Kohora	413	1899	
4	Halowa N.C.	Halowa N.C.	310	1311	
5	Chepenakubua	Chepenakubua	168	714	
		Halowa gaon	13	47	
6	Bocha gaon	Bocha gaon	291	1404	
7	Kakojuri-Panbari	Kakojuri	137	707	
8	Diffalopathar	Diffalopathar	618	3010	
9	Japoripather	Japoripather	63	297	
10	Da-Gosaqnibor	Gosanibor	229	1071	
		Lukhurakhania	79	348	
11	Lukhurakhania-Domjan	Domjan No.1	68	341	
		Domjan No.2	28	145	
12	No.2 Kohora-Mohpora	No.2 Kohora	124	672	
		Mohpora	104	529	
13	Panbari Missing Adarsagaon				Suspended
14	Palashguri-Dhansirmukh	Palashguri	240	1221	
15	Ahomgaon	Ahomgaon	361	1784	
16	Dhubaati-Beloguri	Beloguri	162	956	
17	Teliabari-Sarogaon				Suspended
18	Egaratoli	Egaratoli	32	156	
19	Tamulipather	Tamulipather	97	529	
20	Borbheta	Borbheta	190	924	
21	Bohikhowa	Bohikhowa	493	3139	
22	Bagori	Bagori	278	1223	
23	Harmoti	Harmoti No.1	259	1394	
		Harmoti No.2	107	520	
24	Nabasti-Najan	Nabasti	153	670	
		Najan	442	2137	
		Kuthori	170	777	
25	Kuthori-Baghmari	Kuthori T.E.	76	331	
			103	465	
		Baghmari	146	703	
26	Deopani-Bandardubi	Deopani	153	833	
		Bandardubi	214	1285	
27	Kanchanjuri-Mandugaon	Kanchanjuri	58	248	
28	Noharubasti-Silimkhowa	Nohorubasti	77	336	
		Silimkhowa	116	619	
29	Natundanga	Natundanga	79	594	
30	Rangolu gaon	Rangolu gaon	91	923	
31	Amguri gaon	Amguri gaon	157	349	
32	Deosur chang	Deosur chang	207	1078	
33	Phuloguri Chang	Phuloguri chang	78	1051	
			8471	42981	

Proposed EDCs:

There are 26 new proposed EDCs around the Kaziranga National Park on the south bank side. The north bank areas have not yet been proposed as the official handover of the land has not taken place till date.

TENTATIVE LIST OF VILLAGES PROPOSED FOR NEXT PHASE OF EDC				
Sl No	Name of Revenue Village	No. of Household/Family	Population	Revenue Circle
1	Kaziranga NC	32	204	Bokakhat
2	Geleki Mikirgaon	357	1610	Bokakhat
3	Siljuri	138	584	Bokakhat
4	Borjuri Bagisa	244	1201	Bokakhat
5	Borjuri Gaon	304	1462	Bokakhat
6	Kandhulimari	316	1602	Bokakhat
7	Bangali Gaon	313	1424	Bokakhat
8	Balijan	792	3953	Bokakhat
9	Koroiati	138	648	Bokakhat
10	Bezgaon	22	88	Bokakhat
11	Kumarani Pathar	75	383	Bokakhat
12	Kumaraniati	139	786	Bokakhat
13	Da Gaon	394	1721	Bokakhat
14	Amguri Chang	157	767	Kaliabor
15	Palkhowa	5	35	Kaliabor
16	Burapahar No.1	12	54	Kaliabor
17	Kawaimari	5	32	Kaliabor
18	Burapahar T.E. No.1	154	892	Kaliabor
19	Burapahar No.2	62	282	Kaliabor
20	Injai (Jujai)	25	128	Kaliabor
21	Pub Deopani	86	455	Kaliabor
22	Najan NC	47	268	Kaliabor
23	Bagori NC	40	203	Kaliabor
24	Dakhin Deopani	21	88	Kaliabor
25	Kalapanimukh	8	46	Kaliabor
26	Kasojuri	27	126	Kaliabor
		3913	19042	

4.2 EDC Fact Sheets

A survey of all the existing 33 EDCs was initiated in April, 2014 to collect the baseline data for planning and preparation of micro-plans. Printed forms were circulated to all the EDCs with one form of several pages per family. Volunteers of WWF have been engaged to assist the EDC members and villagers for filling up of the forms. The forms are in local language. Data has so far been gathered for more than 30 villages. Data analysis has been completed for five EDCs comprising of 19 villages. These are Chilimkhowa-Neherubasti (2), Kanchanjuri (5), Harmoti (2), Kuthuri-Baghmari (8) and Deopani Bandardubi (2). There are a total of 1527 households in these EDCs with a total population of 6386 persons. As per the census of 2011, there are only 11 no. of revenue villages in these 5 EDCs. However, on ground survey 19 villages have been reported. It shows that during past few year, atleast 8 no. of villages were allowed to be set up.

4.2.1 Demographics

The communities residing in these villages are Karbi, Muslim and tea garden communities. Literacy rate is 56%. About 67% families are BPL.

4.2.2 Land and land Holdings

The total land in the 5 EDCs comes to 5102.9 Bigha. There are 62 families classified under medium land holding, and only one family as large land holding. There are 154 families with small land holding. Rest are landless or marginal farmers. The percentage of marginal and landless families comes to a staggering figure of 85% in these EDCs.

4.2.3 Livelihood Options

Of the surveyed population, it was found that 867 families are solely dependent upon daily wage earnings. 516 families are engaged in farming, while 318 families are engaged in some or other petty businesses. Only in 35 households, there are persons in service. About 66 families are surviving on skilled labour such as carpentry, masonry, driver etc. Only six families are engaged in collection and sale of NTFP (in Silimkhowa-Neherubasti EDC), while 12 families of this EDC and 5 families of Kanchanjuri are engaged in fisheries.

4.2.4 Livestock

There are 4536 heads of cattle in the 5 EDCs along with 3064 goats and 925 pigs. There are 144 other animals including buffalo and horses/ ponies. There are 1745 ducks and 9540 hens. The average per family cattle comes to 3.05, goat 2.06, pig 0.63, hens 6.42 and ducks 1.18.

4.2.5 Housing, Electricity, Water and Energy

About 369 houses are pucca, and the rest are all kuccha houses. The % of pucca houses comes to 24.85%. Only 27% houses were found to be having electricity connection. Tube well is the most common source of water, followed by ring well and ponds. There are about 90 ring wells in the surveyed villages. Several families take water from springs or ponds. For cooking energy all households depend upon firewood. LPG was found only in 167 households, which is just 11.25% of the total household surveyed. All households also used kerosene for lighting purposes.

4.2.6 Man Animal Interactions

It was found from the survey that 720 households were affected by elephant depredation. This constitutes almost 47% of the households. 35% of the households admitted that they were affected by wild buffalo. Wild boar affected 12% of the households. However, tiger depredation affected just about 22 households which is just little more than 1%.

4.3 Challenges Faced by the Fringe Village Communities

As can be seen from the field survey, most communities are very poor, landless and have little or no means of survival. Some of the key challenges faced by them are:-

1. Limited or no access to clean drinking water, power and LPG.
2. Lack of amenities such as school, hospital, vet centre.
3. Since more than 55% families are daily wage earners, livelihood options are very limited.
4. Almost all the households are affected by animal depredations and crop damage.
5. On average, land holdings are 3 bighas or less.
6. There are little options for alternate livelihoods.

4.4 Tourism

It may be noted that there has been almost 7 times increase in inflow of tourists from 1996-97 to 2011-12. There has been spurt in number of private accommodation over the last decade, and no doubt the overall infrastructure has become better. However, this has led to increased construction, blocking of corridors, mushrooming of hotels, dhabas and restaurants. The pollution levels also seem to have gone up, with increased garbage. All the hotels do not follow the system of solid waste management. The carrying capacity of the park needs to be evaluated, and tourism needs to be regulated, along with strict enforcement of regulations for hotels, restaurants etc.

Year	No of visitors		Total	Revenue (INR)
	Indian	Foreigner		
1996-97	16715	1677	18382	1,70,062.00
1997-98	17117	2408	19523	21,97,068.00
1998-99	18157	1091	19248	18,02,856.00
1999-00	37496	1623	39319	22,29,291.00
2000-01	50498	1838	52336	30,38,258.00
2001-02	44162	2144	46306	34,94,084.00
2002-03	59811	2055	61866	53,60,425.00
2003-04	57864	3772	61636	61,38,657.00
2004-05	68412	5147	73559	66,75,037.00
2005-06	49116	5210	54326	76,15,169.00
2006-07	67968	5748	73716	79,80,949.00
2007-08	53640	6106	59746	87,34,185.00

2008-09	100384	5767	106051	1,12,20,698.00
2009-10	105264	7580	112844	1,21,67,974.00
2010-11	112392	7447	119839	1,36,73,482.00
2011-12	117411	7521	124932	1,49,46,171.00
2011-12	93747	7418	101165	2,05,76,098.00
2013-14	121513	6922	128435	2,68,65,775.00

4.4.1 Jeep Safari:

The Jeep Safari in Kaziranga are run by private operators from the nearby villages. They have, as of now, been allowed to operate registered Maruti Gypsy soft top with canvass cover and olive green body color as Jeep safari vehicles on the tourists routes in the Central, Western, Eastern and Burapahar ranges. There are a total of 208 registered vehicle. The registration of the vehicles is done annually, and a unique number issued to each vehicle. The Jeep Safari route circuits are fixed in the four ranges, and the vehicles are allowed to be plied on on the designated circuits. In case a vehicle owner is found to violate the terms and conditions, his registration number is canceled for the balance of the tourist season.

The number of vehicles entering the Park has steadily been increasing. There is a need to fix the daily quota of vehicles. Further, the vehicles must be monitored for pollution levels. Though the Park authorities have insisted for pollution certificates from the Jeep safari owners, it may not actually guarantee pollution free vehicles. These vehicles need to be checked regularly while entering the Park. Some drivers have also been found in inebriated conditions. Such incidences must be stopped by using breath analysers at the time of entry. It has also been noticed that some tourists throw chip packets/ water bottles etc. in the Park. These incidences must also be stopped from happening.

4.5 Human Animal Interface

Population of all the wild animals is on the rise in the Park. Due to anthropogenic activities, spurt in development and economic activities, Kaziranga is fast becoming an island in the sea of humanity. Explosion of population in surrounding areas has led to fast degradation of natural habitat outside the Park in the Kaziranga landscape. Therefore, the spill over population of wild animals from Kaziranga regularly come in contact with humans. As a result, life and property of the people on the fringe of the park has been adversely affected. There have been several incidents of loss of life, accidents and crop and property damages by wild animals. These incidents are steadily on rise. During 2013, 246 incidents of cattle depredation by tiger alone were reported. During the last 10 years, 22 persons have lost their life due to elephant depredation. During 2012-13 financial year, crop damage compensation paid was Rs. 8,23,000.00.

In the 2nd Stakeholders meeting, the issue of compensation was raised by the local communities. It was observed that not only the procedure was and cumbersome, the amount of compensation paid was much less compared to the monetary loss suffered by the villagers.

4.6 Conclusions

The following are the salient points emerging from the write up given above:

1. There are 74 villages in the vicinity of the Kaziranga National Park with a population of about 65,000 persons.
2. There are 33 registered EDCs, and 26 proposed EDCs in the vicinity of the Park.
3. EDC baseline survey is currently going on.
4. About 85% of the families are found to be marginal and landless farmers
5. More than 55% of the households are daily wage earners.
6. The fringe village populations have been facing a lot of challenges including lack of amenities.
7. Wild animal depredation is very common, and almost every household is affected by it
8. Tourism is steadily increasing and touched all time high of more than 1,28,000 visitors in 2013-14.
9. There are 208 registered jeep safari vehicles operated by local populations.

CHAPTER 5

5 Policy and Law Issues

The key areas covered under this section are:

- State Amendment to the Wildlife (Protection) Act, 1972
- Immunity to Forest Staff in using fire arms
- Wildlife crime and conviction
- Intelligence and Trans boundary issues
- Permissions for UAV flying
- Issues of funding
- Existing Institutional Mechanisms in Kaziranga
- Wildlife laws in International Perspective
- A general discourse on Wildlife Crime and Punishment
- Rhino Protocols

5.1 State Amendment to the Wildlife (Protection) Act, 1972

The State Govt. of Assam has done a commendable job by amending certain provisions of the Wildlife (Protection) Act, 1972 which is a central legislation. The following key amendments have been made vide the Assam Gazette Notification No. LGL.107/2008/33 Dt. 20th October, 2010:

- "hunting in and outside the boundary" included. This allows for taking cognizance of wildlife offences outside the PA limits.
- Three years punishment enhanced to seven years, seven years punishment enhanced to 10 years and fine enhanced from Rupees ten thousand to Rupees fifty thousand for the first time offenders.
- For the repeat offenders, three years punishment enhanced to ten years, seven years punishment enhanced to life imprisonment, and rupees twenty five thousand fine enhanced to rupees seventy five thousand.
- Offences were made cognizable and non bailable within the meaning of CrPC, 1973
- Bail cannot be granted ex-parte
- The offences shall be tried by the Court of Sessions of the respective jurisdiction.

5.2 Immunity to Forest Staff in Using Fire Arms

Vide order No. FRW.22/2005 Dt 14th July, 2010, the Govt. of Assam made the following provisions under the CrPC, 1973:

- The provisions of section 197(2) shall apply to all forest officers including members of the AFPF who are charged with maintenance of public order relating to forest and wildlife protection, conservation and management.
- Only if it is held by an Executive Magistrate through an enquiry that use of fire-arms have been unnecessary, unwarranted and excessive and such report has been examined and accepted by the Government, then alone any proceeding including institution of a criminal case of any nature or affecting an arrest can be initiated by Police.

5.3 Provisions of the Sarai Act, 1867

The Sarai Act, 1867 is an Act for the regulation of public Sarais and Puraos. "Sarai" under the Act means any building used for the shelter and accommodation of travelers. Keeper of sarai includes the owner and any person having or acting in the care or management thereof. The District magistrate is required to keep a Register of sarais as per the section 4 of the Act, and as per section 5 of the Act, lodgers cannot be received in sarais until registered. If a keeper of the sarai is punished three times for violations under this Act, he is barred from running the sarai until he is given a written permission from the Magistrate to run the sarai.

It appears that none of the hotels and dhabas in and around Kaziranga National Park are registered under the Sarai Act, nor is there a register of the sarais with the concerned Deputy Commissioner. If the Act is applicable to Assam, then, even the paying guest accommodations and eco-tourism accommodations would be required to be registered under the Act.

5.4 Wildlife Crime and Prosecution

It is to be noted that once a wildlife crime – primarily poaching of Rhinos – is committed inside the Park, the rhino horn travels through the human inhabited areas, village roads, highways and / or railways of these districts to reach neighboring states for international export. Therefore, the role of police becomes extremely important in curbing down the illegal wildlife trade. In the context of rhino poaching, the following become crucial:-

- (a). Police does not provide enough priority to such trans national trade.
- (b). Majority of the Police personnel are unaware that the Wildlife law (WPA) defines duties of police along with forest staff.
- (c). Similarly, they are also not aware of the Gazette Notifications of the State which empowers them under the Act.
- (d). There is virtually no coordination between the enforcement agencies and also forest department of the neighboring states which are the main conduit route and homes the majority of the rhino horn traders. Border dispute finds the center stage as far as coordination is concerned amongst the police forces of Assam and Nagaland.
- (e). The Park authorities do not seem to have any reach or means of intelligence outside the area of influence of the Park, not to speak of influences outside the State.
- (f). The crime scene is not preserved by the field staff. This leads to tampering of evidence, wiping away of vital finger prints:-
 - As of now, there is no practice of recording finger print from the crime scene
 - As of now, there is no practice of collecting sample at the crime scene for DNA tests of the criminals
 - Samples for DNA test of the poached rhino are not done
 - Use of deep search metal detectors was only started from 2014
 - Cast of foot print of the poachers not collected
 - Detailed photography of the crime scene usually not done
 - Map/ sketch of the crime scene is not prepared

- (g). Currently no ballistic analysis is being carried out.
- (h). Due to multiple duties, investigation by forest staff is not drawn to any conclusions.
- (i). Since 2009, there is not a single instance of conviction indicating the poor state of affairs in wildlife crime detection, enquiry and conviction.

Apart from Police, Railway Protection Force (RPF) and Government Railway Police can play crucial role in detecting illegal wildlife trade and consignments of wildlife products travelling through trains but are equally lack understanding of the wildlife crime.

It has also been seen that with changing modus operandi of the criminals, modes of transport also changes and at times airlines have also been used to transport wildlife articles from Guwahati to Imphal. Awareness and priority vis-à-vis Central Industrial Security Force (CISF) and airlines operators themselves is at the lowest for such things to take place right under their control.

Informant Network is an extremely important factor in preventing wildlife crime and within the Park Staff, use of such network is limited. Networking with public is also very much important aspect that is lacking at present and makes wildlife crime enforcement that much difficult.

There is complete lack of systematic information compilation on poachers, traders, linkmen and field-men of rhino horn trade. The problem multiplies with virtually no exchange of information amongst enforcement agencies with regards to wildlife criminals. It has often been seen that a poacher or a linkman has been arrested but multiple cases pending against them are not known to the arresting agency. Therefore bail is obtained easily as "first timer" who then gets back to doing the same business.

On the investigation and prosecution front, lack of dedicated investigation and legal team within the command of Park authority, does pose as a constraint as the field staff has to play multiple roles that eat out valuable time from the protection duty.

5.5 Intelligence and Trans-Boundary Issues

It is no denying that rhino poaching has international connotations, and there are long chains crossing many borders of states and countries. Action within the Park boundaries may result in only partially eliminating the menace of poaching only by delaying by way of eliminating poachers, seizure of arms or inflicting injury upon the poachers. The higher level players in the game do not get affected. The lower rung teams only get assaulted within the park boundaries. This leaves the main organizers of the crime still free to regroup, have new recruits, provide training, get new arms and make another attempt at poaching. The efforts inside the Park, must, therefore, be supplemented by equally strong action outside the Park boundaries.

Several key issues emerge here which must be addressed. Some of these issues are mentioned below:

- Inter-Departmental cooperation, say between Police and Forest is not institutionalized and is based on individual relationships

- Inter-Government cooperation for wildlife crime is relatively new and under-tested ground. There are no proven institutions and mechanisms to achieve this.
- International border issues
- Institutionalized assistance from Interpol.
- Institutionalized cooperation between agencies such as CBI, Directorate of Enforcement, Customs, Bureau of Economic Offences, Army Intelligence

5.6 Permissions for UAV Flying

The terrain of Kaziranga encompasses river Brahmaputra along with its numerous islands, water bodies, grasslands, highlands and woodlands. Given the high incidence of poaching in the Park, aerial surveillance is a must. Use of UAVs have been successfully implemented in South Africa and Chitwan National Park.

The Unmanned Aerial Vehicle (UAV) was test flied for the first time in Kaziranga from 8th to 13th April, 2013. However, subsequently, further flights had to be canceled due to objection from the Ministry of Defence (MoD), Govt. of India. Later on the MoD gave clearance to the Wildlife Institute of India (WII), Dehradun to fly UAVs in Panna Tiger Reserve, but refused to give permissions in Kaziranga.

5.7 Funding Issues

Other than salary component which comes to almost Rs. 13.65 crore annually, the financial support received from the Govt. of India and the State Govt. for last three financial years is given in the Table below:

Scheme	Amount (In Lakh Rupees)		
	2011-12	2012-13	2013-14
Project Tiger	316.27	243.90	550.87
State Plan	39.55	34.86	36.06
Non Plan Scheme	218.95	180.13	260.89
TOTAL	574.77	458.89	847.82

It is observed that there are inadvertent delays in actual release of funds due to the lengthy procedure of proposal submission, examination, queries, clarifications, inter-departmental consultations/ opinions etc.

After formation of the Kaziranga Tiger Conservation Foundation (KTCF) in 2007, as mandated under the Wildlife (Protection) Act, 1972, there is quite a relief. The Foundation now receives all the proceeds of the tourism entry fee. In times of crisis, the Park authorities resort to taking temporary interest free loans from the Foundation to tie over the financial difficulties. When the funds are received from the Govt. subsequently, the same is duly refunded back to the foundation.

In addition, the Park receives support in cash and kind from NGOs such as WWF, WTI, WCT, Aaranyak, WWT, ATREE etc.

5.8 Existing Institutional Mechanisms in Kaziranga

There are several institutional mechanisms such as the Tiger Conservation Plan (TCP), Eco-sensitive Zone, Kaziranga Bio-Diversity Conservation And Development Committee (KBCDC) and Local Advisory Committee (LAC).

5.8.1 Tiger Conservation Plan (TCP):

Preparation of the TCP is a statutory requirement under the section 38V of the Wildlife (Protection) Act, 1972, as amended in 2006. The TCP is a legally enforcing document. In view of the high density tiger presence in the area and reportedly only viable population of tigers in any of the North East India tiger landscapes, Government of India approved the constitution of Kaziranga Tiger Reserve vide their communication No. 3-1/2003-PT dated 5th August 2006. Government of Assam, accordingly, notified Kaziranga Tiger Reserve with total area of 1030 Sq. Km., involving Kaziranga National Park, Additions to KNP, adjoining Reserve Forests and Laokhowa and Burachapori Wildlife Sanctuaries. Section 38 V (3) and (4) of the Wildlife (Protection) Act, 1972 provide for preparation of Tiger Conservation Plan by the State Government to ensure the proper management of the Tiger Reserve area.

The Wildlife (Protection) Act, 1972, as amended in 2006 states that:

“The State Government shall prepare a Tiger Conservation Plan including staff development and deployment plan for the proper management of each area so as to ensure

- Protection of tiger reserve and providing site specific habitat inputs for a viable population of tigers, co-predators and prey animals without distorting the natural prey-predator ecological cycle in the habitat.
- Ecologically compatible land uses in the tiger reserves and areas linking one protected areas or tiger reserve with another for addressing the livelihood concerns of local people, so as to provide dispersal habitats and corridor for spill over population of wild animals from the designated core areas of tiger reserves or from tiger breeding habitats within other protected areas.
- The forestry operations of regular forest divisions and those adjoining tiger reserves are not incompatible with the needs of tiger conservation.

The National Tiger Conservation authority is mandated to approve the Tiger Conservation Plan of Tiger Reserves”

In view of the above the draft Tiger Conservation Plan for the Kaziranga Tiger Reserve has been prepared and sent to NTCA. The NTCA has suggested for some further modifications. The TCP, accordingly is under revision, and would be submitted to NTCA again for approval.

5.8.2 ECO SENSITIVE ZONE:

Purpose of declaring Eco-sensitive Zones:

The purpose of declaring Eco-sensitive Zones around the National Park and sanctuaries is to create some kind of Shock Absorber for the Protected Areas. They would also act as a transition zone from areas of high protection to areas

of lesser protection. As has been decided by the National Board of Wildlife, the activities in the Eco-sensitive zones would be regulatory in nature rather prohibitive nature, unless and otherwise so required.

Extent of Eco-sensitive zones:

Many of the existing protected areas have already undergone tremendous development in close vicinity to their boundaries. Some of the Protected areas actually lying in the urban setup. Therefore the determination of the zonation is kept flexible and PA specific. The width of the Eco-sensitive Zones and types of regulation may differ from PA to PA. However, as a general principle the width of the Eco-sensitive zone could go upto 10 km around the Protected area as provided in the Wildlife Conservation Strategy-2002.

Procedure adopted :

It is pre-requisite that an inventory of the different land use patterns and the different types of activities, types and numbers of industries operating around each of the protected areas as well as corridor be made. For this purpose a small committee comprising the concerned Wildlife Warden, an Ecologist, an official from the Revenue Department of the concerned areas could be formed. The Chief Wildlife Warden could group the activities under the following categories:

- Prohibited
- Restricted with safeguards.
- Permissible

Once the proposal for Eco-sensitive zone has been finalized, the same may be forwarded to the MoEF for further processing and notification.

Kaziranga Eco-sensitive Zone (KEZ)

The Kaziranga Eco-sensitive Zone (hereafter KEZ) is proposed to consist of the following areas:-

I) National Park- Kaziranga National Park (KNP)

1. First addition to KNP
2. Second addition to KNP
3. Third addition to KNP
4. Fourth addition to KNP
5. Fifth addition to KNP
6. Sixth addition to KNP

II) Reserve Forests:

- Panbari Reserve Forest
- Kukurakata Reserve Forest
- Bagser Reserve Forest
- Kamakhya Reserve Forest
- Deosur proposed Reserve Forest

III) Adjacent areas of KNP: Civil area under EAWL& Nagaon Forest Division

IV) Parts of Karbi Anglong District in the vicinity of KNP

Total area of the proposed KEZ is 1326 sq. km (approx)

The Draft proposal for Kaziranga Eco-sensitive Zone has been submitted to the Govt. of India.

5.8.3 Kaziranga Bio-Diversity Conservation And Development Committee

The Kaziranga Bio-diversity Conservation and Development Committee (KBCDC) was constituted on 1st December, 2008 by the order of the Governor of Assam to examine the matter in holistic manner and also suggest in respect of infrastructural development for better conservation of wildlife along with further development and maintenance of proper bio-diversity in the world heritage site of Kaziranga. The Committee is headed by the Hon'ble Minister, Env & Forest, Govt. of Assam.

A **Sub-Committee** was constituted on 19th June, 2009 which would delve into the matter of growth of tourism zone around Kaziranga National Park and related uncontrolled infrastructure development and other connected and /or incidental activities, their impact on KNP ecosystem and protection of its wild inhabitants. The Committee would suggest measures including legislation to streamline infrastructure development and other connected and /or incidental activities and conservation and protection of KNP bio-diversity as well as promotion of sustainable tourism befitting status of KNP as World Heritage Site. The Principal Secretary, Env. & Forest, Govt. of Assam chairs the sub committee.

After its inception The Kaziranga Bio-diversity Conservation and Development Committee met five times:

1. 5th February, 2009- held at the office chamber of the Hon'ble Minister Environment and Forest Department, Assam, Guwahati.
2. 31st August, 2009- held at Assam State Zoo, Guwahati.
3. 6th October, 2010- held at Kaziranga National Park.
4. 29th December, 2010- held at Kaziranga National Park.
5. 4th January, 2012-held at Kaziranga National Park.

Various important deliberations of the Committee and the Sub Committee are are briefly enumerated here:-

Meeting	Decisions/ Deliberations	Action Points
1 st Meeting	<p>The Chairperson explained the impact of uncontrolled tourism, infrastructure development on the ecosystem of Kaziranga National Park.</p> <p>The PCCF talked about creating a tourism zone with the help of legislation</p> <p>The Chairperson proposed constitution of a sub committee to look into the issues of infrastructure development and regulation of</p>	<p>Sub Committee constituted on 19th June, 2009</p>

	such activities	
2 nd Meeting (1 st Meeting of the Sub Committee)	<p>Revenue officials survey showed presence of 1200 dhabas, hotels and resorts. NOC issued from gram panchayats. No permission under Sarai Act was given.</p> <p>It was decided to issue show cause notice for violation of rules (for change of land use type) and cancellation of patta in case the respondent did not respond.</p> <p>For changing land use, NOC to be obtained from KNP authority</p> <p>Draft Vision of KNP to include socio-cultural, demography, livelihood alternatives and income security issues.</p> <p>Creation of a new Regulatory Body with new set of rules to deal with emerging hazardous development trends</p> <p>Exploring the possibility of making KBCDC a permanent body</p>	<p>Action: Revenue Deptt.</p> <p>Action: Forest Deptt</p>
3 rd Meeting (2 nd meeting of the Sub Committee)	<p>Notices to encroachers on Govt land to be issued.</p> <p>Before giving permission for any construction related to hospitality sector i.e. hotels, dhabas, resorts etc. under the Sarai Act, NOC from Director KNP to be obtained.</p> <p>Any unauthorized establishment coming up in the natural corridors should be stopped and action be taken for its removal. Old constructions should be mapped and reviewed and the best measure to overcome the the problem of animal corridor should be worked out and action taken accordingly after due compliance with rules and procedures.</p> <p>The Director KNP suggested dividing the area in question into zones no or varying degree of development to be finalized jointly by the Revenue and Forest officials.</p> <p>It was decided to make a request to the Hon'ble Chief Minister the parts of Karbi Anglong to be included in the landscape of KNP.</p>	

	<p>Unauthorized construction detected within a period of 60 days from this meeting would be stopped forthwith by concerned officers.</p> <p>All encroachment cases must be cleared within a period of two months.</p> <p>Draft Rules for regulating various activities in the vicinity of KNP to be made ready and presented before the Committee within a period of two months. For zoning of areas, a physical map be prepared and brought in the next meeting</p>	
4 th Meeting (3 rd Meeting of the Sub Committee)	<p>If Eco-sensitive Zone proposal did not include karbi Anglong areas, or did not have enough regulatory provisions, the same should be withdrawn from the Govt of India and resubmitted. Revised proposal should be placed before the Sub Committee.</p> <p>The Kaziranga National Park management to place before the sub committee all its recommendations for regulating infrastructure development adjacent to the Park.</p>	
5 th Meeting (4 th Meeting of the Sub Committee)	<p>It was noted by the members that the Eco-sensitive zone will not be only a time consuming process but also would not take care of all the challenges faced by the KNP.</p> <p>After deliberation, the members felt that the only option left was to enact a specific piece of legislation aimed at regulating uncontrolled, haphazard growth of infrastructure and commercial land use in greater Kaziranga. This legislation should be so drafted that it can address all the diverse issues confronting Kaziranga such as changing land use, issues concerning river and road safety etc.</p> <p>A proposal may be moved for seeking in principal approval of the Govt. of assam for bringing a draft legislation "Assam Land Use Regulation Act for Greater Kaziranga".</p>	

	<p>The task should be assigned to Sri LC Singhi IAS (Retd) for drafting the legislation in about 30 days time. Sri. SR Bardhan ACS, SDO(C), Kaliabor and Sri R.G. Garawad IFS, DFO, WAWL, Tezpur to assist Sri Singhi. Funds to be provided from the KTCF for honorarium and logistic support. The KBCD to approve the legislation.</p>	
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NOC granted by Kaziranga authorities:

As per the decisions of the KBCD, all sale permissions in and around Kaziranga National Park require a No Object Certificate (NOC) from the Director, Kaziranga National Park. So far 24 NOCs have been issued by the Director, Kaziranga National Park all within the Kaliabor Civil Sub Division. Out of these, 21 NOCs have been granted on conditions of "No Change of Land Use". Only in three cases for which NOCs were issued on the 21st of August, 2012, were directly given to developers and involved change to commercial land use, but it stated that "Land has been used by wild animals".

So far, 50 applications for NOC are pending with Director, Kaziranga National Park, mostly belonging to Mauza Duarbagori in Kaliabor Civil Sub Division. The the NOCs issued and a list of pending applications has recently been uploaded on the new portal of Kaziranga namely <http://kaziranga.assam.gov.in>.

5.8.4 Local Advisory Committee

Local Advisory Committee is a statutory body and was constituted under section 38o (1) (c) of the Wildlife (Protection) Act, 1972. It has the following functions:-

- to review the tourism strategy with respect to the tiger reserve and make recommendation to the State Government.
- to ensure computation of reserve specific carrying capacity and its implementation through periodic reviews.
- to ensure site specific norms on buildings and infrastructure in areas inside and close to KTR keeping in view the corridor value and ecological aesthetics.
- To advise local self Government and State Government on issues relating to development of tourism in and around KTR.
- To monitor regularly (at least half yearly) all tourist facilities in and around tiger reserve vis-a -vis environmental clearances, area of coverage, ownership, type of construction, number of employee, etc, for suggesting mitigation and retrofitting measures if needed.
- To monitor regularly activities of tour operators to ensure that they do not cause disturbance to animals while taking visitors into the KTR.
- To encourage tourism industry to augment employment opportunities for members of local communities.

The Committee is chaired by the Divisional Commissioner, Upper Assam Division, Jorhat and has the three Deputy Commissioners of Golaghat, Nagaon and Sonitpur as members along with the concerned DFOs, local MLA and other local stakeholders.

The LAC sat on the 6th November, 2013 for the first time and the following key decisions were arrived at:-

- The Govt. land reserved for Kaziranga National Park, north of NH37 will be identified by the concerned authorities and handed over to Kaziranga National Park for creating highlands.
- The Committee decided to constitute a sub committee to formulate a strategy to stop change of land use pattern.
- The Chairperson suggested to draft a document to constitute a development authority and related legislation to monitor the land use pattern and development in the fringe areas of Kaziranga Tiger Reserved
- The members expressed serious concern over mushrooming of dhabas and their barrier effect on animal crossing during floods. The Chairperson suggested that concerned revenue authorities would examine legal aspect of their presence along NH37 and take necessary action.

5.8.5 Committee on De-horning of Rhinos in Assam

The Principal Chief Conservator of Forests (Wildlife) & Chief Wildlife Warden, Assam vide Notification No. 970 Dt. 11th February, 2014 notified a 10 member committee to ascertain the feasibility and necessity for de-horning of translocated rhinos in Assam. The Terms of Reference of the Committee included among others:-

- The committee will decide whether de-horning will be a viable option to meet the goal of setting up a new population from among the translocated rhinos by ensuring their safety from poachers for an initial period of 10 years.
- The committee will examine the veterinary implications, if any, that may arise due to de-horning, by consulting various sources, national and international.
- The committee should take opinion from the public by providing them atleast 7 days to time to respond over email or general mail to an identified address. The call for public opinion in written form should be advertised through Janasanjog in atleast one widely circulated English and Assamese daily...
- The committee will submit their report within 3 months from the date of this notification.

The intentions of the committee were largely misunderstood by the public and media, as if rhinos of Kaziranga are going to be de-horned, and it led to a huge public outcry and criticism of the Government. The committee has come of the view that de-horning was not a practical solution at all; and hence, did not recommend the same.

5.8.6 Committee for Preparation of Comprehensive Rhino Conservation Plan for Assam

A Committee was constituted by the PCCF (WL) and the Chief Wildlife Warden, Assam vide his office order No. 977 Dtd. 08.02.2014 for preparation of a comprehensive rhino conservation plan for Assam. The 1st meeting of the Committee was held on the 4th May,

2014. The Committee carried out a SWOT analysis of the rhino conservation in Assam. Some of the salient decisions taken by the Committee are as mentioned below:-

- All rhino bearing park managers will prepare PA specific rhino conservation plan pertaining to their PA with proper justification on the requirements for the PAs under their control in consultation with NGOs/ Researchers/ Academic institutions where required.
- Data on existing manpower, infrastructure, census figures to be provided by the PA managers.
- The Plan would cover initially a period of 10 years (3 years short term and 10 years long term)

5.8.7 Anti Rhino Poaching Task Force (ARPTF)

The Govt. of Assam, vide their order No. FRW.2/2014/2 Dt. 16th May, 2014 constituted the "Anti Rhino Poaching Task Force" a Special Task Force under the overall supervision of the Addl DG (P), STF, Assam with the three Superintendents of Police of Golaghat, Nagaon, Sonitpur and Karbi Anglong districts along with the Park authorities. The Director, Kaziranga National Park is a member of the ARPTF.

The Task Force has already started its operations in the last week of May, 2014 as many as 15 arrests of poachers were made by police and forest personnel in a series of commando based raids.

5.9 Wildlife laws in International Perspective

Internationally one finds that rhinoceros bearing areas are confined to South Africa and some other neighbouring countries such as Kenya, Zimbabwe, Malawi etc in the African continent, India, Nepal and Indonesia in the Asian continent. The rhino poaching issues are very alarming in the African countries. However, for past couple of years, poaching seems to have been brought under control in Chitwan National Park in Nepal. Each of the rhino bearing countries have their own enactments for protection of the rhinos. Its worth learning lessons from some of these.

5.9.1 Nepal Enactment on Wildlife Conservation

The Government of Nepal enacted the National Parks and Wildlife Conservation Act, 2029 (1973). The Act defines various conservation entities such as National Park, Strict nature Reserve, Wildlife Reserve, Hunting Reserve and Reserve, Conservation Area and Buffer Zone.

Under section 26 (1), the wildlife offenses are punishable with fine of Rs. Fifty to one hundred thousand rupees and or imprisonment ranging from five to 15 years or both. Under section 27, the accomplices would get half the punishment given to the principal offender. Another major step taken by the Nepal Govt. which is worth emulating in Assam, especially in Kaziranga, is that the Govt in Nepal has awarded magisterial powers to the Chief Warden (equivalent to the Field Director/ Director) and the DFOs to sentence culprits caught with evidence of involvement in poaching or trafficking in wildlife parts, and sentence them to jail terms. The convicted persons would have to appeal their cases through regular courts either to get relief or have their sentences reduced or confirmed.

This tremendously helps in keeping offenders from indulging in crimes repeatedly, unlike in Assam where poachers are almost free to continue poaching after out on bail.

Though the Royal Chitwan National Park is patrolled by the Army, there are issues in coordination, monitoring and management. When the Army units change, the Park authorities have to start afresh everything they did with the previous unit. There are often issues of law and order in the fringe villages who once in a while fall victim to Army excesses.

5.9.2 South Africa/ Kenya Enactments on Wildlife Conservation

The enactments of South Africa and Kenya seem to be very elaborate and encompass the entire gamut of wildlife conservation. The Acts define such terms as "conservation area", "corridor", "dealer", "ecosystem", "endangered ecosystem", "habitat", "invasive species", "national park", "protected area", "threatened ecosystem", "wildlife conservancy", "wildlife conservation area" etc. Another feature worth mentioning is the provision of "conservation orders" and easements for private participation in conservation by way of which a landowner may enter into agreement with conservancy agencies to further the cause of wildlife conservation.

The Act provides for use of fire arms by the members of the Kenya Wildlife Service, under conditions which are worth noting:-

1. in the course of law enforcement against—
 - any person charged with an offence punishable under this Act, when that person is escaping or attempting to escape lawful custody;
 - any person who, by force, removes or attempts to remove any other person from lawful custody;
 - any person who, by force, attempts to prevent the lawful arrest of himself or any other person; or
 - any person unlawfully hunting any wildlife using a firearm;
2. in self-defense or in defense of another officer or other person;
3. for the protection of people and property against any animal causing destruction to human life or crops or livestock or property;
4. for the protection and safety of visitors against banditry or animals;
5. in the course of problem animal control; and
6. wildlife veterinary activities.

The Act provides a series of punishment for varied wildlife crime which include:

- Offences against "Management Plan"
 - Whoever contravenes a management plan
 - Whoever fraudulently alters a management plan
 - punishment: fine 500,000 shillings and or imprisonment for 2 or more years
- Whoever introduces "invasive species" in a wildlife conservation area
 - punishment: fine 300,000 shillings and or imprisonment for 1 year or more
- Possession of wildlife trophy illegally invites 100,000 shillings fine and or imprisonment not less than 5 years
- Whoever hunts for bush-meat

- punishment: fine 200,000 shillings and or imprisonment for 1 year or more
- Whoever illegally exports or imports wildlife species
 - punishment: fine 10,000,000 shillings and or imprisonment for 5 years or more
- Whoever makes a false statement / claim before a Service officer,
 - punishment: fine 100,000 shillings and or imprisonment for six months or more
- Whoever enters without permission into a national park, carries arms,, causes fire etc.
 - punishment: fine 200,000 shillings and or imprisonment for 2 years or more

These Acts are comprehensive as they deal with environment, forests and wildlife, wildlife service, conservation, wildlife endowment fund, wildlife and conservation easements and international treaties/ CITES etc. There also appears to be a single chain of command for implementation of the Acts. The Act itself empowers the Service personnel to fly their own aircrafts over the parks and conservation areas and at the same time prohibits other flights crossing/ hovering/ landing in such areas.

Some of the documents, which were examined by the author, for filing of offence reports pertaining to wildlife, clearly indicate that each section that has been violated needs to be mentioned exclusively giving details of the offenders.

5.10 Crime and Punishment

Criminal jurisprudence has a long history and can be traced back to treatises such as Manu Smriti, or even to Aristotle and Plato. However, what is remarkably different today than the days when the foundation of criminal jurisprudence must have been laid down. Crimes against society or State or Sovereign were acts against another individual or threatened the orderly manners of the society or State. Crime against mother nature and wildlife and forestry is a crime against society or State, and as such it did find adequate place in ancient criminal jurisprudence. Kautilya's Arthshashtra does talk of even death punishment who hunt in nature reserves kept for the exclusive use by the royalty or on killing of animals such as elephants. Crime against man such as murder and rape are seen as the most heinous crimes in society and there are provisions for highest degree of punishment to the culprits. Crime against nature, forestry, environment and wildlife is largely seen as crime which can largely be settled by fines or at best few years of imprisonment. However, the larger questions remains to be examined whether crime against nature weighs heavier or crime against man. Who's crime weighs heavier Mr. A guilty of killing a rhinoceros in cold blood in the wild habitats of Kaziranga or that of Mr. B charged with murdering a man? To my mind modern criminal jurisprudence does not have an answer to this, as its evolved from crime against man and society in the times when environment or ecosystems were not threatened, or there were no ozone holes or there were no threats from green house gases or biodiversity was not threatened or atleast perceived to be plenty and replenishable. The foundations of modern jurisprudence were laid when there was no threat to human civilization from climate change threatened by anthropogenic activities. The foundations of modern jurisprudence were laid when hunting wildlife for food and sport was as common as killing pests and vermins. Cutting a forest and encroaching upon it and settling down there is no crime when compared with slaughter of people in several villages. Cutting of forests that sustain the ecological

balance in nature, disruption of which would actually murder the whole society silently in the distant future is only a crime which can at best be dispensed with fines and a few years of imprisonment at best. The criminal jurisprudence does not realize that there are crimes that erode the very root of existence of all civilizations on this earth silently, and these crime are far more heinous than murder. Who would be responsible if the river Ganges dries tomorrow and there is not a drop of water in it? Is any one responsible for the dirty and muddy waters of the river Yamuna? What if the river Brahmaputra becomes a bed of desert in a century to come, just because the people wantonly cut and settled on the hill slopes? Who can be punished for crimes for which the entire society shall have to pay dearly? The question is that if Kaziranga were to disappear from the face of the earth, or the Greater One Horned Rhinoceros were to be extinct, can any amount of moneys and penalties get them back? If the answer is yes, then probably modern criminal jurisprudence can sustain itself in the manner it stands today. But if the answer is no, then who in society is responsible for heinous crimes as death of the Brahmaputra or extinction of the rhino or incessant floods that would pester every now and then? To my mind, criminal jurisprudence needs to be re-looked when one is talking of crime against nature, environment, forests and wildlife. Such crimes must, to my mind, be described as most heinous such as crime against the whole society, and must carry severe-most punishments possible. Crime against man, an animal which is found in great abundance and one who is largely responsible for destroying nature and ecosystems, must take a back seat when crime against mother nature is on the examination table. Criminal laws pertaining to violation of environment, pollution, wildlife and forestry must be re-framed under a new criminal jurisprudence that sets apart such crimes as the ones that must be nipped in the bud at the slightest pretext, else the existence of the whole humanity would be at stake.

The Wildlife (Protection)(Assam Amendment) Act, 2009 promulgated by the Government of Assam gains considerable significance as a new leaf in criminal jurisprudence pertaining to crime against nature and wildlife. However, a lot more is required to be done so that criminals of rhino poaching get the most severe punishments. In the sections below, three key issues namely provisions of bail, life imprisonment and wild animal rights have been discussed.

5.10.1 Bail

The concept of bail in criminal jurisprudence is significant by which a criminal is allowed to come back to society by furnishing "guarantees" or "sureties" or "bonds" that would ensure his presence before the trial court or any other authority if required. The main reasons for refusing bail according to the Bail Act 1976 are that there are substantial grounds for believing that the defendant (1) will abscond; (2) will commit further offences whilst on bail; or (3) will interfere with witnesses. It has been observed that the trial courts award bail to rhino poachers who come back and again start poaching.

The question here is whether human freedom is more important or preventing the rhinoceros from extinction at any cost. Though in denying bail, there could be questions of certain rights or even questions of natural justice or even question of denying justice, but all such considerations should not outweigh the fact that even to think (*mens rea*) to kill a rhinoceros or to plan or to collude in planning or making preparations to kill a rhinoceros are fraught with great dangers to the society's existence on this earth. Therefore, criminals brought before the trial courts, must not be given bail as a matter of one of the very basic

principles of criminal jurisprudence pertaining to crime against nature, environment forestry and wildlife. The arguments that "the object of bail is neither punitive nor preventative, deprivation of liberty must be considered a punishment, the courts owe more than verbal respect to the principle that punishment begins after conviction, that every man is deemed to be innocent until duly tried and duly found guilty, that detention in custody pending completion of trial could be a cause of great hardship, and that any imprisonment before conviction has a substantial punitive content and it would be improper for any Court to refuse bail as a mark of disapproval of former conduct whether the accused has been convicted for it or not or to refuse bail to an un-convicted person for the purpose of giving him a taste of imprisonment as a lesson" are very good for crimes committed against man, but not against nature, environment, forestry and wildlife. What use is that liberty that can endanger the very existence of civilization or that can drive a species to extinction? Further, criminal justice against environment, forestry and wildlife cannot be said to be complete as there is no one to speak on behalf of the poor trees and animals who cannot express their agony by engaging a learned counsel. Therefore, the benefit of doubt must tilt towards them who can never be represented in a court of law.

Bail has been provided for under Section 436 of the CrPC, 1973. Under the Section 437(3), it is clearly laid down as follows:

When a person accused or suspected of the commission of an offence punishable with imprisonment which may extend to seven years or more or of an offence under Chapter VI, Chapter XVI or Chapter XVII of the Indian Penal Code(45 of 1860) or abetment of, or conspiracy or attempt to commit, any such offence, is released on bail under sub-section (1), the Court may impose any condition which the Court considers necessary-

(a) in order to ensure that such person shall attend in accordance with the conditions of the bond executed under this Chapter, or

(b) in order to ensure that such person shall not commit an offence similar to the offence of which he is accused or of the commission of which he is suspected, or

(c) otherwise in the interests of justice.

The question remains as to how the provisions of the Section 437(3)(b) be enforced by the trial court, so that a person released on bail does not again get engaged in either planning or colluding or actually killing/ attempting to kill (actus reus) a rhino? What are those conditions that a court can impose upon an accused released on bail to enforce the provisions of Section 437(3)(b)?

There is provision of anticipatory bail under section 438 of the CrPC. However, when the crime involved is likely to be crime against nature, environment, forestry and wildlife, bail ought to be refused, as these are extra-ordinary crimes. The criminal jurisprudence needs to be modified/ amended to deal with such crimes sternly. The reason being that the law makers of the yore never could have realized that environment and ecosystems which are life supporting could have been threatened by criminal activities of mankind. Nature has always been thought to be perpetual, in abundance and never ceasing. All these assumptions do not hold today. If the mankind behaves properly and pays the price for its wrong doings in the past, chances are that humans may continue to inhabit the earth for a

little less than the time when the sun shall suck the earth into its mantle, or overwhelm the planet with its extra-ordinary heat, and that would be still more than 3.5 billion years from now. However, if we continue to abuse our environment, forests, wildlife and ecosystems, chances are bright that human race may not even last a century, what to speak of a billion or even a million years. Therefore, its time that a new criminal jurisprudence is brought to practice to firmly deal with crime pertaining to environment, forestry and wildlife.

5.10.2 Life Imprisonment

The Wildlife (Protection) (Assam Amendment) Act, 2009 has in a single stroke laid the foundations of a new criminal jurisprudence for crimes pertaining to wildlife in Assam, by modifying a central Act, namely the Wildlife (Protection) Act, 1972. Therefore, this piece of legislation becomes original in thought, seminal and historic. The minimum imprisonment term prescribed has been amended to "seven years" from the original "three years"; and for a second and subsequent offence, the imprisonment term prescribed has been amended to "life imprisonment" from the original "seven years".

Therefore, it becomes very important to dwell upon "life imprisonment" for a while. It has been learnt that the courts in South Africa and Kenya are inflicting imprisonment even upto 29 years in case of wildlife offences. In India, the Assam amendment is the only enactment that provides for "life imprisonment" in subsequent wildlife crimes. However, there has always been confusion as to what constitutes a life imprisonment. In common parlance, a minimum term of 14 years in jail is broadly seen as life imprisonment, as the term is nowhere defined. The Hon'ble Supreme Court, of late, has issued certain clear cut directions in this regard, which are worth noting. The Supreme Court has ruled that in murder cases the convict sentenced to life imprisonment cannot claim any automatic right to be released after serving a minimum 14 years sentence, except under extraordinary Constitutional provisions. The apex court further held that in case of life imprisonment, a convict should serve a minimum of 14 years imprisonment. A bench of Justices Altamas Kabir and Cyriac Joseph made the remarks while directing Chattisgarh government to ensure that the convict Ramraj sentenced to life imprisonment serves at least a minimum of 20 years. "In the various decisions rendered after the decision in Godse's case, 'imprisonment for life' has been repeatedly held to mean imprisonment for the natural life term of a convict, though the actual period of imprisonment may stand reduced on account of remissions earned. But in no case, with the possible exception of the powers vested in the President under Article 72 of the Constitution and the power vested in the Governor under Article 161 of the Constitution, even with remission earned can a sentence of imprisonment for life be reduced to below 14 years," the apex court said.

Therefore, two things are very clear that life imprisonment cannot be less than 14 years in any case; and that life imprisonment means term for life, unless certain express conditions are invoked. It is well known that clemency of the highest offices of the Governors of the States and the President of India is sought by relatives of such convicts. There is also a practice that on certain occasions such as the Independence Day or the Republic Day, offences of such criminals gets commuted, or certain prisoners are freed.

Though no one has yet been brought to book even once under the Wildlife (Protection) (Assam Amendment) Act, 2009, there are good chances that a few of the cases may even reach this stage. In course of time, it would become important to ensure that criminals

convicted of life imprisonment do not have chances of getting their terms commuted on any ground. This would make the foundations of a new criminal jurisprudence pertaining to crimes against environment, forestry and wildlife more solid and capable of ensuring that the very basic fabric of life support systems are not damaged in the least by criminals.

5.10.3 Environment, Forestry Wildlife Rights

"Human Rights" is a very well understood as a super crime against humanity, and carries grave consequences of its violation, especially for erring officials and institutions, including the Governments. The question is what rights are violated when a stream dried up for good? Or when a river ceases to carry clean water in its folds and started to transport polluted water? Or when ground water gets so heavily exploited that it pumps out only arsenic? Or who shall be responsible when a group of people have cleared the forests and deprived the wildlife of their life support system? Who is to be held responsible for encroaching upon the land that once rightfully belonged to the elephants and rhinoceros? Who would adjudicate if crime against wildlife and forestry is committed, and who would speak for the mute animals and trees; and who would ensure that human justice is not totally biased against the wildlife and forests? Therefore, there is a good case for a Environment, Forestry and Wildlife Rights Commission who speak for the cause of those who cannot speak.

Though Nepal Govt. has already set an extra-ordinary example in this regard by declaring their Chief Wardens and DFOs as magistrates who can pass sentences of fine and imprisonment, against which the accused is free to file an appeal in an appropriate court of law. This is also what we need to do in India. Of course those arguing against the motion would be saying loudly, how can "you be a judge in your own case?" My argument is that a Forest Officer passing judgment and imposing imprisonment as punishment in case the accused is found guilty is not a judge in his own cause. If necessary, the new system of Nepal needs to be studied and a sound system of legal remedy in the first instance itself needs to be devised so that criminals perpetrating heinous crimes against environment, forests and wildlife are brought to book speedily.

Protectors can also turn criminals. In this case, the environment laws of Kenya have a lesson or two to be learnt. Violations of approved Management Plans or Tiger Conservation Plans (TCP) would be criminal and those responsible for it must be brought to book. The Forest officers at higher level can be empowered to inflict punishment, if lower ranks are found to be involved in such infringements. However, if the Government as a whole, is responsible for its lackadaisical attitude and indifference, then this becomes a fit case to be tried before the Environment, Forestry and Wildlife Rights Commission.

Whatever the case be, or the institutional arrangements or systems of governance the basic principle should remain the same that crime against environment, forests and wildlife are the worst of crimes, and nothing can be more serious than these, not even human rights violations; and ever if a question arises as to which rights shall get higher priority, it shall not be the human rights. *Else the doom of mankind is writ large, and no one has the power to stop it.*

5.11 Rhino Protocols

Currently there are too few protocols on rhino and its various facets of management and administration. Rhino being restricted to few geographical areas such as South Africa, Kenya, Zimbabwe, Malawi etc in the African continent, parts of India (Assam, north Bengal and Dudhwa), Nepal and Indonesia, it is the responsibility of these countries and governments to define the systems and protocols for appropriate and scientific management and administration of the rhino bearing areas. The Government of Assam has constituted a committee vide order No. 979 Dt. 18th February, 2014 in the office of the PCCF(Wildlife) & Chief Wildlife Warden, Assam, to develop a Standard Operating Protocol for Rescue of Stray Rhinos. The committee is yet to submit its recommendations.

There are several areas where protocols are required, though some sort of ad hoc management is in place. NTCA has come up with excellent protocols on tigers starting from census to reporting a death of a tiger. Similarly for rhinos, the good practices across the rhino bearing areas and depending upon local conditions, local laws and suitability of the methods, needs to be assembled together into Standard Operating Procedure/ Protocols; and if possible these should be made enforceable by law, wherever required, especially death of a rhino, stockpile and custody of rhino horns, disposal of toe nails etc. The crime scene investigation of a rhino poaching ought to be handled through a standard protocol. An attempt has been made to present a few of such protocols in the Part II of this Report (which have been compiled based on inputs received from experts and or stakeholders)

5.12 Conclusions

The following are the salient points of the discussion above:

1. The State amendment of the Wildlife (Protection) Act, 1972 has given altogether a new dimension to the wildlife crime, hitherto unknown. However, it requires further amendments to give it more teeth.
2. The forest staff has now immunity in using fire arms
3. The provisions of Sarai Act has not been implemented
4. There are several lacunae in wildlife crime investigation and prosecution
5. There are limitations and issues in intelligence gathering and trans-boundary cooperation
6. The Ministry of Defence has refused permission to Kaziranga to fly UAVs.
7. The fund allocation is very meager.
8. There are recommendations by the KBCDC and the LAC to form an Authority to regulate development around Kaziranga.
9. There are international best practices to learn from.
10. The wildlife jurisprudence needs a fresh thinking.
11. Protocols on rhino are lacking.

CHAPTER 6

6 Rhino Population Dynamics

This Chapter initially provides a brief description of rhinoceros, followed by world population. Thereafter, it describes briefly the rhino population in Kaziranga National Park.

6.1 About Rhinoceros In Brief

The word 'Rhinoceros' is a combination of two Greek words - Rhino means nose and Keros means horn, that is a creature with horn on its nose. Fossils discovered in many locations in North America, Europe, Africa and Asia confirms the first appearance of Rhino like animals i.e. Hyrachus on earth 60-40 million years ago. Its size was somewhat between that of a large dog and a horse. After 20-30 million years Hyrachus developed long slender legs with three toes on each foot and were known as Hyracodon. A lot more changes occurred in the Rhino throughout the period. Around one million year ago the Rhino like animal was called as Coelodonta, i.e. woolly rhinoceros.

Geological upheavals, climatic changes as well as biotic factors have ensured that most of the several dozen genera of the family Rhinocerotidae have become extinct. **At present there are only five species in the world, two in Southern & Eastern Africa and three in tropical Asia.** All five extant species today are also threatened with extinction due to interference by man. Due to its present status it has been included in the Appendix-I of CITES and Indian Rhino has been included in the schedule-I of Wildlife (Protection) Act, 1972.

- **The African White or Squaretipped Rhinoceros (*Carathoerium simum*):** Average weight is 3.6 tons and average shoulder height is 198 cm. The actual colour is grey. White word comes from the African word "Weit" i.e. wide square mouth of the animal. It is the biggest [Comments by Richard Emslie: *NO it is not the largest - the White rhino (or possible GOH) is the largest rhino. BR are quite a bit smaller than WR and GOH Rhino. There is not much to chose between GOH and Whites in terms of size.*] of all the five Rhinos and also the second largest terrestrial mammal after the elephant. It has two horns on its nose, anterior one larger than the posterior. Only male has horns. It is a grazer.
- **The African Black Rhino (*Diceros bicornis*):** Average weight 1.5 to 2.0 tons and shoulder height is 160 to 170 cm. It has two horns. It is a browser.
- **The Asiatic two Horned or Sumatran Rhino (*Dicrorhinus sumatrensis*):** The average weight is 0.85 to 1.0 ton and shoulder height 120 to 130 cm. It is the smallest of the five, and population is around 100. Being two horned it forms a link between Asiatic and African Rhino. It is the only Rhino, which has hair on its body. [Comments by Richard Emslie: *the Sumatran is the hairiest by far and hair can be visible on its flanks but other rhinos can also have hair even at very sparse densities. BR and WR also have hair on the tips of their ears*]
- **The lesser One Horned or Javan Rhino (*Rhinoceros sondaicus*):** The average weight is around 1.5 to 1.3 tons and shoulder height is 160-175 cm. It has a single horn. It is currently confined to only one population.
- **The Great Indian One Horned Rhinoceros (*Rhinoceros unicornis*):** The average weight is 2.0 tons and shoulder height 170-180 cm. Male & female both has horn and also of almost equal length. The horn length is 35- 40 cm. It is a mixed feeder.

Fossil remnants show that all the 3 species of Asiatic Rhino were to be found in India in the prehistoric past. Asiatic species have heavy folds on their body in comparison to African ones. Though the skin of Greater One Horned Rhino like the others is unusually thick & seems to be impenetrable, in reality it is quite soft and is easily cut by a knife or penetrated. Rhino's vision is extremely poor but sense of hearing and smell are acute. In Indian Rhinos it is very difficult to distinguish a male from a female, but the female skull is slightly thinner and base of the horn narrower and horn slimmer. The horn of rhino is not a true horn because it does not have a core of bone. Instead it is a compact mass of keratin fibres, not fixed to the skull, but resting on a bony cushion. The rhinos could be browse, grazer or having mixed feeding habits. [Comments by Richard Emslie: *Not all are browsers. The white rhino is a grazer. The black is a browser and GOH a mixed feeder eating browse and grass. White rhino also do not only favour open areas as the broadleaved, highly palatable and favoured Panicum maximum and Panicum deustum grasses are found growing under tree canopies.*] i.e. However, the GOH rhino was more adapted to live in woodlands. It was restricted to the alluvial plains of mega Rivers such as Indus, Ganges, Yamuna and Brahmaputra. It remained confined to the Northern half of the Indian subcontinent. It was also found in plain, marshy, riverine terrains at a higher elevation such as Chitwan in Nepal and Bhutan on the foothills of Eastern Himalaya i.e. Manas & Jaldapara. The largest resident population occurs in the Kaziranga National Park.

In case of the GOH rhino, mating is the only activity that brings the male & female together or else they are solitary in nature. There is no fixed season for mating. The average age of sexual maturity of female rhino is 8-9 years and for male 9-10 years. Female rhino is polyestrous, with an estrus cycle of 46-48 days, and remains for 2-3 days. When a female rhino comes to estrus it urinates frequently and runs to and fro and shows an air of restlessness, intake of food becomes low. A male will detect the pheromone in urine of the female and will be aroused for mating. A pregnancy may be detected only at least 6 months after conception, when there is a swelling of her underbelly. Before delivery her stomach almost touches the ground. Gestation period of the rhino is 16-18 months. Single birth is a rule and give birth to fully developed ones i.e. precocial. Delivery is anterior i.e. head and forelegs comes out first. The newborn calf is completely red in colour & after 3-4 weeks changes into greyish colour. Average lying out period is one day. The average intercalving period is three and half years [Comments by Richard Emslie: *3.5 years as an average is a little long and in Africa would be indicative of a population probably above its maximum productivity density. Under ideal conditions where densities are below Ecological Carrying Capacity (ECC) both Black and White rhinos can have average intercalving intervals of around 2 to 2.5 years. No reason to think that GOH should have any different demography. In Africa we would consider ICI's of <2.5 years as good to excellent. 2.5-3 as good to moderate, 3-3.5 moderate to poor and >3.5 as poor to very poor. This may suggest that you have nothing to lose by translocating more rhino to found or boost GOH populations in other areas. Ultimately if you hardly remove any rhino then if dispersal is prevented densities are likely to increase to the point the productivity suffers.*] Average suckling period for rhinos is 18 months. At the age of 4 years, rhino calf attains relative physical maturity and afterwards the growth is slow. The average life span of a rhino is 40 years. In captivity, it could go a bit higher, or could be reduced much in the wild.

The GOH Rhino is an indicator species of the wetland ecosystem, are of the richest & most productive ecosystems of the world. By studying the rhino we can learn a lot about the wetland ecosystem. Study of rhino requires a lot more conservation, protection & awareness about rhino.

6.1.1 World Population Of Rhinoceros

The table below shows that the world population of the rhinoceros species is struggling to survive today.

Species of Rhinoceros	World Population
African White Rhino	
Northern (Ceratotherium simum cottoni)	4
Southern (Ceratotherium simum simum)	20,420
African Black Rhinoceros	
Eastern (Diceros bicornis michaeli)	799
South western (Diceros bicornis bicornis)	1,960
South central (Diceros bicornis minor)	2,320
Black Rhino total	5,080
Southern Asian Rhinoceros	
Greater One Horned Rhinoceros (Rhinoceros unicornis)	3,333
Javan Rhinoceros (Rhinoceros sondaicus)	35-45
Sumatran Rhinoceros (Dicerorhinus sumatrensis)	< 100

The rhinoceros have been hunted since time immemorial for their horn, skin and nails. The distribution of species was fairly well all across the terai region in India in the past. Incessant hunting, for example, has reduced the territory of the rhinoceros in India to the Brahmaputra valley grasslands.

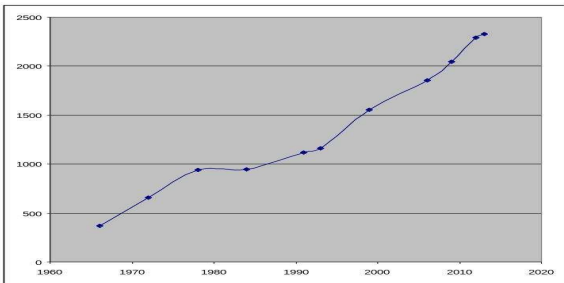
6.2 Rhino Population of Kaziranga

The rhino population of Kaziranga have grown out of the handful, reportedly twenty pairs in 1905 to an impressive number of 2329 (direct count, 2013). The population survived some of the highest poachings in 1980s and 1990s. The population growth of the species is given in the table below:

Year	Count
1966	366
1972	658
1978	939
1984	946

1991	1120
1993	1164
1999	1552
2006	1855
2009	2048
2012	2290
2013	2329

[Comments of Richard Emslie: *Would be good to also show the Kaz numbers as a graph showing the success story. Maybe there is a danger here in that someone may think "What is the problem?". If so could add a comment like – While numbers continue to increase, poaching has also increased in recent years. While current levels of poaching are sustainable (there are still more births than deaths in the population) it will be necessary to redouble efforts to prevent poaching escalating further and reaching the tipping point where deaths start to exceed births and rhino numbers start to decline again.*]



Here, further on, the word "Gain" would be used to denote births of rhino and "Loss" would indicate a rhino lost whether due to poaching or natural death. Net gain would mean total gain minus total loss. Further, the population would be extrapolated for the non census years by the formula:

$$P_i = P_{c1} + \frac{(P_{c2} - P_{c1})}{C2 - C1} X i$$

Where P_i is the population in any given year i between two census years $C1$ and $C2$ ($C2 > C1$). P_{c1} and P_{c2} are two census year populations.

The losses from the population are available since 1982, as shown below:

YEAR	POACHING				TOTAL	NATURAL											TOTAL
	Gunshot	Pit Poaching	Electrocution	Other		Old age	predation/Tiger	Disease	Flood	Accidental	Fighting	Drowning	Stuck in mud	Matting	Others	Unknown	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1982	7	19	0	0	26	21	14	0	1	0	8	0	1	0	0	2	47
1983	6	31	0	0	37	21	13	0	0	0	5	0	1	0	2	4	46
1984	17	14	0	0	31	24	9	2	0	0	8	0	3	0	0	1	47
1985	22	23	0	0	45	18	13	1	1	1	1	0	0	0	0	1	36
1986	27	18	0	0	45	17	14	0	1	0	2	0	1	0	1	2	38
1987	17	6	0	0	23	25	10	1	4	1	0	0	0	0	0	0	41
1988	16	7	0	0	23	29	21	1	46	0	2	0	1	0	2	4	106
1989	28	11	3	0	42	28	13	1	1	1	4	0	1	0	2	5	56
1990	29	4	2	0	35	28	12	0	0	0	5	0	0	0	3	8	57
1991	20	4	0	0	24	36	23	0	7	0	7	0	0	0	3	2	78
1992	44	2	2	0	48	36	16	0	0	0	7	0	0	0	0	8	67
1993	39	2	0	0	41	27	18	0	4	0	4	0	0	0	0	4	57
1994	11	3	0	0	14	17	14	0	0	0	3	0	0	0	2	1	37
1995	22	7	0	0	29	28	13	0	1	0	4	0	2	0	2	1	51
1996	26	1	0	0	27	31	11	0	1	3	2	0	0	0	1	2	51
1997	6	6	0	0	12	27	9	0	1	1	3	0	3	1	0	3	48
1998	4	4	0	0	8	22	11	0	43	0	7	0	0	0	1	3	87
1999	2	2	0	0	4	15	14	0	4	0	7	0	2	1	0	3	46
2000	2	2	0	0	4	24	9	0	0	2	3	3	0	1	0	2	44
2001	2	6	0	0	8	12	13	0	0	1	2	1	3	0	0	3	35
2002	3	1	0	0	4	41	6	0	1	1	8	4	1	0	0	0	62
2003	3	0	0	0	3	42	13	0	0	2	4	0	1	0	1	1	63
2004	4	0	0	0	4	55	26	0	12	0	1	1	1	0	1	3	100
2005	7	0	0	0	7	43	19	1	1	0	4	0	0	0	2	3	73
2006	5	0	0	0	5	26	18	0	0	0	7	0	0	0	0	2	53
2007	15	1	0	0	16	49	19	1	1	0	1	5	1	0	0	2	79
2008	6	0	0	0	6	65	23	0	1	0	8	5	2	0	1	0	105
2009	6	0	0	0	6	29	15	1	0	1	8	2	0	0	0	3	59
2010	5	0	0	0	5	45	20	0	2	0	1	0	0	0	0	0	68
2011	3	0	0	0	3	46	18	0	0	1	0	0	0	0	0	2	67
2012	11	0	0	0	11	62	8	0	28	2	1	1	1	0	0	6	109
2013	26	0	0	1	27	48	13	0	1	1	5	3	1	0	1	1	74
2014	17	0	0	0	17	28	4	0	0	1	3	0	0	0	0	0	36
TOTAL	458	174	7	1	640	1065	472	9	162	19	135	22	24	4	24	82	2023

Cumulative losses since 1982 are computed in the Table below:-

Year	Poaching	Natural Death	Total Losses	Cumm Poaching	Cumm Natural Death	Cumm Total Removals
1982	26	47	73	26	47	73
1983	37	46	83	63	93	156
1984	31	47	78	94	140	234
1985	45	36	81	139	176	315
1986	45	38	83	184	214	398
1987	23	41	64	207	255	462
1988	23	106	129	230	361	591
1989	42	56	98	272	417	689
1990	35	57	92	307	474	781
1991	24	78	102	331	552	883
1992	48	67	115	379	619	998
1993	41	57	98	420	676	1096
1994	14	37	51	434	713	1147
1995	29	51	80	463	764	1227
1996	27	51	75	490	815	1305
1997	12	48	60	502	863	1365
1998	8	87	95	510	950	1460
1999	4	46	50	514	996	1510
2000	4	44	48	518	1040	1558
2001	8	35	43	526	1075	1601
2002	4	62	66	530	1137	1667
2003	3	63	66	533	1200	1733
2004	4	100	104	537	1300	1837
2005	7	73	80	544	1373	1917
2006	5	53	58	549	1426	1975
2007	16	79	95	565	1505	2070
2008	6	105	111	571	1610	2181
2009	6	59	65	577	1669	2246
2010	5	68	65	582	1737	2319
2011	3	67	70	585	1804	2389
2012	11	109	120	596	1913	2509
2013	27	74	101	623	1987	2610
2014	18	36	54	641	2023	2664

Now let us examine the losses vis a vis gains and the total extrapolated population since 1982. The rate of net gain per can be easily obtained from the census years:

$$G_{Net} = \frac{(P_{C2} - P_{C1})}{C2 - C1}$$

This value can further be extrapolated to have the net gain for every year between the non census years. Further, the losses can be easily added to the net gain to arrive at "actual gains" for that year, assuming the population has been witnessing a positive growth all this while [which is true for Kaziranga]. Thus, the following Table is obtained:

Year	Population	Net Gain	Total Losses	Total Gains	% Gain	% Loss
1978	939					
1982	942	1	73	74	7.86	7.75
1983	943	1	83	84	8.91	8.80
1984	946	1	78	79	8.35	8.25
1985	969	23	81	104	10.73	8.36
1986	992	23	83	106	8.77	8.37
1987	1015	23	64	87	8.57	6.31
1988	1038	24	129	153	14.74	12.43
1989	1062	24	98	122	11.49	9.23
1990	1096	24	92	116	10.58	8.39
1991	1120	24	102	126	11.25	9.11
1992	1144	22	115	137	11.98	10.05
1993	1164	22	98	120	10.31	8.42
1994	1228	64	51	115	9.36	4.15
1995	1292	64	80	144	11.15	6.19
1996	1356	64	75	139	10.25	5.53
1997	1422	66	60	126	8.86	4.22
1998	1486	66	95	161	10.83	6.39
1999	1552	64	50	114	7.35	3.22
2000	1595	43	48	91	5.71	3.01
2001	1638	43	43	86	5.25	2.63
2002	1681	43	66	109	6.48	3.93
2003	1724	43	66	109	6.32	3.83
2004	1767	43	104	147	8.32	5.89
2005	1810	45	80	125	6.91	4.42

2006	1855	43	58	101	5.44	3.13
2007	1919	64	95	159	8.29	4.95
2008	1983	65	111	176	8.88	5.60
2009	2048	64	65	129	6.30	3.17
2010	2129	81	65	146	6.86	3.05
2011	2210	80	70	150	6.79	3.17
2012	2290	80	120	200	8.73	5.24
2013	2329	39	101	140	6.01	4.34
2014	2368	39	54	93	3.93	2.28

As can be seen from the bar diagram below, the losses were just very close to getting negative in the eighties and early part of nineties. However, as the population rose steadily, all losses, including poaching, have been averaging around 8.27% from 19982 to 1995, and 4.10% from 1996 to 2014. During 1996-2014, the average growth rate appears to be 7.23%. Despite poaching the population is sustainable. It can be said that as of now, the population in Kaziranga does not have a threat from poaching.

As regards the losses, other than natural death, there are three main other causes (all of which are also included already in natural death category in the Tables above):

1. Tiger predation
2. Death in Floods
3. Accidents

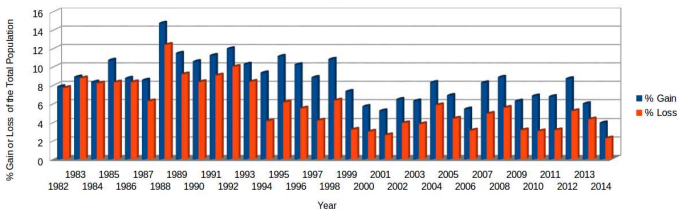
Deaths due to tiger predation reported from 1982 to 2014 till now are 472/2023 (23.33%), deaths due to floods and drowning are, during the same period, 184/2023 (9.1%). However, accidental deaths are few, 19/2023 (0.94%). Despite tiger population increasing, it does not seem to have any bearing on deaths due to tiger predation. However, tiger predation is a natural process, and cannot be avoided at all, and no management measures can be taken against it.

Deaths due to floods, especially during high floods such as 1988, 1998, 2004 and 2012 are high. So far 184 rhinos have been lost. At 7% growth rate, over a decade, we have lost 120 productive rhinos, over and above 184 actually lost, taking the seeming toll to 304. Therefore, there is a necessity to adopt management strategies such as creation of large number of eco-friendly highlands that do not disturb the water movement during floods, for protection of the rhinos.

Though accident cases are very minimum, below 1% of the total deaths, yet the rescue and rehabilitation of the rhinos should be modernized. There is a requirement of investment in building capacities to rescue large mammals. Cases of death due to rhinos getting stuck in mud can also be counted in accidents.

Kaziranga National Park

% Gain & Loss of Rhino Population, 1982-2014



The total deaths due to poaching from 1982 to 2014 till date are 640/2023 (31.64%). Though not alarming, the numbers are on the higher side. This is mainly due to higher level of poaching during eighties and early nineties. At 7% growth rate, we have additionally lost potential 450 rhinos over a decade. However, under no condition, the poaching levels can be allowed to go up any further. All possible measures are required to be taken to stop poaching.

Once the poaching comes under control, managing the additional, atleast 5% of the population, which comes, at current levels of populations in 2013, to 116 should be so managed that after accounting for all natural deaths, the balance of the population should be translocated to some other safe destination – first within Assam & when saturated to safe areas outside Assam, for which if need be, the Govt of Assam may form an agency like NTCA having mandate to fund and monitor rhino populations under a “Project Rhino” All India scheme with very strict and stringent guidelines. If need be, another chapter on “Project Rhino” may be added to the Wildlife (Protection) Act, 1972 on the lines of the Project Tiger.

6.2.1 Rhino Census Productivity Levels in Kaziranga

The primary source of arriving at productivity levels in rhinos is the census data. Kaziranga has traditionally been carrying out census operations using the “Direct Visual Count” method. The salient features of the visual count method followed in Kaziranga are:

1. Now census is done every three years, or in between as well, if required by the management.
2. The season of conducting census is usually the month of March of the census year. Next census, for example, is due in March, 2015.
3. A total of 81 compartments are there, of which 30 north of Difaloo and 34 south of Difaloo have been maintained from very early times. There are 9 compartments which fall in the Brahmaputra river islands, and another 8 that fall in revenue areas.
4. The areas of the compartments vary from 3.75 sq km to 16 sq km.

5. Compartments are mostly based on natural boundary features. Artificial lines are marked with flags
6. 100% direct visual count is done within the compartments.
7. Every rhino spotted is counted, and its age and sex are recorded.
8. For each compartment, there is a team of 3-4 persons consisting of one mahout, one enumerator. One armed guard and one NGO/ media person.
9. Start time of the census is at 5.30 AM till 12.30 PM.
10. The south of Difaloo compartments are counted on day 1, followed by north of Difaloo compartments and other areas on day 2. This is mainly to optimize resources during census. This has been traditionally followed since beginning.
11. On the day 3, a random sample count of 15% of the compartments is done as a check.
12. Day 1 and day 2 numbers are added and declared as "Total Count".
13. Sample checks are for cross checking in case of any accidental/ gross errors only

The disadvantages of the system are:

1. Chances of double counting
2. Recording the sex wrongly (unless with baby, a rhino is difficult to be categorized as male or female)
3. Lack of visibility (A rhino may not be visible if under thick canopy, or in tall grass or under water)
4. There is no scope of error calculation
5. The numbers are absolute (Even if the rhinos could be more or less, the number sticks)
6. Though counted, but determination of age or sex for rhinos submerged in water holes and swamps is next to impossible (unless the rhino comes out after a long wait)
7. A large number of the rhinos get counted as unsexed. This makes actual male to female ratio determination a challenge.

Therefore, there is also a need to try out sample based counting, as well as try other methods such as DNA profiling from dung samples. Count from census of 2006,2009, 2012 and 2013 are shown in Table below and productivity discussed:

Year	Adult Male	Adult Female	Calf <1 yr	Juvenile	Sub- adult		Un-sexed	Total
					Male	Female	Adult, Sub-adult	
2006	481	640	105	304	64	53	208	1855
2009	597	710	100	307	54	80	200	2048
2012	658	819	172	350	56	49	186	2290
2013	645	810	135	276	97	99	267	2329

Year	Calf <1 yr	Total Removals	Net Additions
2006	105	5+53=58	47
2009	100	6+59=65	35
2012	172	11+109=120	52
2013	135	27+74=101	34

Based on the cumulative losses, an attempt was made to see how long it takes approximately (nearest cumulative figures only were taken) the populations to be lost totally:

Census Year	Population	No of Years for Total Loss
1966	366	5
1972	658	9
1984	946	11
1993	1164	13
1999	1552	19
2006	1855	23
2009	2048	26
2012	2290	29

The table above indicates that, say, for example, there was a population of 1164 rhinos, and at the current rate of losses, and assuming that you had uniquely marked a rhino, and then, at the end of 13th year, if you came looking for that rhino, chances are that you would not find it because it would have been lost by then either by way of poaching or natural death. If one were to mark one rhino today in Kaziranga, chances of finding that rhino in 2044 AD would be almost nil.

Linear Regression analysis was performed on the above, the following results were obtained:

Sample size: 8
Mean x (\bar{x}): 16.875
Mean y (\bar{y}): 1364.75
Intercept (a): 14.72588711598
Slope (b): 80.001428911646
Regression line equation: $y=14.72588711598+80.001428911646x$

The linear regression analysis shows that the average loss rate was 80 in Kaziranga from all sources. Using the logic just described, and assuming that average life span of rhino is 40 years, what is that population figure which should be maintained so that a rhino marked today has a chance of getting spotted again 40 years hence. Assuming this rate of loss, which is 80, and also assuming that average life span of a rhino is 40 years, the population figure comes to 3214. Therefore, if we were to maintain a population figure of 3214+, chances are that some of the rhinos would be able to spend their average life span without being lost due to natural death or poaching in Kaziranga. This figure incidentally is also very close to the assumed Ecological Carrying Capacity (ECC) of Kaziranga.

Thereafter, linear regression analysis on the rhino census statistics was performed. It yielded the following results:

Sample size: 11
Mean x (\bar{x}): 27
Mean y (\bar{y}): 1387.9090909091
Intercept (a): 311.24661866631
Slope (b): 39.876387860844
Regression line equation: $y=311.24661866631+39.876387860844x$

The result shows that on an average net 39 rhinos are getting added annually, despite the losses. The next question to be asked is at this rate when will Kaziranga reach the magical figure of 3214 rhino population? Given the current rate of losses and gains, Kaziranga should be able to reach a population level of 3214 rhinos by 2047 AD.

Some studies [Richard Emslie (2005) and updated in 2014, Rajendra Garawd (2009)] show that Kaziranga is starting to show density dependent reductions. An analysis of the last four rhino direct count census reveals that the productivity of Kaziranga is on decline. This is evident from the "Calf per Capita Female" ratio computed from the available census data.

Year	Observed Adult Male	Observed Adult Female	% Female in the Observed Population	No of Un-sexed adults	No. of Females in Un-sexed Adults	Total Estimates Females
2006	481	640	57.09	208	119	759
2009	597	710	54.32	200	109	819
2012	658	819	55.45	186	103	922
2013	645	810	55.67	267	149	959

Year	Total Female Population	Calf <1 yr	Calf per Capita Female
2006	759	105	0.1383
2009	819	100	0.1222
2012	922	172	0.1084
2013	959	135	0.1043

Therefore, this is a strong signal that remedial measures need to be taken for, on one hand habitat expansion of Kaziranga securing about 2500 - 3000 sq km (targetted to house a population of 3214+ rhinos) of quality space for the animals to roam freely and dwell therein without fears of poaching,. Of course, ecologically, 100% stocking is not desirable. Assuming the populations need to be maintained at 80% of the ECC, the figure for Kaziranga comes to 2571. Given the current population of 2329, Kaziranga is only short of 242 rhinos, which can be easily achieved in next ten years. Side by side, the effort in the coming next 10 years should be to secure the other habitats outside Kaziranga where annually about 25 rhinos can be translocated from Kaziranga. However, efforts to increase the area of Kaziranga should go on.

6.2.2 Modeling the Rhino Census Population in Kaziranga

Though certain linear relationship has been worked out above in respect of growth behaviour of rhino population in Kaziranga, using equation such as

$$Y \text{ (or } P) = 311.24661866631 + 39.876387860844 X \quad \dots \quad (1)$$

However, if the net gain is G_{net} for some population P , the per capita gain is

$$r = \frac{G_{net}}{P} \quad \dots \quad (2)$$

So, if there is an initial population P_0 , the population next year would be

$$P_1 = P_0 + r.P_0 \quad \dots \quad (3)$$

$$P_1 = (1+r).P_0 \quad \dots \quad (4)$$

The population next year would be P₂:

$$P_2 = P_1 + r.P_1 \quad \dots \quad (5)$$

$$P_2 = (1+r).P_1 \quad \dots \quad (6)$$

$$P_2 = (1+r).(1+r).P_0 \quad \dots \quad (7)$$

$$P_2 = (1+r)^2.P_0 \quad \dots \quad (8)$$

Therefore, the population in the nth year would be

$$P_n = (1+r)^n.P_0 \quad \dots \quad (9)$$

$$P_n = R^n.P_0 \quad \dots \quad (10)$$

$$\text{where } R = 1+r$$

However, it is seen that Equation 10 is a simplistic representation, and in reality, the population cannot increase indefinitely, so that the value of r and R should be reducing over a period of time.

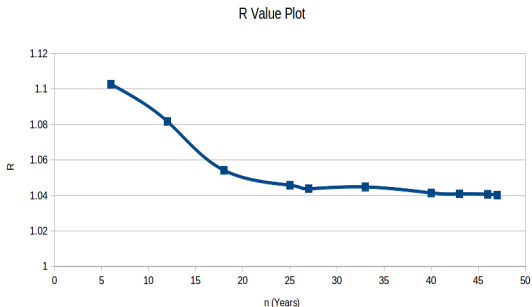
If the populations are known, the value of R can be easily found out by:

$$R = \sqrt[n]{\frac{P_n}{P_0}} \quad \dots \quad (11)$$

The value of R was found for the census years of Kaziranga from 1966 to 2013 as below:

Year	n	Population	R	Remarks
1966	0	366		Initial Population
1972	6	658	1.102700237	
1978	12	939	1.081679774	
1984	18	946	1.054172468	
1991	25	1120	1.045753863	
1993	27	1164	1.043782642	
1999	33	1552	1.044750153	Over Count!
2006	40	1855	1.041409585	
2009	43	2048	1.040858838	
2012	46	2290	1.040667645	
2013	47	2329	1.040159053	

The R vs n Plot is shown below:



It shows that the relationship of R and n is exponential in nature, which is but natural. When R approaches very close to 1 or (becomes even slightly less than 1), the population would start declining.

An exponential best fit of the (n,R) pairs was obtained with the following values:

$$R_n = 1.091219873 e^{-0.001184294083 \cdot n} \quad \dots \quad (12)$$

Though the residual sum of squares (RSS) was **1.111717616·10⁻³**, the predicted values of R were far from satisfactory. Using the exponent part of the Equation 12,

$$E_n = e^{-0.001184294083 \cdot n} \quad \dots \quad (13)$$

values of R' were obtained as below:

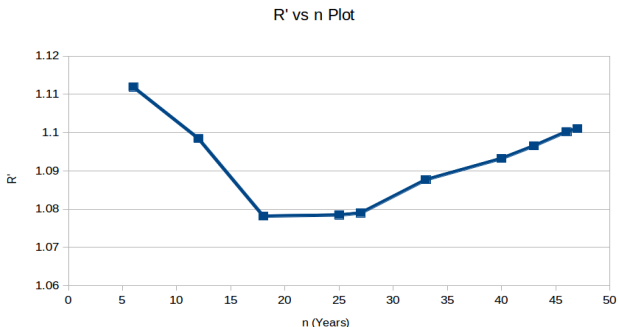
$$R'_n = \frac{R_n}{E_n} \quad \dots \quad (14)$$

The following table was obtained:

n	R	R'
6	1.102700237	1.1105636703
12	1.081679774	1.0971618485
18	1.054172468	1.0768858052
25	1.045753863	1.0771787744

27	1.043782642	1.0776979198
33	1.044750153	1.0863891313
40	1.041409585	1.0919301711
43	1.040858838	1.0952370497
46	1.040667645	1.0952370497
47	1.040159053	1.0996978485

The plot of R' vs n is shown below:



The plot clearly shows that the first three points fall on a decreasing line, and remaining points fall on an increasing line. The two sets of lines were approximated using linear fit, and the following results were obtained:

For the first three points:

$$R'_n = -2.806488758 \times 10^{-3} \cdot n + 1.128548306 \quad \dots \quad (15)$$

The correlation coefficient being -0.993128, and RSS being $7.875820205 \times 10^{-6}$.

For the rest of the points:

$$R'_n = 1.04392076 \times 10^{-3} \cdot n + 1.050657271 \quad \dots \quad (16)$$

The correlation coefficient being 0.996679, and RSS being $3.531087677 \times 10^{-6}$.

These two lines together were found to approximate the R' vs n curve very well. However, when each of these lines was used to approximate R values separately, it was found that Equation 15 dropped of the population rapidly after $n=25$, and the Equation 16 showed poor approximation for early years, but did well for rest of it, but tended to overpopulate towards the end. The predicted populations can be seen in the Table below:

Year	n	Population	Population by Eq 15 & 16	Population by Eq 15	Population by Eq 16	Error in Eq 16
1	2	3	4	5	6	7
1966	0	366				
1972	6	658	662	662	489	-169
1978	12	939	916	916	644	-295
1984	18	946	964	964	835	-111
1991	25	1120	1109	721	1109	-11
1993	27	1164	1198	619	1198	34
1999	33	1552	1493	323	1493	-59
2006	40	1855	1888	105	1888	33
2009	43	2048	2073	57	2073	25
2012	46	2290	2266	29	2266	-24
2013	47	2329	2331	23	2331	2

Therefore, it is seen that the equation 16 approximates very well the census from 1991 till 2013, with the highest error being in 1999 census. However, the equation starts showing very high populations above and below. Therefore, the error of equation 16 was simulated using a 10 degree polynomial fit with the following coefficients:

Power	Coefficient	Power	Coefficient	Power	Coefficient
10	-3.198061364x10 ⁻¹⁰	9	8.811297914x10 ⁻⁸	8	-1.044340459x10 ⁻⁵
7	6.962380539x10 ⁻⁴	6	-2.864416037x10 ⁻²	5	0.7499609701
4	-12.39932597	3	123.2118263	2	-647.9196014
1	1216.532593	0	586.1505127	RSS	14832.77645

The error is given by:

$$\Delta E_n = \sum_{i=0}^{10} C_i \cdot n^i \quad \dots \quad (17)$$

The simulated population is given by:

$$P_n = [R_n \cdot E_n]^n \cdot P_0 - \Delta E_n \quad \dots \quad (18)$$

Though the Equation 18 very well approximates the census in Kaziranga from 1966 to 2013, the error function goes out of proportions beyond 2018. Without the error function, the equation 16 shows that an initial population of 366 would reach a peak in 100 years (for us

in 2066AD) with a population of 4789, and then the population would start declining. Another error function needs to be designed for Equation 16.

The simulated population values from 1966 to 2013 are shown below:

Year	n	Observed Population	Population by Eq 16	Error Function	Corrected Population	Error
1	2	3	4	5	6	7
1966	0	366				
1972	6	658	489	-222	711	53
1978	12	939	644	-343	987	48
1984	18	946	835	-151	986	40
1991	25	1120	1109	-30	1139	19
1993	27	1164	1198	-8	1206	42
1999	33	1552	1493	-75	1568	16
2006	40	1855	1888	6	1882	27
2009	43	2048	2073	30	2043	-5
2012	46	2290	2266	-9	2275	-15
2013	47	2329	2331	-4	2335	6

According to equation 15, an R value below 1.0275 leads to decline in population; and according to Equation 16, the R value below 1.026 is not sustainable in the long run. Taking the upper value of 1.0275, it can be theorized that if the net gain is below 2.75% of the total population P_0 , then the population is likely to decline. This magical number comes to 2.75% of 366=10.07. Therefore, net gain cannot get below 10. This makes the journey of the rhino in Kaziranga from 2013 to 2014-18 a little scary, given the extreme poaching pressures. If poaching, deaths due to flood and accidents are almost eliminated, rhino population would be safe, till the ecological parameters of Kaziranga so permit.

The other way of modeling the population based on factors of the habitat, productivity, competition, predation etc. is beyond the scope of this Report. It would require some additional ground based inputs. Currently research on grassland productivity is going on.

6.3 Conclusion

The following key conclusions are drawn based on the discussion above:

1. The rhino population of Kaziranga has started to exhibit density dependent reductions.
2. A net gain of 10 or below would lead the population to decline. Currently it is 39, but may get hit by excessive poaching, if not controlled.
3. If poaching is brought to halt, some population, say about 25 in numbers, must be translocated elsewhere in safe rhino habitats to keep the population of Kaziranga productive.
4. If need be in future, populations may have to be moved outside Assam, if the Assam habitats reach saturation.

CHAPTER 7

7 RHINO POACHING

7.1 The Rhinoceros Horn

It is the horn of the rhinoceros that has become the cause of likely extinction of the animal species from the face of the earth. It is also used as talisman in many cultures. The horn has been traditionally held to have magical curative powers and an aphrodisiac [Richard Emslie: *Not right to say magical curative powers and an aphrodisiac. The latter was a very small part of the market but this collapsed in the past when horn prices rose. For decades rhino horn use as an aphrodisiac (despite press reports) has not been one of its main uses. This perpetuation of the aphrodisiac myth is coming home to bite us because now there are some reports it is being used for this in Vietnam although not sure if it is just an isolated incident. Rhino horn has been a respected ingredient in Traditional Chinese medicine for over 2000 years.*]. It is not entirely correct to say that modern research has shown that the rhino horn has no such properties, as it has been shown to have certain fever reducing property. Studies using Scanning Electron Microscopy (SEM) and X-ray Spectroscopy reveals that the rhino horn consists of two separate phases- one of hair like filaments, built around a central core in circumferential layers and the other surrounding and filling the spaces between the filaments as a matrix. Together these structures make up as a biological composite, structurally similar to metal, ceramic or polymer based composites. Using X-ray Computed Tomography (CT Scan) of the white rhinoceros horn revealed that the horns, though entirely keratinous in nature, also contain melanin and calcium salts in the core.

CITES commissioned a study No. S-389 with TRAFFIC in March, 2012 to compile a comprehensive review on the rhino horn and its curative powers etc. Though modern research has shown that the horns do not have any curative powers [Comment of Richard Emslie: *The TRAFFIC document notes that there has been one proper double blind clinical trial that was undertaken in Taiwan. IN this study rhino horn was found to have statistically significant fever reducing properties and was superior to buffalo horn which also reduced fever. While the placebo control had no fever reducing effects, a cheaper western medicine was the best fever reducer as it reduced temperature by more than rhino horn, and did so for a longer period. Thus rhino horn did appear to have fever reducing powers in this case; albeit not as good as the cheaper western medicine. I recall that in one other study, dosages of horn that were higher than would ever be given did appear to have some fever reducing effect. However I think another study didn't show any effect. However this issue is not just one of efficacy or not of specific treatments but perceptions of the people taking the supposed treatment. In the same way some people still buy homeopathic remedies in the west when they may have been diluted so much that they may not contain even a molecule of active ingredient*], the horn continues to find more and more curative uses among its traditional clientèle, including cure for cancer and now almost anything where every other medicine fails. The CITES report, thus, throws some insight as to why the trade in rhinoceros horn continues by way of faith healing and traditional medicine, despite the same being banned in China, Japan, South Korea and Viet Nam.

This has led to escalation of prices in the international market. Today, the rhino horn is costlier than gold and platinum. A rhino horn could cost as much as US \$ 300,000.00 per Kg. Rhino horn in some cultures of the World, especially in countries such as Viet Nam, as virility enhancer and "Party Drug", or even status symbol, as its now costlier than cocaine. Thus, the killing of the rhinoceros continues. [Comment of Richard Emslie: *Poaching fuelled by the demand - this currently has to be supplied by killing rhinos as there currently is no legal international trade and there is a limit to the number of existing horns that can be stolen from museums etc. Demand reduction efforts are likely to be a key part of any solution. Interestingly the new trade dynamic in Viet Nam appears to favour horns from African rhino as these are larger and currently high prices are being paid/kg. Historically Asian horns fetched much higher prices but today it may be more profitable for criminals to poach African rhinos given the greater amount of horn they get per rhino. One could hypothesize that possibly this may be giving some protection to Asian rhinos currently as the relative poaching rates of Asian rhinos appear lower than in African countries being affected by the big upsurge in rhino poaching. However the other argument is that given the high prices being paid/kg it still will be worthwhile for a poacher to kill a calf rhino in Africa or an Asian rhino.*]

7.2 International Scenario On Rhino Poaching

In 2012, a record 668 rhinos were poached in South Africa, up by almost 50 per cent from 2011 figures. In 2013, the toll continued to rise, with 201 rhinos killed in Kruger National Park alone. A subspecies of the black rhino was declared extinct in the wild in West Africa in 2011, and that year Vietnam lost its last Javan rhino, which was killed by poachers. In April 2013, wildlife authorities in Mozambique's Limpopo National Park reported that the country's last 15 rhinos had been wiped out by poachers working with the game rangers responsible for protecting them. In India, rhino horn is seen to be bartered for arms by militant groups working with poaching syndicates. Below is the table which depicts the year and no of rhino poaching occurred in South Africa.

Year	No of Rhino Poached in South Africa
2000	6
2001	7
2002	25
2003	22
2004	10
2005	13
2006	10
2007	13
2008	83
2009	122
2010	333
2011	448

2012	668
2013	1004
2014 (as of 10 th July)	558

* Data published by South African Department of Environmental Affairs (2014)

Looking at the data, if we see in 2012, a staggering 668 Rhinos were killed, that's almost 2 rhinos a day. The scenario was worst in 2013 where 1004 rhinos were killed which amounts to almost 3 rhinos a day killed. Worrying trend is also seen in 2014 where 419 Rhinos have already been killed by May, 2014 at a rate of about 2.8 rhinos per day. The current rate is about 2.9 per day. With this rate we could see rhino death overtaking the birth in 2016-18. The poaching is by no means confined to South Africa, but it is surging all around the Rhino bearing countries made possible by easy to establish illegal trading routes spanning across many countries. [Richard Emslie: *Poaching has been escalating alarmingly in Kenya where in relative terms poaching is higher than in S. Africa. Also appears poaching to be increasing in Namibia (second most important rhino range state), which is worrying*]

7.3 Rhino Poaching In Kaziranga

The international trade in rhino horns is the leading factor driving the world's five species of rhino on the verge of extinction. The recent pressure of poaching of all species of rhinos in rhino bearing areas of the world invited severe concerns of the world conservation community. African rhino are heavily targeted and Indian rhino are also subjected to this threat of international demand based poaching in all rhino bearing areas in India and Nepal. The pressure on the Kaziranga National Park is tremendous as the rhinoceros population is very high and the entire boundary is very porous. The northern side is surrounded by the river Brahmaputra and its numerous islands/charpoories. There is a very large population of traditional fishing communities all along the river, some of whom may be potential field men to the gang of poachers. The southern side of the Park is also full of human habitation, making patrolling very difficult. Poaching in the Park is on the rise. The statistics below shows that just like South Africa, Kaziranga is experiencing a period of very heavy poaching. Large scale continued poaching would make the resident rhinoceros population unviable and prone to extinction, if the trend continues to steepen or is not arrested in the long run.

YEAR	NO. OF POACHING	YEAR	NO. OF POACHING	YEAR	NO. OF POACHING	YEAR	NO. OF POACHING
1965	18	1979	02	1993	41	2007	16
1966	05	1980	11	1994	14	2008	06
1967	12	1981	24	1995	29	2009	06
1968	10	1982	26	1996	27	2010	05
1969	08	1983	37	1997	12	2011	03
1970	02	1984	31	1998	08	2012	11
1971	08	1985	45	1999	04	2013	27
1972	-	1986	45	2000	04	2014*	18
1973	03	1987	23	2001	08		

1974	03	1988	23	2002	04		
1975	05	1989	42	2003	03		
1976	01	1990	35	2004	04		
1977	-	1991	24	2005	07		
1978	03	1992	48	2006	05		

* Till June, 8th, 2014

Taking advantage of the annual projected populations as already worked out in Chapter 6, we can reproduce the table above in terms of % of the population poached annually as shown below:

Year	Population	Poached Rhinos	% of Poaching
1965	318	18	5.66
1966	366	5	1.37
1967	412	12	2.91
1968	468	10	2.14
1969	516	8	1.55
1970	562	2	0.36
1971	610	8	1.31
1972	658	0	0
1973	704	3	0.43
1974	750	3	0.4
1975	796	5	0.63
1976	843	1	0.12
1977	891	0	0
1978	939	3	0.32
1979	940	2	0.21
1980	941	11	1.17
1981	941	24	2.55
1982	942	26	2.76
1983	943	37	3.92
1984	946	31	3.28
1985	969	45	4.64
1986	992	45	4.54
1987	1015	23	2.27

1988	1038	23	2.22
1989	1062	42	3.95
1990	1096	35	3.19
1991	1120	24	2.14
1992	1144	48	4.2
1993	1164	41	3.52
1994	1228	14	1.14
1995	1292	29	2.24
1996	1356	27	1.99
1997	1422	12	0.84
1998	1486	8	0.54
1999	1552	4	0.26
2000	1595	4	0.25
2001	1638	8	0.49
2002	1681	4	0.24
2003	1724	3	0.17
2004	1767	4	0.23
2005	1810	7	0.39
2006	1855	5	0.27
2007	1919	16	0.83
2008	1983	6	0.3
2009	2048	6	0.29
2010	2129	5	0.23
2011	2210	3	0.14
2012	2290	11	0.48
2013	2329	27	1.16
2014	2368	21	0.89

Till 4th August, 2014

The table above clearly shows that though highest poaching numbers were achieved in 1992, but the highest poaching rate occurred in 1965 only. [Richard Emslie: *one issue to discuss is how confident you are in finding all poached rhino? If you are not then the rhino poaching will underestimate actual relative poaching. However, in your case the manpower density is so high you should presumably find most carcasses*]

7.3.1 Analysis of the Poaching Statistics

The highest reported poaching has taken place in 1984 when the rhinoceros population was just about 1100 in numbers. The period from 1980 to 1997 seem to be heavy poaching era with total deaths due to poaching being 530, giving an average of 29 rhinos per year. During the same period, the rhino population grew from 940 to 1300, at a rate of 2.12%. Before and after this period, the poaching figures are very low, which could be either due to excellent protection, low intrusion or unreported/ undetected incidents of poaching.

Let us look at the current trends of poaching in 2013 and 2014.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	2	4	4	1	4	0	1	2	3	2	3	1
2014	3	5	3	2	5							

This can be further broken down range-wise year-wise:

Year	Range	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2013	HQ	1	0	0	0	0	0	0	0	0	0	0	0
2014	HQ	0	0	0	0	0							
2013	BP	1	1	1	0	0	0	1	2	1	1	1	0
2014	BP	1	2	0	1	0							
2013	CR	0	0	0	0	0	0	0	0	0	0	0	0
2014	CR	0	1	3	0	0							
2013	ER	0	1	1	1	2	0	0	0	0	1	1	1
2014	ER	0	1	0	1	3							
2013	NR	0	1	1	0	0	0	0	0	0	0	0	0
2014	NR	2	1	0	0	0							
2013	WR	0	1	1	0	2	0	0	0	2	0	1	0
2014	WR	0	0	0	0	2							

Range wise figures show that till May, 2014 HQ Beat at Bokakhat has gone poaching free this year. Till May, there was 1 poaching last year, but none so far this year. In Burapahar Range (BP), the total count this year is just one up from the last year till May. The Central Range (CR) also known as Kaziranga Range has been the real cause of concern as it contributed 4 cases of poaching this year till now against nil poaching in the range for several years. Poaching in Eastern Range (ER) has remained constant with respect to last year, totaling to 5 till now (May). The Northern Range (NR) has seen increase in count by 1 from January to May this compared to last year. The Western Range (WR) till now seems to have the best performance among the five ranges, as it had so far only two instances of poaching compared to 4 last year for the period January to May.

If one looks at the spatial distribution patterns of poaching, it is clear that attacks from the north of the Brahmaputra river are on the rise, as can be seen from the table below:

SI No.	Geography	Poaching Incidents (No)		Remarks
		2013	2014 (till 23 rd May)	
1	Attack from the North Bank (affecting all the ranges)	6/27	8/17	
2	Attack from South Side, Karbi Anglong and Bagser RF side (affecting BR, WR)	9+5=14/27	4+1=5/17	BP+WR
3	Attack from South Side, Karbi Anglong Side (Affecting Panbari RF/ KA areas)	0	0	
4	Attack from South Side, Dhanbari-Japoripathar area (affecting ER and part of CR)	6/27	3/17	
5	Attack from South Side, Sildubi to panbari (affecting CR)	0	1/17	
6	Stray Rhino Killings (Majuli, Golaghat, Gohpur etc.) outside Park areas	1/27	0	Near Majuli
	TOTAL	27/27	17/17	

It is clear from the table above that about 50% of the poaching has taken place from the north bank side in 2014 (till May), compared to just 22.2% contribution for the whole of the last year. Last year more than 50% of the poaching was contributed from Karbi Anglong and Bagser side, whereas this year its contribution so far has been only to about 30%.

Year	Pit Poaching	Electrocution	Gun Shot	Other Methods	Total
1983	31	0	6	0	37
1984	14	0	17	0	31
1985	23	0	22	0	45
1986	18	0	27	0	45
1987	6	0	17	0	23
1988	7	0	16	0	23
1989	11	3	28	0	42
1990	4	2	29	0	35

1991	4	0	20	0	24
1992	2	2	44	0	48
1993	2	0	39	0	41
1994	3	0	11	0	14
1995	7	0	22	0	29
1996	1	0	26	0	27
1997	6	0	6	0	12
1998	4	0	4	0	8
1999	2	0	2	0	4
2000	2	0	2	0	4
2001	6	0	6	0	8
2002	1	0	3	0	4
2003	0	0	3	0	3
2004	0	0	4	0	4
2005	0	0	7	0	7
2006	0	0	5	0	5
2007	1	0	15	0	16
2008	0	0	6	0	6
2009	0	0	6	0	6
2010	0	0	5	0	5
2011	0	0	3	0	3
2012	0	0	11	0	11
2013	0	0	26	1	27
2014	0	0	18	0	18

Pit poaching appears to be the most prevalent mode of rhino poaching upto 1995. Gun shot, though has been there since beginning, but it can be said that by the end of 2002, pit poaching was almost deserted as a method of poaching. Since 2002, gun shots have dominated the poaching method. It has been observed that for past four to five years, the poachers have started to use sophisticated fire arms such as silencer guns and AK series rifles. Of late, involvement of extremist organizations has also come to light. It is strongly suspected that members of banned outfits such as KPLT and NDFB are involved in Rhino poaching.

Time of Incident Analysis:

In order to see if there was any preferred time of poaching, the data of 2013 and 2014 was subjected to a time analysis. For convenience of classification 10 time zones in a day were devised as given below:-

Sl. No.	Time From – Time To	Common Name	Time Code	Hours
1	23.00 to 01.00 HRS	Mid Night	T1	2
2	01.00 to 03.00 HRS	Wee Hours	T2	2
3	03.00 to 05.00 HRS	Dawn	T3	2
4	05.00 to 08.00 HRS	Morning	T4	3
5	08.00 to 11.00 HRS	Mid Morning	T5	3
6	11.00 to 13.00 HRS	Noon	T6	2
7	13.00 to 16.00 HRS	After Noon	T7	3
8	16.00 to 18.00 HRS	Dusk	T8	2
9	18.00 to 21.00 HRS	Evening	T9	3
10	21.00 to 23.00 HRS	Night	T10	2

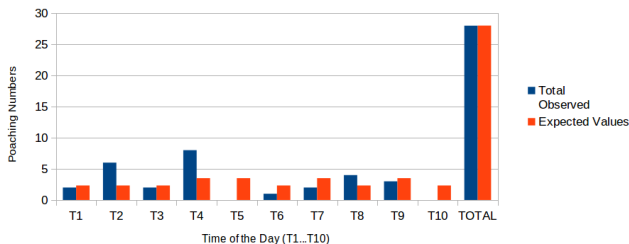
The classification above is more of a convenience, best suited to jungle scenario. Of the 27 events of 2013, time of the incident was available only for 15 incidents; and for 2014, of the 18 incidents so far time was available for 13 incidents of poaching. Each of these events were classified as to have happened during one of the T1 to T10 time periods of the day. Accordingly, the following table was obtained:

Time Period	No of Incidents in 2013	No of Incidents in 2014	TOTAL Observed	Expected
T1	2	0	2	2.334
T2	5	1	6	2.334
T3	1	1	2	2.334
T4	3	5	8	3.501
T5	0	0	0	3.501
T6	1	0	1	2.334
T7	0	2	2	3.501
T8	1	3	4	2.334
T9	2	1	3	3.501
T10	0	0	0	2.334
TOTAL	15	13	28	28.01

The expected value in the table above has been arrived at by dividing the total incidents by 24 hours and then adjusting for their exact summation to 28. Chi square test was using <http://graphpad.com>. The null hypothesis was that poachers have no preference for time of the day for poaching. Chi square test was performed. The following results were obtained:

$$\begin{aligned} \text{Chi squared} &= 20.142 \\ p &= 0.0171 \end{aligned}$$

Poaching Statistics with Time Period of the Day



This implies that the null hypothesis is not correct, and poachers do seem to have statistically significant preference for time, which is the periods of the night time, dusk to dawn. However this could depend a lot on patrolling and vigil, as can be seen from the analysis of data of 2013 and 2014 as discussed below:-

It is clear from the table above that during 2013, 50% of the poaching incidents happened during T1 to T3 period. When night patrolling was strengthened, poaching during this time has shown a drastic reduction in 2014, but poaching increased during staff withdrawal hours i.e. morning time, and evening time as well. Given the current strength of staff and deployment mode, it not possible to give overlapping time periods for change of guard. The poachers seems to have availed the off guard hours. However, it should not be taken as the only way to reduce poaching (i.e. by rotating staff with sufficient overlaps in duty hours).

Moon Phase Analysis:

Having seen that poachers do prefer night time to day time. Now let us examine if moon phases have any impact on poaching. Moon Phase analysis of the incidents was done for the period 2013 and 2014. In order to classify the moon phase correctly, a complete cycle of moon phase was selected as shown below:-

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Depending upon visibility during night and shape of the moon, the moon phases were divided into four classes of unequal period. The phases of the moon were classified into four categories for convenience as shown below:

SI No.	Days of the Month (as in Figure)	Description	Moon Phase Code	No. of Days
1	12 to 20	Full Moon Period	M1	9
2	21 to 26	Waning Moon Phase	M2	6
3	27 to 04	New Moon Phase	M3	9
4	05 to 11	Waxing Moon Phase	M4	7

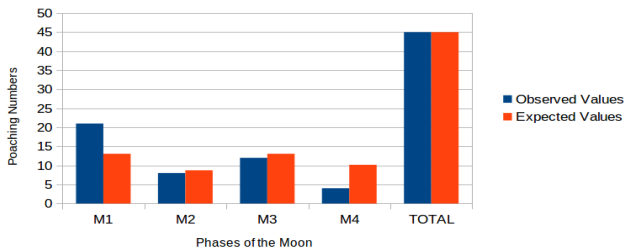
For a given date of occurrence of the incident, the actual phases of the moon for that month were seen from <http://stardate.org/nightsky/moon> (from where the above moon phase diagram has been taken for this analysis), and then counted back or forth from a suitable start point of the above reference chart to get the day classified into any of the 4 categories. Since each category has roughly 6 to 10 days, date of reporting was taken as the date for look up. Accordingly all the incidents of 2013 and 2014 were classified into the four categories, and the results are summarized in the Table below:

SI No.	Moon Phase Period	2013		2014		Total Observed	Expected Values
		No.	%	No.	%		
1	M1	14	52	7	39	21	13.06452
2	M2	4	15	4	22	8	8.70967
3	M3	8	30	4	22	12	13.06452
4	M4	1	3	3	17	4	10.16129
TOTAL		27	100	18	100	45	45

Chi square test was performed on the above data. The null hypothesis is that poachers have no preference for any phases of the moon and poaching could happen during any phase of the moon. It was, however, found that

$$\begin{aligned} \text{Chi square} &= 8.701 \\ p &= 0.0335 \end{aligned}$$

Phases of the Moon and Poaching Incidences



This means that the null hypothesis is not valid, and poachers do seem to have preference for certain phases of the moon, namely the full moon period.

It may be noted here that M1 represents the full moon period when the Park is supposed to be most susceptible to poaching. M3 is the new moon period when there is pitch darkness, and poaching incidents are less likely to happen. M2 is the period of waning after the full moon, and poaching incidents may continue post full moon period as well. M4 is the period after new moon when the moon is waxing, but since it succeeds the dark moon, poaching incidents are less likely to happen.

The table for 2013 mostly fits the above assumption, except the fact that 30% of the poaching happened during dark period. This implies that poachers are willing to take advantage of darkness and attempt poaching, despite the fact that visibility is at its minimum in the Park. The break up for 2014 typically does not meet up the description given above for 2013, as full moon poaching has reduced due to extra vigil during this period. However, the pressure has shifted to the darkness period and its succeeding days. In all, there is no distinct pattern in the poaching in 2014 wrt moon phases. From the field information, it can be said that due to stepped up vigil, attempts have become now almost random in nature.

Conclusion:

The poachers constantly change their strategy. Therefore, no single solution from the management side will work magic. The problem needs to be understood in entirety and strategies to be evolved accordingly. A single type solution is most likely to fail sooner.

7.3.2 Anti-Poaching Statistics

The statistics below clearly indicates that there has been serious attempts on part of the Park authorities to contain poaching within the available means of rigorous patrolling and extensive field duties. However, poaching has seen a rising trend mainly due to rising prices of the rhino horn in the international market. If one goes by pure statistics and area, the poaching pressure is higher in Kaziranga National Park than Kruger National Park.

However, Kaziranga lacks the sophistication and infrastructure of Kruger. Despite all odds such as lack of infrastructure, equipment, shortage of staff, a very porous border all along, every attempt has been made to contain poaching:

Particulars	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
No. of poachers arrested	5	16	2	11	38	24	22	17	23	14	11	7	16
No. of poachers killed by forest staff	0	0	0	0	0	3	1	5	2	0	6	3	1
No. of arms seized by the forest staff	0	1	0	2	4	0	3	3	1	0	3	7	3

Year	No. of poacher arrested	No. of poacher killed	Recoveries			Remarks
			Arms	Ammunition	Others	
2006	22	nil	0.303 = 1 SBBL = 1 Handmade Gun = 1	44 Rds	Cash recovery Rs 20,000/-	
2007	17	5	0.303 = 3	25 Rds	Cash recovery Rs 12,500/-	
2008	23	2	Gun = 1	nil	nil	Poacher killed in Western Range
2009	14		nil	nil	nil	
2010	11	6	0.303 = 3	34 Rds	Dry Rhino skin = 15 kg	Poacher killed in Kaziranga Range = 4 Eastern Range = 2
2011	7	3	0.303 = 7 Silencer = 3	92 Rds		Poacher killed in Kaziranga Range = 3
2012	16	1	0.303 = 3	37 Rds		Poacher killed in Northern Range = 1
2013	71	5	0.303 = 7 Stand Gun = 1 Silencer = 2	70 Rds	Vehicle = 3 M Cycle = 3 Cash recovery = 13,19,500/- Decomposed Tiger Skin = 1	Poacher killed in Eastern Range = 2 Western Range = 2 Burapahar Range = 1
2014 (Till June, 8 th)	17	7	0.303 = 5 Rifle Bore not ascertain = 1 Silencer = 2	58 Rds	Cash recovery=4,78,000/-, Horn recovered = 2	Poacher killed in Western Range = 3 Northern Range = 1 Eastern Range = 1 Burapahar Range=2

Already in 2014 in less than half the year, 17 arrests have been made by the forest staff and 5 poachers have been killed. Though this is a very good record in itself and testimony that the field staff are discharging their duties. However, poaching numbers have also risen.

Use of Dog Squad:

K9 Dog squad was used for the first time in Kaziranga National Park in 2013. Looking at the advantage that the dog squad offers, the Park authorities have started using dog squad is being used now frequently since January, 2014. Currently "Zorba" a trained member of the K-9 Dog Squad Unit trained as a tracker dog has been stationed at Kaziranga for investigating wildlife crimes in the Park. A brief of the investigation using the dog squad in 2014 is presented below:-

Sl. No.	Date and Start Camp	Event Description	Outcome
1.	25 th January, 2014, Sundari Camp, Burapahar Range	Tracked the poacher based on piece of cloth found at crime scene	Ended in Amguri Village, and suspect Ratna Gowala was arrested
2	30 th April, 2014, Kukrakata RF, Jurital Burapahar Range	Tracked based on foot print, led to spot where the team relaxed a while ago	Meanwhile poachers spotted by staff, and opened fire on staff by AK 47
3	5 th May, 2014, Barnalini camp Western Range	Tracked based on foot print at the scene-of-crime, on way found sole of the shoe on further track found raincoat cap...	Search abandoned due to darkness, but encounter event took place at night
4	6 th May, 2014, spot of encounter	Tracked till Brahmaputra river	
5	7 th May, 2014, spot of injury and blood	Tracked for 1.5 km, spotted poacher, staff alerted	Poacher cordoned, due to bad weather subsequently killed in encounter on the 9 th May, 2014
6	23 rd May, 2014, scene of counter, Eastern Range	Tracked based on bags and axe, found foot track near river, crossed over to village	Entered house, suspect absconding

7.3.3 Possible Reasons for Increase in Poaching in Kaziranga

Though there is an immediate and direct reasoning that poaching is on the rise internationally and Kaziranga is no exception. However, local conditions differ in Kaziranga and Kruger National Parks, and so do the levels of sophistication and the issues surrounding the Parks. In order to get an objective understanding of the underlying issues, it would be advisable to segregate issues that have always existed, and the phenomena that are relatively new in respect of Kaziranga.

In the first category of existing issues, the following are notable:

- Porous border all around
- Lack of sophistication
- Lack of conviction of poachers
- Growing population around the fringes of the Park.
- Low income opportunities
- Easy access to international markets through neighbouring States

On the other hand, the new issues emerging are:

- Rising prices of rhino horn in the international market (such as Vietnam)
- Easy availability of illegal arms around Kaziranga
- Involvement of terrorist outfits in poaching
- Use of sophisticated arms such as AK Series rifles and Silencers
- Counter-fire on Forest Staff
- Emergence of new poaching gangs/ recruits
- Poor relations between fringe population and forest staff
- Poor intelligence network
- Lack of motivation among the staff

Today all the issues including the ones that were always existing or have emerged of late must be fully addressed to make Kaziranga a poaching free National Park.

7.3.4 International Perspective on Poaching

All the interactions with most of experts at international level points to the exceptionally sharp increase in poaching in South Africa driven by high market demands and high rates being offered for rhino horns. Rod Potter admits that there has been exceptionally high poaching pressures not seen in the past. The poachers also seem to constantly changing their strategies. There was a period in Kruger when poachers entered in groups of 3 to 4 (the typical formation being the shooter with his weapon, armed body guards and hacker). This pattern gave way to back-pack poacher with a gun, GPS and Mobile phone who could enter surreptitiously and leave by fall of night without getting detected in the night vision devices. Night time intrusions have been now been taken over by day time intrusions to avoid detection by thermal scanners and night vision devices.

In Chitwan, the anti poaching strategies started with building a base of informers who were paid monthly remunerations. Additionally, they were paid incentives whenever poachers were actually captured. These informers mostly come from the population residing on the fringe of the Park.

7.3.5 Anti Poaching Measures Taken So Far

The Government of Assam has not only taken effective steps to protect rhino in all rhino bearing areas but has also made sincere efforts to scientifically plan and manage its protected areas to ensure long term survival of rhino, assemblages and habitats. With the spurt of recent poaching incidents, following major initiatives have been taken by the Government:-

- Government of Assam has taken many measures for effective management of Wildlife in the state including legislative changes, bringing Wildlife (Protection) (Assam Amendment) Act, 2009 for strict enforcement in handling wildlife crime including poaching of Rhinos. The penalty for the offence committed relating to any animal in Schedule I or Part II of Schedule II of Wildlife (Protection) Act for second and subsequent offence has been raised to minimum seven years but may extend to life imprisonment and fine not less than seventy five thousand rupees.
- The Government of Assam has constituted a Kaziranga Biodiversity and Development Committee chaired by Minister Environment and Forest, Govt. of Assam including members from other line departments, district civil and police administration and technical experts to examine the infrastructural development in

holistic manner for better conservation in the fringe area of the KNP.

- Additional support for control of poaching in KNP has been provided by placing 535 Assam Forest Protection Force personnel with 200 SLRs and 125 home guards. Process is on to acquire more sophisticated arms like AK Series weapons.
- The Government has engaged services of the elite investigation agency of the country, the CBI, to establish forward and backward linkage of the wildlife crime.
- An Electronic surveillance system, called the Electronic Eye in under implementation in Kaziranga. Under the scheme, 8 nos of tall towers of 45 meter height are being erected, and those would be fitted with visual and thermal imaging cameras with 24X7 access.
- Aerial surveillance using Unmanned Aerial Vehicle (UAV) has been tested in Kaziranga. However, the Govt of India, Ministry of Defence has so far not given clearance on flying of UAVs in the Park.
- A "Special Task Force" under Addl D.G. of Police has already been constituted by the Govt. of Assam. The Force has become operational in the field.

It is no doubt that the Government is doing all it can to save this World Heritage Site from any damages and has left no stone unturned for protection of the rhinoceros.

Since Kaziranga National Park is the home of the largest number of endangered Greater Indian One Horned Rhinoceros, it is constantly under threat from the poachers. Owing to vigorous patrolling by the field staff as well as pro-active role played by the Park authorities, the poaching is contained to certain extent. However, it is high time that the modernization of the strike forces, forest guards and other front-line staff is carried out by upscaling the anti poaching infrastructure, so that the home of the rhinoceros can be protected from poachers and the species along with other endangered wildlife continue to thrive and multiply.

7.4 Conclusions

The following conclusions may be drawn from the discussion above:

1. The rhino horn has been traditionally used for more than 2000 years in Chinese medicines
2. Internationally poaching has increased. This year till 10th July, 2014 South Africa lost 558 rhinos, while Kaziranga lost 21. Both the figures are very high.
3. In Kaziranga, attack from the north bank seems to have increased recently
4. There have been certain impact of increased prices of the horn in the international market in increasing poaching
5. Poachers prefer night time and full moon nights for poaching, but could otherwise strike at any time.
6. No fixed strategy would pay dividends; only a combination of strategies would be workable to stop poaching.
7. Anti Poaching performance of the field staff in the year 2014 has been very good, surpassing all previous records.
8. The Govt. of Assam has taken a series of anti poaching measures. However, the efforts must continue.

CHAPTER 8

8 Stakeholders' Analysis and Responsibilities

Even though the primary responsibility of protection of the rhino in Kaziranga lies with the staff of the Park, there are equally important other stakeholders, who if do not discharge their duties (whether written down or otherwise, or in respect of the Fundamental Duties as laid down in the Constitution of India, (g) to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures;), very little protection can be achieved inside the Park under the currently prevailing circumstances. For example, adverse publicity against staff and the Forest Department, in respect of rhino poaching, can create a negative and demoralizing impact upon the field staff who are, otherwise, doing their best possible duty within the limits of the given resources and abilities. Such gaps in understanding can arise due to non exchange of ideas, issues and problems on a common platform.

The primary, secondary and key stakeholders were identified, and several consultations, meetings, discussions, workshops were organized. The stakeholders meeting have helped in better understanding and cooperation among the various stakeholders. A quick stakeholder mapping helped in identifying and categorizing members of each stakeholder community. Need assessment and gap analysis, i.e. the fringe village populations is in the process of identification using participatory approach. The initial findings indicate that providing alternate livelihoods to the fringe village population has emerged as the biggest need.

Stakeholders relating to the management of the Park and support services namely the Forest Department and other Govt. Departments have been brought together in enhancing understanding of inter-departmental issues and constraints and forging new strategies and coordination for long term management of Kaziranga. Experts from the global communities i.e. researchers and park managers elsewhere in the rhino bearing areas in the world have provided valuable inputs in chalking out strategies for short term, medium term and long term implementation.

The stakeholders identified are:

1. The Staff of Kaziranga
2. The Fringe Village Population
3. The Assam Forest Department
4. The Govt. of Assam
 - Revenue Department
 - Finance Department
 - PWD
 - Water Resources Department etc.
5. The Assam Police
6. The Govt of India
 - MoEF
 - NTCA
 - Home Ministry
 - CBI

- Ministry of Defence etc.
- 7. Local Population of Kaziranga Landscape
 - EDCs
 - Fringe Villages
 - Tea gardens
- 8. Tourists visiting Kaziranga
- 9. Local Civil Society Organizations
- 10. Local Business Entities dependent upon Tourism in Kaziranga
 - Hotel owners
 - Tour operators
 - Commercial establishments
- 11. CBOs and Organizations of Assam
- 12. IUCN
- 13. Donor Agencies
- 14. Wildlife and Other National and International NGOs
- 15. Wildlife Researchers
- 16. Research and Training Institutes
- 17. Service sector institutions
- 18. People of Assam
- 19. Print and Electronic Media of Assam
- 20. National and International Media
- 21. People of India
- 22. Corporate World (National and International)
- 23. World Communities

In order to make the consultations broad based and learn from the knowledge and experience of other stakeholders, the various chapters of the draft Report were shared with some of the identified representative members of the various stakeholding groups and organizations right from the local to the global. The opinion, suggestions and expert views given by the various representatives of the stakeholders have been compiled in the Part III of the Report. The Report draws heavily from the valuable inputs provided by the various stakeholders.

CHAPTER 9

9 ABOUT KAZIRANGA

9.1 INTRODUCTION:

KAZIRANGA NATIONAL PARK is a name known worldwide for its success in the conservation history of one horned Indian Rhinoceros. It is spread over an area of 430 sq km and there is further addition of 400 sq km area to the park. The management history dates back to 1st June 1908 when it was first declared as a Reserve Forest. It was subsequently upgraded to a Game Sanctuary in 1916, a Wildlife Sanctuary in 1950 and finally a National Park in 1974. It also provides a natural habitat for a number of rare, threatened and charismatic species. A symbol of dedication for the conservation of animals and their habitat, Kaziranga, with a National Park status represents the single largest protected area to provide long term viable conservation.

Kaziranga National Park is an outstanding example representing significant ongoing ecological and biological processes in the evolution and development of natural ecosystems consisting of several communities of plants and animals. Kaziranga is the most important and significant natural habitat for *in-situ* conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science and Biodiversity Conservation with Rhino as the flagship species.

9.2 GEOGRAPHIC LOCATION & CONSERVATION PROVINCES:

Situated on the southern bank of the Brahmaputra River at the foot of the Mikir - Karbi Anglong Hills about 8 km from Bokakhat and 230 km east of Guwahati, the State capital of Assam. After the proposed 6th Addition, the northern high bank of the river Brahmaputra would form its northern boundary. The National Highway No.37 forms partly the southern boundary. Its coordinates are 26° 30' to 26° 45'N and 93° 05' to 93° 40'E.

As per UNESCO, it falls within the Burma Monsoon Forest (4.09.04) and within the North-east Brahmaputra Valley (9A) Bio-geographical Province. It also represents the Assam-Arakan Geological Province. It falls within the Indo-Malayan Terrestrial Eco-Zone, Brahmaputra Valley Semi Evergreen Eco-Region.

9.3 WORLD HERITAGE SITE:

The unique values and criteria made Kaziranga National Park to get inscribed on the **World Heritage List** of "Convention concerning the protection of the world cultural and natural heritage" in the year 1985 under criteria N (ix) and N (x) of the Natural World Heritage. Some of the significant conservation values of Kaziranga National Park are enumerated below: -

- The largest Undivided and Representative area of Brahmaputra Valley flood plain grassland and forest with associated large herbivores, avifauna and wet land values.
- The world's largest population of:
 - Greater One horned Rhinoceros (*Rhinoceros unicornis*)
 - Wild Buffalo (*Bubalus bubalis*)

- Swamp Deer (*Cervus duvauceli ranjitsinghi*)
- Home to the Bengal Florican (*Houbaropsis bengalensis*)
- Significant population of Asiatic Elephant (*Elephas maximus*)
- The junction of the Australasia flyway and Indo-Asian flyway
- Exhibits considerable diversity in avifaunal species.
- Provides an entire range of habitat from the floodplains to grassland to hill evergreen forest communities.

9.4 IMPORTANT DATES & MILESTONES

Year	Event	Remarks
1905	Preliminary notification of constitution of Kaziranga Reserved Forest Issued	
1908	Kaziranga Reserve Forest constituted	On 1 st June, 1908
1916	Declared a Game Reserve	
1938	Opened to the public	
1950	Declared a Wildlife Sanctuary	
1954	Assam Rhinoceros Preservation Act passed	
1968	Assam National Parks Act notified	
1969	Preliminary notification of Kaziranga National Park issued under the Assam National Parks Act	
1974	Final notification of Kaziranga National Park issued	11 th February, 1974
1984	1 st Addition preliminary notification issued	20 th September, 1984
1985	Declared World Heritage Site by UNESCO	
1990	Burapahar Range started with HQ at Ghorakati	27 th December, 1990
1997	Final notification of the 1 st Addition issued	20 th May, 1997
2002	Kukrakata RF was added to the Kaziranga National Park under the Burapahar Range	
2005	Declared Elephant Reserve	
2005	Celebrates Centenary	
2007	Declared Tiger Reserve	
2010	Northern Range at Biswanath opened	

9.5 FLORA & FAUNA:

The Kaziranga National Park is known to house 38 mammal species, about 553 birds species, about 64 herpetofauna, 41 amphibian species, 42 piscifauna, and about 550 species of flora (of which 106 floras has been identified as rare and endangered).

The Sloth bear (*Melarsus ursinus*) is commonly found in the wooded areas of the park near Kanchanjuri, Bimoli, Kathpara, Rangamotia etc. They are not sighted frequently due to their natural habits. Estimated population of Sloth bear is about 40 - 50 in the park. The Hoolock gibbons (*Hylobates hoolock*) visit the wooded areas of the park near Kanchanjuri and Panbari R.F. Common langur (*Presbytes entellus*), Capped langur (*Presbytes pileatus*) are also found in this area. During 1999 census operation, 139 capped langur were found in the park. Rhesus monkey (*Macaca mulatta*), Assamese macaque (*Macaca assamensis*) are also found in the forested areas of the park. However their number is small. Indian porcupine (*Hystrix Indica*), Hog badger (*Aratonyx collaris*), Fishing cat (*Felis viverrina*), etc. are some of the smaller animals found in the park. During 1999 census operation, 9 Hog badgers were found.

Amongst the reptilian fauna, python (*Python molurus*), common (Naja naja) and king cobra (*Ophiophagus hannah*), water monitor lizards (*Salvator monitor*), Tortoises and Turtles of various species, Indian gharial (*Gavialis gangeticus*) etc. may be mentioned.

The rivers, streams and the Beels inside the park are ideal habitat for the fresh water fishes, reptiles and other aquatic forms of life. There are many places where the freshwater turtles can be seen basking on the fallen tree trunks and on the banks of the rivers. The Gharial (*Gavialis gangeticus*) was once very common in the Moridifalu and Difalu rivers, but they are rarely seen these days.

The Gangetic dolphin (*Platinista gangetica*) is another common sight in the Dipholu river. With their populations decimating in other parts of the country, Kaziranga can serve to provide an important refuge to this mammal.

9.5.1 AVIFAUNA :

The Kaziranga National Park supports a rich and varied bird life. In addition to numerous species of resident birds it serves as the winter visiting ground to many migratory birds. Altogether 478 species of birds, both migratory and resident, have been identified. The list included 25 globally threatened and 21 near threatened species. The park has also been identified as an Important Bird Area (IBA) by Birdlife International for the conservation of the avifaunal species. The 25 globally threatened species are: The Swamp francolin (*Francolinus gularis*), Lesser White-fronted Goose (*Anser erythropus*), Ferruginous Pochard (*Aythya nyroca*), Baer's Pochard (*A. Baeri*), Blyth's Kingfisher (*Alcedo hercules*), Pale-capped pigeon (*Columba punicea*), Bengal Florican (*Houbaropsis bengalensis*), Nordmann's Greenshank (*Tringa guttifer*), Black bellied tern (*Sterna acuticauda*), Pallas's Fishing Eagle (*Haliaeetus leucoryphus*), Greater spotted eagle (*Aquila clanga*), Imperial Eagle (*A. Heliaca*), Lesser Kestrel (*Falco naumanni*), White-bellied Heron (*Ardea insignis*), Spot-billed Pelican (*Pelecanus phillippensis*), Dalmatian Pelican (*P. Crispus*), Greater Adjutant (*Leptoptilos dubius*), Lesser adjutant (*L. Javanicus*), Hodgson's Bushchat (*Saxicola insignis*), Rufous-vented prinia (*Prinia burnesii*), Bristled Grassbird (*Chaetornis striatus*), Marsh Babbler (*Pellorneum palustre*), Jerdon's Babbler (*Chrysomma altirostre*),

Black-breasted Parrotbill (*Paradoxornis flavirostris*) and Finn's Weaver (*Ploceus megarhynchus*). There is a breeding colony of the pelicans near Boralimora in the Eastern Range where as many as six hundred nests were observed. When the chicks grow up and they are taken out by their parents for fishing in the Beels it presents a very interesting and impressive sight of hundreds of pelicans moving in army formation. In addition to the breeding colonies of the pelicans, there are large breeding colonies of egrets, cormorants and the darter.

Kaziranga National Park consists of vast alluvial grasslands along with its 6 additions and there Reserved Forests comprising an area of 1055 Sq Km. This area supports, in addition to a large tiger population, mega-herbivores like Rhino, Elephant, Buffalo, Swamp deer and Sambar. This assemblage along with numerous hog deer and wild boar forms a healthy prey base of tiger and other carnivores. There are 108 tigers in the Park which makes it one of the densely populated tiger reserve in the country.

9.6 WILD ANIMAL CENSUS AND POPULATION:

The following Table shows the existing animal populations in the Kaziranga National Park:-

Sl No	Wildlife	Population	Census/ Estimation Year
1	Rhinoceros	2329	2013
2	Elephant	1163	2011
3	Tiger	111	2012
4	Wild Buffalo	1937	2008
5	Swamp Deer	836	2013
6	Hog Deer	35,000	2012
7	Sambar	1100	2012
8	Wild Boar	18000	2012
9	Non Human Primates	4214	2009

9.7 ADDITIONS TO THE KAZIRANGA NATIONAL PARK:

The following additions have been proposed/ effected to the original area of 430 sq km of the notified Kaziranga National Park in 1974:

NAME	STATUS	NOTIFICATION NUMBER		AREA (Ha)	DISTRICT
		NUMBER	DATE		
KNP	FINAL	FOR/WL/72 2/68	11 th FEB 1974	42993	NAGAON AND SIBSAGAR
FIRST ADDITION TO KNP	FINAL	FRS.253/90/ 198	28 th MAY 1997	4378.8	NAGAON AND SONITPUR
SECOND ADDITION TO KNP	FINAL (De- Novo)	FRS.89/200 2/112	12 th JULY 2010	646.98	GOLAGHAT
THIRD ADDITION TO KNP	PRPOSED	FRS.101/85/ 3	31 st MAY 1985	69.76	GOLAGHAT
FOURTH ADDITION TO	FINAL (De-	FRS89/2002	10 th APRIL	89.754	NAGAON

KNP	Novo)	/129	2012		
FIFTH ADDITION TO KNP	PROPOSED	FRS.126/15/2	13 th JUNE 1985	115.36	GOLAGHAT
SIXTH ADDITION TO KNP	PROPOSED (De-Novo)	FRS.89/2002/13	22 nd DEC 2008	40150	SONITPUR
TOTAL AREA (in Ha.)				88443.65	

So far, the 1st and 4th Additions to the National Park have been fully handed over to the Park authorities. The 2nd Addition has been partly effected. Rest of the areas are yet to be handed over to the Park authorities.

9.8 Kaziranga Forest Types & Habitat

The floristic composition of the Kaziranga National Park comprises of following forest types (Champion & Seth, 1968):

- Eastern Wet Alluvial Grasslands (4D/2S2)
- Assam Alluvial Plains Semi-Evergreen Forests (2B/C1a)
- Tropical Moist Mixed Deciduous Forests (3C3)
- Eastern Dillenia Swamp Forests (4D/SS5)

The habitat consists of (area-wise break up in %):

- Woodland 27.95 %
- Short grass 3.01 %
- Tall Grass 61.01 %
- Beels 5.96 %
- Jiya Difaloo 0.97 %
- Mori Difaloo 0.70 %
- Sand 0.40 %

**GOVERNMENT OF ASSAM
KAZIRANGA NATIONAL PARK**

**DETAILED REPORT
ON
ISSUES AND POSSIBLE SOLUTIONS
FOR
LONG TERM PROTECTION
OF
THE GREATER ONE HORNED
RHINOCEROS
IN
KAZIRANGA NATIONAL PARK
PURSUANT TO THE ORDER OF
THE HON'BLE GAUHATI HIGH COURT**

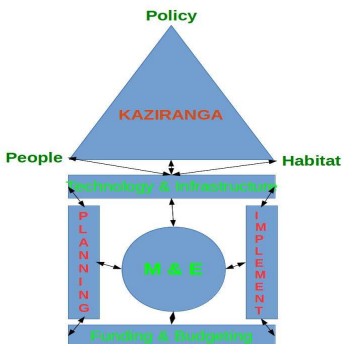
PART II



CHAPTER 10

10 THE PROPOSED SOLUTION FRAMEWORK

Based on primary data collection, discussions and consultations with stakeholders, secondary literature review of laws, acts, policies, research findings and reports, and inputs from experts from local, national and international levels, a solution framework has been proposed which is multi pronged and multi disciplinary in approach. The figure below depicts the proposed solutions framework for Kaziranga.



The key to successful long term management of Kaziranga and protection of rhinos is a fine balance between the Habitat management and the growth and development of the people, which can be pivoted on sound policies, frameworks, strategies and protocols based on technology and low carbon infrastructure. However, it would require a very good planning as well as implementation maintaining the fine balance between conservation and growth, which would ultimately rest on sound budgeting and financing principles and regular flow of funds. A very strong monitoring and evaluation, project management and audit would ensure that the flow of resources is in the right direction.

Of course, it is no denying that nothing can be achieved without a well trained, well motivated and skilled manpower. Human resource management would, therefore, be one of the first and foremost of the challenges to be overcome while implementing the proposed solution framework.

The proposed solution framework is as below:-

1. Habitat:
 1. Erosion Control strategies
 2. Improvement strategies
 3. Extension Strategies
 4. Retrofitting Strategies
 5. Informed Management
2. People
 1. Front-Line Staff
 1. SMART GUARD
 2. SMART COMMUNICATION
 3. Technology & Infrastructure Interventions
 4. Operation & Maintenance
 5. Staff Welfare
 2. Fringe Villages Development
 1. Livelihoods & Employment
 2. Education
 3. Health
 4. Insurance and Social Security
 5. Green Development Initiatives
 3. Kaziranga Tourism
3. Policy
 1. Amendments in the Wildlife (Protection) Act, 1972
 2. Wildlife Crime Detection, Reporting and Conviction
 3. Creating Kaziranga Landscape Authority
 4. Kaziranga Landscape
 1. Kaziranga Watershed
 2. RF & PA Network
 3. Corridors
 4. Other areas
 5. Kaziranga Landscape Development Framework
 1. Green Growth
 2. Tourism
 3. Modern Means of Communication
 4. Land use Zonation
 6. Rhino Range Expansion Project
4. Implementation
 1. Immediate measures
 2. Short Term measures
 3. Medium Term Measures
 4. Long Term Measures
5. Cost Estimates & Sources of Funding

CHAPTER 11

11 Habitat Strategies

Six specific strategies have been proposed for habitat of the rhinoceros in Kaziranga. These are:

1. Erosion Control
2. Habitat Improvement
3. Extension of Habitat
4. Retrofitting Strategies
5. Encroachment Eviction
6. Informed Management

11.1 Erosion Control Programme (ECP)

The beginning of Chapter 2 highlights the basic issue of habitat loss of Kaziranga by way of erosion. The areas lost are quality habitat areas. Some of them, such as the present Debeswari formation (since it was lost to the river somewhere between 1914 to 1972, and formed again in course of time in subsequent years) is a very critical habitat for the Eastern Swamp Deer and the Bengal Florican. Today, Kaziranga cannot afford to lose this habitat to the Brahmaputra, as it may prove very costly for these two species. Currently, erosion is going on. It is apprehended that by the end of the 2014 flood season, some more of Debeswari area would be eroded.

There is another issue which was not discussed in Chapter 2, is the threat to the entire Kaziranga National Park, if by any chance the river Brahmaputra were to enter into the dead Dhansiri (Mora Dhansiri) channel by breaching the existing embankment east of Dhanbari near the Bokakhat township. Once Brahmaputra main channel enters into Mora Dhansiri (currently the river is only *less than 350 meters short* of hitting the embankment), it has the potential to destroy the Park habitat by splitting it east to west in two parts.

Erosion is very severe on the eastern bank above Dhanbari, followed by Debeswari upto Sitalmari through Arimora on the south bank. There are chances of deposition and further aggregation of landmass west of Sitalmari. There are also possibilities of consolidation between Debeswari and Arimora. However, the exact ground configuration would be only clear after the 2014 floods are over. Currently, inspection of the bank line shows that though Arimora IB was pulled down and the Beat Office was washed away in 2013 September, this year in the 2nd week of June, 2014, the Arimora point completely went into water including the road behind it and the group of trees on the bank, forcing us to make another road further south. The river is hitting the bank in south-west direction, probably after the water gets deflected in that direction at the Buroi river point. At Buroi, the river gets pushed south-west ward with great force. If this trend continues, there could be possibilities of the Brahmaputra entering the barbeel through the Siga bridge (about 2.3 kilometer west of Arimora) or through the streams about 900 meters east of the point, the waters could hit the Difaloo river near Holalpath which is also 2.5 kilometers away from the bank. In either case, Naobhangi, Arimora, Gobrai, Kartika, Sitalmari etc. are likely to become part of the river and reappear as char areas in near future. These are again prime habitats of the rhinoceros. It is now expected that within this season itself we may have to

shift again the Arimora beat location further south, as the river may erode another 500 meters in a year or two.

It needs to be mentioned here that in the past there were attempts to control erosion by the Park authorities. There were several porcupine structures put around the Arimora area in 2010 under a centrally sponsored scheme of the NTCA. However, all that has been very harshly dismantled by the river, and today there is no trace of them. Further, under the ADB assisted FREMAA project, a proposal in Tranch-2 has been proposed for erosion control of the river. The proposal is currently waiting for nod from the MoEF, New Delhi for Environment Clearance. The author has briefly examined the proposal, which consists of sluice gates, porcupine structures and embankments costing Rs. 137 crore. According to the author, the FREMAA proposal would require certain modifications as per the requirements of habitat management. Kaziranga and Brahmaputra have a unique relationship. It may be worthwhile to mention here in brief some of the intricacies of this relationship.

11.1.1 Flood – A Boon for Kaziranga

As already mentioned elsewhere in part I of the Report, flood is a boon for Kaziranga. The very existence of Kaziranga is due to the interplay of the Brahmaputra river and its flood waters and silt load. First of all, the floods serve as annual hygiene and cleansing operation (which is manually not possible to be done). Kaziranga supports a large number of wildlife, including most of the large mammals such as rhino, tiger, elephant, buffalo, sambar, swamp deer and hog deer. These live bodies act as hosts for many kind of bacteria which often are passed on in the habitat through defecation. If these are not cleansed regularly, chances of spread of disease and epidemic become high in course of time. The flood water washes away all this annually, thereby keeping the hygiene of the Park in high order.

Secondly, fresh silt is deposited in the habitat which in turn gets enriched in nutrients and minerals. Thus, productivity of the habitat does not decrease, rather it is maintained. Thirdly, this also applies to the large number of water bodies whose water gets replenished afresh with new water annually. The water bodies get charged for supporting wildlife during the winter and dry season that would follow. Kaziranga largely has never faced water crisis, and ample availability of water through a network of about 300 small and large water bodies, is made for the wildlife. This is one of the reasons why visibility of wildlife is so high in Kaziranga compared to other Parks elsewhere in the world.

Fourthly, the water bodies of Kaziranga, due to a very high level of protection accorded, act as rich nurseries/ hatcheries and fertile spawning ground for variety of fishes and other aquatic fauna. During the floods, the fledglings get the opportunity to get into the mainstream and move onward enriching the aquatic faunal life downstream. Fifthly, the Kaziranga Tiger Reserve is unique in supporting fresh water mangroves in parts of its habitat. The *Barringtonia acutangula* is the fresh water mangrove growing mostly in flood affected areas of the Tiger Reserve. This unique forest type requires annual floods for its continued nutrient supply and survival. If floods cease to occur, this forest type may die down. Sixthly, one of the great effects of high floods is that it suppresses the invasive

weeds such as mimosa selectively. If the weeds remain under water for some time, they naturally tend to die. Thus, floods help in weed control as well.

Therefore, floods are a must for Kaziranga Tiger Reserve. The higher the flood levels, the better is the habitat. However, more severe the flood, more is the casualty and loss of wildlife. This calls for creation of more highlands, a topic which has been dealt with separately in the Chapter.

11.1.2 Staggered Inflow and Outflow of Flood Waters

The Kaziranga National Park (as notified originally) and its 1st Addition areas share about 70 km of bank line with the Brahmaputra river on the south bank side. The bank line is mostly vertical all along, only broken at places by the large mammals who have made regular tracks for their movement to the river and beyond. There are several ghats which are used by the staff for river patrolling and navigation. There are more than 25 major channel entry points along this bank line, and numerous minor channels through which flood waters can enter the park area. Since the Brahmaputra varies considerably in depth upto 60-100 ft at places, the different water channels meet the river at different elevations. This variation in elevation of the water channels at the bank leads to staggered flooding of the Park. The lowest and deepest channels get flooded first, and flooding is observed to happen from west to east. As the water level rises, more channels get flooded and the water flow reverses. Similarly while flood on the decline, its the higher elevation channels which get drained out first, followed by the deeper channels towards the end.

This leads to setting up of current and counter current in the Park, thus, helping in generating the required natural force for cleansing and nutrient cycling within the Park. Therefore, prior to taking up any engineering enterprise for control of erosion in and around the Kaziranga Tiger Reserve, the river and channel dynamics (and the lotic ecosystem comprising of the river and its numerous streams) must be taken into account. The Kaziranga-Brahmaputra bank line has considerable topographical and vegetational variation all along.

11.1.3 Proposed Erosion Control Measures

Several rounds of discussion took place between the Kaziranga authorities and the Water Resource department authorities. The following possibilities have emerged which need to be pursued after obtaining all clearances from the Govt.

1. The FREMAA proposal in its current form needs to be totally modified and resubmitted after mutual consultations
2. In the short term, the embankment south of Dhanbari needs to be secured for which necessary permission may be given the Forest & Environment Department.
3. An experimental bank line erosion control mechanism using geo-bags/ geo-tubes and geo-mats needs to be tried along the Debeswari bank line subject to the condition that there should not be any change/ damage / blockade of the existing channels along the bank line.
4. As a futuristic experiment, since Kaziranga has already lost about 84 sq km of land, the following may be tried with caution:
 1. Extend the Debeswari experiment from all along the south bank line
 2. Attempt to reclaim chapori land which are within 500 meters of the bankline by a mix of engineering intervention and vegetative stabilization.

3. Then, secure the new bank line.
4. Since the river has entered about 7 km inside on the eastern bank, attempt should be made for recovery of part of land by way of causing siltation near Dhanbari.
5. Dredging of the river at certain places, and dumping of the silt at certain other places (such as at Serial 2 above) to reclaim more land.
5. The bank line migration around Kaziranga must be studied in detail.
6. The river profiling and acoustic survey should be carried out annually.

11.2 Habitat Improvement Programme (HIP)

The existing habitat within the originally notified Kaziranga National Park and the 1st addition areas, as already mentioned in Chapter 2, have undergone / undergoing degradation due to various biotic and abiotic factors. The park authorities have been carrying out certain improvement measures from time to time subject to quantum of fund available. There has been some improvements or even temporary relieve, but the issues continue. There seems to be a requirement of long term consistent programme of habitat improvement to be adopted for the Kaziranga Tiger Reserve as a whole with adequate infrastructural and funding support. The following programmes need to be institutionalized:

1. Invasive Weed Control
2. Encroachment of grassland by Simul and other woody growth
3. Desiltation of water bodies
4. Highland creation and maintenance
5. Biotic Interference Control: Grazing and Fishing
6. Water harvesting
7. Forest Fire Control

For invasive weed control, in addition to manual methods, effectiveness of herbicides as suggested by Richard Emslie may be tried. Weeds also come due to nearness of agricultural crops and human habitation next to the Park/ Tiger Reserve boundaries. It is proposed:

1. To maintain a No Activity Buffer Zone of 500 meters at certain select places along the boundary, especially in Eastern, Central and Western Ranges where agricultural fields and habitations are just next to the Park boundary. Habitations falling in such zones should be suitably rehabilitated, and adequate compensation should be paid for loss of agricultural land.
2. Use of pesticides and insecticides should be banned in the landscape area. Any loss of productivity should be adequately compensated for till production levels do not bounce back to the original levels.
3. Mechanical weeding by resorting to ploughing before flowering may be tried
4. Tested and safe herbicides may be used for removing unwanted growth and vegetation.
5. Depending upon the efficacy of the method adopted and cost involved, annual areas for operation should be demarcated
6. The cycle at serial 5 above may have to be repeated after passage of time.

Trees such as Simul are heavily encroaching upon the grassland with profuse regeneration. These are the vast grasslands that are plain with slight undulation on the ground, broken by water bodies. The only way out appears to be mechanical removal

using logging equipment after the grasses have been burnt during late January to March, to make the operation less costly and sustainable. The other option could be, for the areas which are already covered by Simul regeneration, to cut down the trees below the soil surface in the month of September/ October and burn the area during January-February.

Desiltation and highland creation could go hand in hand. Highlands to be raised must be planned and mapped before-hand. Similarly, water bodies and parts thereof should be identified well in advance based on ecological and water flow dynamics of the area. An annual plan of operation should be made in advance for these activities.

As regards water harvesting, structures should be built very cautiously. Since there is no dearth of water bodies in Kaziranga, the only threat is that in extreme drought conditions, water could become scarce. By desiltation, the situation should improve considerably. However, it is observed that barring the deeper river channels, the higher elevation channels do not store any water. Small causeways with strong foundation should be made so that some water in the upstream level is retained in different stages in cascading manner. As of now, there does not seem to be any need to digging artificial tanks in the Park. However, at landscape level, there would be serious shortage of water for the wildlife, as most of the areas would be highland. Therefore, water harvesting structures needs to be planned in the landscape outside the core areas. Such structures could also include artificial water channels, and improving of the natural water channels of the 4th order and above in the landscape, based on appropriate hydrological study and design.

Fire is extensively used in Kaziranga National Park for grassland management. Starting from the end of February to early April, fire is set to the vast grasslands in a phased manner. Burning is a very important management tool for maintaining the grasslands (though scientifically speaking, such a large scale burning releases lot of carbon in the atmosphere, and definitely one cannot term this management practice as "green" management technique, which is a major contributor of CO₂.)

Fire is so much a part of the Kaziranga management that talking of fire fighting appears to be out of place. There is another reason for this topic to be out of place, namely slash and burn agriculture practice of the tribes residing on the hills opposite the Park/Tiger Reserve. Several hectares of forests are set on fire randomly and continue burning for days together (again releases a lot of carbon in the atmosphere. Slash and burn system, according to the author, has a very serious negative connotation with climate change).

Having said that fire fighting is a topic out of place here, the relevance of fire fighting comes in the backdrop of landscape level management. It may happen that the structural corridors passing through thick populations may pose a major fire threat in future. Therefore, it is proposed that over a period of time, the forest fire fighting capabilities be initiated and augmented.

Grazing Control:

It has been observed that the local population living on the fringe of the Kaziranga Tiger Reserve often let their cattle loose in the Reserve to graze. This problem has persisted since long without any solution. The field officers find it difficult to come in direct confrontation with the local population on a regular basis. The cattle are highly

unproductive and are not stall fed. Since they are not stall fed, the cow dung, which otherwise is a source of cooking energy/ bio-gas, is not available for any practical utility for the owners of the cattle. The other associated problem of stray dogs from these villages entering the Park boundary. It is possible that these dogs may be attacking the newly born fawns and babies of other animals. Further, such attacks would be adversely affecting the growth of the populations concerned, especially endangered animals such as swamp deer.

Electric Fencing has been put at several places in the Park, and seems to be a miserable failure. The reason being that when the villagers on the fringe feel the threat from wild animals who would raid their crop, they see to it that the fence works. But on other occasions, they themselves often damage it. Another reason for failure of electric fencing in Kaziranga is the continuous migration of wild animals, especially during floods. To facilitate smooth migration, the fencing has to be removed performe.

The experiments of stall feeding would not be successful. The main reason being that the Assamese community, and this is also true of most other communities (except Nepali, Eastern UP and Bihari) are not in any traditional habit of stall feeding, and moreover, the kind of infrastructure and man-power investment that would typically go into stall feeding (such as regular cleaning, collection and disposal of cow dung, getting feeds, regularly serving the cattle etc.) is totally missing from these communities. Therefore, preaching stall feeding and hybrid cows may not work at all.

The only solution to the author appears to be an enterprise of dairy cooperatives in the landscape, where each of the owners are given "cattle shares" and dividends based on the number of shares that a household owns. The rest of it should be managed professionally.

Fishing Control:

Fishing is another vice plaguing the Park. Though it cannot be strictly termed as Habitat degradation factor, and hence there cannot be a Habitat Improvement programme for fishing control. Fishing is a serious law and order issue and finds mention here along with grazing control.

Fishing is prevalent in entire parts of the 6th Addition areas, Burapahar Range (along the NH37), along the banks of the Mora Dhansiri and Mora Difaloo rivers in the Eastern, Central and Western Ranges wherever there are villages near the boundary. Fishing on the North Bank is more organized, commercial in nature and on a bigger scale, while on the south bank, its for household consumption and local markets. Another phenomenon that has been noticed of late is community fishing by the fringe villages on certain festive occasions such as Magh Bihu, Bohag Bihu etc. In such community fishing, people join from certain remote areas beyond Kaziranga such as Rupohi, Laokhowa, Puranigodam etc. who come in hired trucks with fishing nets and baskets. There have been at least two skirmishes with such fishermen and on both the occasions, it followed by burning of camps, blockade of the NH37 and demand of arrest/ transfer/ suspension of the Burapahar Range Officer. These are being done allegedly to exert the community's traditional fishing rights. Further, it has been observed that in most cases the poachers take the shelter of these fishing communities for getting in and out of the Park. Especially in the north bank, it is the fishermen who use their country boats to cross the river with the team of poachers.

Possible solutions may be:

1. Take legal recourse to the habitual offenders
2. Constant river patrolling to act as deterrent
3. Seizure of boats, nets and arrest of offenders
4. Awareness campaign through EDCs on the south bank
5. Formation of EDCs on the north bank
6. Alternate livelihood options, including creation of fisheries through EDCs

Habitat Management Infrastructure:

Habitat improvement programme for the Park/ Tiger Reserve would require certain infrastructure to be created on permanent basis along with necessary staff and running cost. Currently there is no infrastructure to carry out the improvement works, and the Park authorities have to depend upon hired vehicles which not only becomes costly, but also is not available all throughout. The following infrastructure is suggested for the Tiger Reserve:

1. All Terrain Vehicles (8x8 Drive Amphibious Off-Road Vehicle with tracked configuration/ wheels)
2. Tractors
3. Excavators and Dumpers
4. Forestry Crawler Dozers
5. Trucks
6. Forestry Logging Equipment
7. Forest Fire Fighting Equipment

However, in order to make the best use of the equipment, their regular maintenance, a new cadre of personnel is required to be recruited along with trained people to handle the equipment and drive the gears. Therefore, the Habitat Improvement Programme must take into account the following:-

1. Adequate trained manpower for all mechanical equipment
2. Availability of spare parts and proper maintenance
3. Setting up of in-house mechanical workshop

11.3 Extension of Habitat

On the face of the fact that 4 additions to Kaziranga National Park are pending since 1985, and this Report talks of taking some more areas! However, this Reports proposes a change of strategy in this regard, subject to its approval by the Government of Assam.

It is no denying that the current system of land acquisition is very lengthy, difficult to implement and land prices may change at the time of final hand-over leading to further delays in land acquisition.

The following strategies for private land procurement for Kaziranga are proposed:-

1. All land for Kaziranga should be procured at prevalent market rates
2. The market rates can be determined by the concerned Deputy Commissioner by averaging sale value of last three sales for that class of land.
3. The Deputy Commissioner should certify that the land in question is non encumbered.
4. Payment must be made to the owner of the land outright by way of cheque/ ECS

5. Possession of land must be taken immediately
6. GPS readings of the corners of the plot should be recorded
7. The area must be immediately secured against any possible encroachment.
8. The land should be registered in the name of Kaziranga Landscape Authority or any such authority Govt. may deem fit.
9. Once the land is in possession of the Authority, the procedure for declaration of National Park or Sanctuary should be followed as per the Wildlife (Protection) Act, 1972.

In case of Govt. land, the procedure of the Assam Land Revenue Regulation may be followed as usual for allotment of the land to the Kaziranga Landscape Authority, if constituted. Once the land is transferred and mutated in the name of the Authority, the procedure for declaration of National Park or Sanctuary should be followed as per the Wildlife (Protection) Act, 1972.

The third strategy for land procurement is to create community reserves where people, NGOs, foundations and other philanthropic minded entities, individuals and corporates may offer non encumbered land to Kaziranga authorities only for conservation of wildlife. These chunks of land could be, then, treated as blocks or compartments of Kaziranga. These could be even named after the donors or their patrons.

All land transactions should happen at market rates including payment of revenue and duties to the Govt.

11.3.1 Recommendations of the AsRSG of IUCN

The Asian Rhino Specialist Group by IUCN had recommended a series of projects including one for extension of rhino habitat for Kaziranga. The group delineated a total of 20 projects for rhino conservation for India at a cost of US\$ 16,239,000.00. This amount translates to Rs. 100,68,18,000.00 at the current exchange rates. However, it should be noted that these are based on the estimates in 1996, which is about almost two decades back. There would be significant cost escalations in these values in today's price terms. The comments of the AsRSG about the need of habitat extension for Kaziranga can be seen at Page 44 of the Report. To emphasize its importance, the same is quoted here, "... However, there is need to expand the habitat for the rhino in Kaziranga. Much of the original area of the Park has been lost due to erosion along the Brahmaputra (Northern) side and to human encroachment and development along the the southern border. Particularly needed are extension into higher areas not affected by the annual floods". The group also kept a provision of US\$ 900,000.00 only for habitat extension into the higher areas. This amounts to Rs. 5,58,00,000.00.

In view of high cost of land, it is proposed that this recommendation of the AsRSG be implemented at market rate strategies as mentioned in the previous section. An annual fund of Rs. 50 crore may be created for this purpose. The fund could be used to build core/ critical areas/ buffer areas and corridors, and or retrofitting of these areas by adding additional land.

11.3.2 Possible Extension Areas

Agaratoli Range: All the areas falling between the Mathaori (Embankment) and Kaziranga (from Dhanbari to Sukhani)

Kohora: Expansion and consolidation of the corridors, including some tea garden areas

Bagori: Expansion and consolidation of the corridors, including some tea garden areas

Burapahar: Bagser RF, Kamakhya Hill RF, Expansion and consolidation of the corridors, including some tea garden areas

Burachaporil/ Laokhowa: Riverine areas west of Kalia Bhomora bridge measuring about 250 sq. km. right up to the Singri hills in Sonitpur district. Kuchmara RF which is fully encroached. This may be treated as 1st Addition to the Burapahar Wildlife Sanctuary.

Karbi Anglong: Entire forested area including and north of Mikir Hills/ Kaliani RF

Based on the above indications, a tentative list has been prepared below of the possible areas for immediate extension of the Kaziranga National Park/ Tiger Reserve. This is based on actual reconnaissance survey and areas available with the Forest Department or land with the Govt. The suggested areas for immediate extension of the kaziranga Tiger Reserve are:-

1. Bagser RF
2. Chirang Pahar (Fresh survey to be done, based on the PRF notification)
3. Kamakhya Hill RF
4. Other Areas:
 1. Gakhirekhaiti Village near the Kaliabhomora bridge towards Kaliabor side
 2. Areas between NH37 and Kaziranga at certain places
 3. Govt. land/ VGR / PGR Sukhani to Japaripathar
 4. Govt. land north of embankment from Japaripathar to Dhanbari
 5. SF Plantation area near Dwar Bagori
 6. Govt land near Harmoti camp
 7. Encroachment on the south side of Deopnai Bridge to be removed and corridor restored
 8. Govt. land in and around Banderdubi
 9. All Chapories outside the 6th Addition but within the proposed landscape

11.4 Corridor Retrofitting Strategies

There are geographically three different type of corridors that one needs to address to restore connectivity, namely:

1. Corridors on NH37 which link Kaziranga to Karbi Anglong
2. Corridors elsewhere which are needed for safe migration of long range animals such as elephants, rhinoceros and tigers.
3. Functional corridors which wild animals use such as agricultural fields and crop lands for which a different strategy needs to be adopted.

11.4.1 Corridor Retrofitting on NH37

The corridors on the NH37 between Jakhlabandha and Bokakhat fall in a different category all together, as they are subject to the various orders that may be passed in the matter before the Hon'ble National Green Tribunal. As of now, as per the current orders, the PWD(NH), Govt. of Assam would prepare a DPR for the fly overs that would pass through these corridors giving exact alignments. Thereafter, the next main work would be to study each of the alignments and carry out detailed survey on the ground. The park authorities and the PWD(NH) teams must be in constant interaction during the DPR preparation process so that corridors structurally connect well both sides of the NH37 and ensure safe passage to the wild animals.

The following strategies are suggested for this set of corridors:-

1. Carry out a complete survey of the corridor area right from the Park boundary to the forested tracts of Karbi Anglong, and prepare a detailed map of the corridor.
2. All habitations, tea gardens, agricultural fields, dhabas, hotels, and other obstacles in the corridors such as deep fishery, boundary walls, long fencing etc. must be identified and recorded in the map of the corridor.
3. All land parcels that would be required to retrofit the corridor structurally on both sides of the NH37 should be identified along with ownership and class of land.
4. While doing the survey, representatives of Forest, Civil Administration, and Karbi Anglong Autonomous Development Council should be present.
5. Consultation with local stakeholders, Gaon Panchayats, EDCs, citizenry in general and local public representatives should be carried out while delineating the corridor.
6. A detailed plan and estimate of retrofitting the corridor should be prepared once the geographic limits are finalized.
7. Due compensation rates, if required as per prevailing rates, should be obtained from the Concerned Deputy Commissioner.
8. The final plan should have cost estimates and methods of restoration of the corridor including afforestation activities, if so required.

It is suggested that the NH37 corridors should be made an integral part of the Kaziranga National Park by adopting the strategies suggested in the "Extension of Habitat" strategies.

11.4.2 Other Corridors

In addition to the corridors on the NH37 between Jakhlabandha and Bokakhat, there are many wild animal corridors scattered all around Kaziranga, notable among them are Nambor-Doigrung-Garampani, chapories of Majuli and from thence to Lakhimpur, river channels on the north bank such as Jia Bhorali, Buroi, Gabharu, Borgang, towards west across Silghat, Kaliabhomora to Laokhowa and Orang National Park.

As per the Tiger Conservation Plan (TCP) preparation guidelines, about 1.5 km buffer around these corridors on both the sides need to be delineated showing different land uses and villages, forest areas that fall in the corridors. If more than 50% of the land-use/ land parcel falls within buffer, the entire land parcel/ village/ forest compartment/ block would be required to be included in the corridor. The concerned DFO is required to do a detailed mapping of the corridors in association with the Civil Administration and the same need to be notified as a corridor under the Tiger Conservation Plan of the Kaziranga Tiger Reserve.

The notified corridors shall be regularly monitored and watched. Requisite infrastructural support to the concerned DFO would have to be provided from the KTR for maintenance of the corridor. If the corridor is highly fragmented, retrofitting planning may have to be resorted to as already outlined for the NH37. There would be provision to form EDCs as well, if required.

Support may be provided to the concerned DFO for maintaining the structural and functional parts of the corridors such as camps, watch towers, wireless communication, remuneration to staff etc.

11.4.3 Functional Corridors

Along with the existing structural corridors, as in case of corridors of NH37, the areas falling outside the forest, especially the agricultural land use would need special attention, once the same has been identified and delineated.

The following provisions are suggested for functional parts of the corridors:

1. No land use change to non agricultural/ commercial/ housing type land use should be allowed.
2. No deep uncovered wells, or straight edged fisheries should be allowed.
3. Provision for life, cattle and crop insurance should be made
4. Immediate compensation should be paid on damage of life and property
5. Provision of watch towers for keeping eye on migrating rhinos, so that poachers cannot take aim.
6. Setting up Local Protection Squads (LPS) on the lines of the experiment done in the Laokhowa and Burachapori WLS.
7. Promoting green development, green infrastructure in the corridor areas
8. Incentivising and providing alternate livelihood options to the stakeholders of the corridors.

11.4.4 No Activity Buffer Zone

It is often observed that there are certain areas on the fringe of the Kaziranga National Park where there are habitations and intense agricultural activities, including grazing and fishing. This translates to continuous presence of people in the close vicinity of the Park starting from dawn to dusk, and may encroach even into the night depending upon visibility. As already stated at the beginning of this Chapter, the offenders of law and poachers take full advantage of the human shield and enter into the park with bad intentions of rhino poaching. It becomes very difficult for the staff on duty to resort to action or to distinguish the alleged offender from the genuine villagers. Further, during ambush, there are chances of accidental fire hitting an innocent villager which may lead to complicated law and order situations. Another factor is the straying of wild animals in the nearby farms and damaging crop, often injuring/ killing people.

In order to minimize the ill effects of proximity between the Park and the people, it is proposed that the vulnerable patches be studied and surveyed thoroughly. After detailed consultation and taking people into confidence, a 500 m "No Activity Buffer Zone" may be drawn on the ground. IF there are habitations, those may be shifted to model villages built at the cost of the Kaziranga Landscape Authority. If there are agricultural land, adequate market rate compensation should be awarded. There also could be loss of livelihoods due

to loss of access to fishing etc, which also must be accommodated by way of alternate livelihoods or additional financial assistance to the affected families.

11.5 Eviction of Encroachments

It must be mentioned here without any prejudice that all the territories of the Kaziranga National Park under the control of the Forest Department are 100% encroachment free. These territories are the originally notified Kaziranga National Park, the 1st Addition to KNP, the 4th Addition to KNP and part of the 2nd Addition to KNP (in possession of the Park Authorities). The other areas which are either not finally notified (6th Addition to KNP), or not handed over by the Revenue Department to the Park Authorities (part of 2nd Addition to KNP, 3rd Addition to KNP and the 5th Addition to KNP) either do have encroachment or have traces of encroachment.

The latest victim of encroachment has been the 5th Addition areas which were forcibly occupied by a certain section of people in 2012 and 2013. It was preceded by encroachments in parts of the 3rd Addition areas in 2005. These encroachments are in the form of small huts, the total number at the time of writing of this Report being about 62 (30 in the 3rd Addition areas and 32 in the 5th Addition areas). There are certain khutis in the 6th Addition areas. Although no one has any rights as of now, and all rights have been extinguished by the then Collector appointed by the Govt. of Assam to enquire into and determine the existence, the nature and extent of any rights/ claims alleged to exist in favour of any person or persons in or over any land in the proposed additions to Kaziranga National Park as per procedure laid down in section 19 to 26 A (both exclusive except (c) of sub-section (2) of section 24) of the Wildlife (Protection) Act, 1972, read with section 35 of the said Act.

Views of the Hon'ble Supreme Court:

It is pertinent to mention here that the entire matter of the proposed Additions to the Kaziranga National Park must also be seen in the light of orders of the Hon'ble Supreme Court vide order dated 12.12.1996 passed in WP(C) No. 202 of 1995 in the matter of T.N. Godavarman Trirumulpad –vs- Union of India others which holds that "the word forest must be understood according its Dictionary meaning. This description covers all statutorily recognized Forest whether designated as regard protected or otherwise for the purpose section -2 (I) of the Forests Conservation Act. The term Forest land occurring in section -2 will not only include Forest as understood in that Dictionary sense but also any area recorded as Forest in the Govt. records irrespective of the ownership. This is how it has to be understood for the purpose of section-2 of the Act. The provision enacted in the Forest Conservation Act, 1980 for the Conservation of Forest and the matter connected herewith must apply clearly to all Forests so understood irrespective of the ownership or classification thereof." The Hon'ble Supreme Court has further directed, under the above mentioned order dated 12.12.1996, the State Governments to:

- (i) Identify areas which are "forests" irrespective of whether they are so notified, recognized or classified under any Law, and irrespective of the ownership of the land and such forests.
- (ii) Identify areas which were early are forests but stand degraded, denuded or cleared; and

(iii) Identify areas cover by plantation trees belonging to the Governments and those belonging to private persons."

Therefore the proposed Addition to Kaziranga National Park as per the directive of the Hon'ble Supreme Court "are"Forest" irrespective of whether they are so notified recognized or classified under any Law" which is the instant case is the Wild Life (Protection) Act, 1972 and in respect of these lands, the preliminary notifications were issued in 1985, prior to the order passed by the Hon'ble Supreme Court, and these areas occur as "Proposed" Additions to the Kaziranga National Park in the Forest Records since 1985.

Further, the Hon'ble Supreme Court in their order dated, 19.11.2000 in I.A No. 2 in WP No. 337/1995 stated "---- pending further orders no de-reservation of Forest/sanctuaries/National Parks shall be effected." The order of the Hon'ble Supreme Court was further re-iterated on 09.02.2004 in I.A. No. 16. Further, the Hon'ble Supreme Court also directed that "no non forest activity is permitted in any National Park or sanctuary even if prior approval under the Forest (Conservation) Act 1980 has been obtained.

Therefore, in the light of the orders of the Hon'ble Supreme Court it is crystal clear that the 6th Addition to Kaziranga National Park, together with all other Additions to Kaziranga National Park which have so far not been given effect either due to pending of decisions of Hon'ble Courts or non handing over of encroachment free and non encumbered land having all the rights extinguished, are Forests in Government records as duly notified and irrespective of ownership of such land. Further no part of such land, so notified can be diverted without application of Forest Conservations Act, 1980 irrespective of ownership of Land. Therefore the Land in question are de facto and de jure National Parks of their own rights and merit as they are notified under the Wild Life (Protection) Act, 1972 irrespective of the fact that who so ever may hold the ownership rights of any land therein. Further, the Hon'ble Supreme Courts directs that no such land can even be diverted under the Forest Conservation Act, 1980. Therefore, the land in question and all such Land as being additions to the Kaziranga National Park are National Parks and cannot be diverted. Further, as per the Hon'ble Court's order no non-forest activity is permitted in the National Park meaning the 6th Addition to the Kaziranga National Park together with all such Additions to the Kaziranga National Park which are pending final notification or handover to the Forest Department by the Revenue Authorities. Further it may be noted that the nature of activities of the petitioners is grazing and cattle rearing which is a non-forest activity and hence is not permitted by Law to be performed or practiced the area notified as 6th Addition to the Kaziranga National Park. Therefore the petitioners do not have any locus standi and or any claim and rights over any part of Land Constituted as 6th Addition to the Kaziranga National Park and all claims and objections of the petitioners and similarly such situated persons, if any, have been extinguished by due process of Law. Therefore the Hon'ble Court may reject the claim of the petitioners and allow the State Govt. to proceed with the final notification without further delay.

3rd and 5th Addition:

Officially, there were 54 affected families in the 3rd Addition and 84 nos families in 5th Addition having cultivation land. Originally there were no huts on these plots. As per reconnaissance survey done for the 3rd Addition areas recently, it was found that there are 30 huts on the western portion of the proposed land; and they have built these huts only in 2005 or later. Similarly, in the 5th Addition area, there are 32 nos of huts. These huts came only in 2012 or later. Some huts came up as late as November, 2013. This may be viewed further in the light of the fact that the preliminary notifications for these areas were issued in 1985. Therefore, these all fall in the category of encroachments, and must be evicted.

2nd Addition:

As regards the 2nd Addition areas, it is interesting to go through the Collector's Report which was carried out de-novo as per the orders of the Hon'ble Gauhati High Court dt. 22nd November, 2002 in the CR No. 4167 of 1996. The Collector received a total of 158 claims. After hearing the claims, the conclusions reached by him are quoted below:

"The initial claim of a group of claimants was that they are erosion affected people and the land had been allotted to them by way of rehabilitation. They could not, however, show any paper issued by any Government functionary making such an allotment of land as claimed by them. The matter was further checked from the Circle Officer, Bokakhat Circle who stated that no such allotment was ever made in the given area. Even the pattern of occupation of land does not support the claim that this land was ever allotted to the claimants by way of resettlement. Normally resettlement is done in symmetrical plots of 2 bighas or 5 bighas for each individual family, which are demarcated in a bigger piece of land. The land held by each family is thus equal and side by side. In the present situation the area of land occupied varies from person to person and is scattered all over the place. This clearly indicates that the claim that the land was allotted by way of resettlement is not correct.

Out of the 158 cases, the claimants in 116 cases, as listed out in Annexure-I, produced receipts of payment of Touzi Bahira. Some of these receipts were tampered while in all cases only the amount and the name of the person making the payment was recorded in the receipt. Normally, even in Touzi Bahira the Mouzadar allots a Touzi number to each occupant of the land and records the name of the encroachers. The receipts for payment of Touzi Bahira normally indicate the Touzi number and the person on whose behalf the money has been paid by the person paying the same. This issue is however only of academic interest. Touzi bahira is the fine laid down under the Revenue laws for encroachment and is not an evidence of title over the occupied land. In view of this all 116 claims, wherein the claimants had produced receipts of payment of Touzi Bahira, have been rejected."

27 claimants did not have any document at all. The Collector rejected their claim. There were 9 claimants who had been using the agricultural land for other purposes, and none of them could produce any title document and their claims were rejected. The Collector found that 6 cases were such that the claims were either fictitious, duplicate or the claimants did not appear. Hence their claims were rejected. The Collector submitted his report on 17th August, 2009 to the Govt. of Assam.

The land involved in 2nd Addition belonged to villages Sildubi No.1, Sildubi No.2, Kaziranga Nanke Gaon and Hathikhuli Bagicha Gaon. In Sildubi No. 1 village 1383B-0K-10L land was VGR/PGR and the same already has been handed over to the DFO, EAWL. There was also additional 158B-3K-18L land covered by annual patta. Of this 31B-2K-0L land could not be handed over as the pattadars refused to part with the land. So far 109B-0K-0L land has already been handed over to the DFO on 21st June, 2004. There is additional 31B-3K-16L of land covered under periodic patta, not handed over. In Sildubi No. 2, there is 1395B-2K-17L of land, which is entirely Govt. land and under encroachment. In the Kaziranga Nanke Gaon, there is 1388B-3K-18L of land which is entirely Govt. land. Of this 58B-3K-18L was found to be under encroachment. The remaining land handed over to the DFO, EAWL. In the Hatikhuli Bagicha Gaon, the measure of land involved is 92B-2K-9L, which were under periodic patta. Possession of this land also was handed over to DFO, EAWL on 26th July, 2004.

Deosur Encroachment:

The most controversial and visible encroachment is the Deosur encroachment on the right side of the NH37 after descending Gajraj View point and Deosur Bridge while coming from Guwahati side. Apparently, from Deosur Bridge to Palkhowa Gaon, all along the NH37. After inquiring with the local forest staff and revenue authorities, and examining certain documents, it appears that this encroachment has a beginning in the acquisition of the 1st Addition to the Kaziranga National Park. Land measuring 6870B-2-K-3L under the Dwar Bagori Mauza was acquired for the 1st Addition and the possession was taken on the 20th of October, 1994 by carrying out eviction operations early in the morning. A total of 93 families were evicted, out of which 36 families had settled on Govt. land and the rest were from patta land. The names of the villages were kawoimari Kissam and Palikhowa Kissam. As these people were driven out on the NH37, stay orders for evictions arrived, and the operation had to be stopped. As a result, the people gathered on the other side of the NH37 near Deosur, and decided to stay put on the vacant lands there. Finding no alternative, the DC, Nagaon vide WT No. NRE.12/87/(KA) Dt. 4th May, 1995 and No. NRQ(KNP) 1/87/-289 Dt. 12th June, 1996 to take necessary steps. Thereafter, the SDO ©, Kaliabor vide order No. 586/95 Dt. 14th December, 1995, asked Kaliabor Circle Officer to submit a report. A proposal was submitted to settle them under Dwar Bagori and Dwar salona Mouzas of Kaliabor revenue Circle, allotting 55B-4K-0L land for the purpose. The proposed land was covered by dag No. 34,35 and 36 of Palikhowa Kissam and Dag No. 8-17. The SDO(C), Kaliabor passed an order vide Memo No. KRS.168/96/23 Dt. 19th June, 1996 allotting the land to the displaced families.

However, a perusal of the forest records reveals a little different set of facts. The area to the right of the NH37 about 800 meters away from the Deosur Bridge upto the Palkhowa Gaon falls very much in the Bagser RF, which was declared in 1919. The boundary description of North side reads towards the end, "...foot of the hills to the largest tributary of the Gorakati Juri on the right. Thence a straight demarcated line eastwards to meet Chota Borjuri southeast of Deosur village. Thence along this Juri to where it meets Borghop Juri near Assam Trunk Road and thence along the Assam Trunk Road to the mouth of an unnamed Juri to the west of Palkai Tea Estate, a little beyond 117th Mile of the Assam Trunk Road", and East side, "Up the unnamed Juri to the west of the Palkai Tea Estate to its source, thence southwards along a ridge to the Bura Parbat, thence along the continuation of the same ridge...". As per the Survey of India Topographic sheets of 1914

and 1972, the stretch of the Bagser RF is almost 1.80 km between the Deosur Bridge and the Burapahar Beat (under Western Range, Bagori) all along the NH37 and the whole area upto the ridge line behind makes the Bagser RF. Therefore, the current settlements, by whatever means achieved in the past, and irrespective of whatever orders issued by the Revenue authorities appear to be very much within the Bagser RF declared in 1919. Hence this calls for eviction. The only issue remains to be examined is the stretch to the right of and between the Deosur Bridge and NH37 till it meets the Bagser RF boundary. The Chirang Parbat was notified as proposed Deosur Hill Reserved Forest in 1979 vide Govt. of Assam Notification No. FRS.482/29/3 Dt. 12th April, 1979 having an area of 67.5 Ha. The Starting point of the boundary reads, "The reference point stands on the K.M. Post No. 116/ N.H.37 Gauhati Saikhowa...". It is to be noted that the Govt. of Assam had already declared its intention to reserve the Chirang Parbat and the adjoining area between the Chirang Parbat and the Baser RF as a RF. The KM Post 116 is actually the Mile Post that can be found only in the 1914 Survey of India Topographic Sheet 83F2. It is interesting to note that the Bagser RF boundary lies just little ahead of mile post 116 and goes beyond the mile post 117 on the NH37. Therefore, between the proposed Deosur Hill RF and the Bagser RF, there is very little area left. In view of the Hon'ble Supreme Court's order already quoted, the area of proposed Deosur Hill RF is very much a forest, notified prior to the order of the Hon'ble Supreme Court, and hence no part of it can be diverted for any non forestry purposes by any authority. Therefore, the entire settlements mushrooming since 1996 on the right of NH37 between the Deosur bridge and Palkhowa village are illegal and should be evicted. The entire proposed Deosur Hill RF area should be remapped and taken as a part of the Kaziranga Tiger Reserve. The entire area which is more than 15 sq km, combining parts of Bagser RF and proposed Deosur RF, is a corridor and must be made free of encroachment for good.

Banderdubi Encroachment:

It is learnt that huge amount of Govt. land were allotted to Social Forestry to raise plantations around the Kaziranga National Park in 1986. Most of the areas were either not planted up or abandoned subsequently. Banderdubi is one such area where the plantations failed and slowly encroachers settled thereafter. Initially there were about 5-6 families. Now a whole village has come up. This is an area which is required very much to give the much needed breathing space to the Park/ Tiger Reserve.

11.6 New Corridors

This paragraph is relevant only when we consider the Bager RF as a part of the Kaziranga Tiger Reserve. As a a thumb rule suggested in Chapter 14, for every 80-100 sq km area added, a new Range must be added. Therefore, if the Bagser RF has to become a part of Kaziranga, a new Range must be brought into existence. However, the matter under discussion here is the connectivity between Bagser RF and Kukrakata RF. At present, rhinos and elephants move across the NH37 from Amguri, Kathalcham and Rangalu side into the Bagser RF area through the intervening Amguri TE. In the current strategies, the field staff patrolling the NH37 keeps on lookout for straying rhinos on the other side of NH37, and if any such rhinos are located, the staff drives them back. This happens quite often. Therefore, it is proposed that if the Bagser RF is to be brought under the management of Kaziranga, there would be a great necessity to maintain several corridors. After a preliminary survey of the area, it is seen that the rhinos prefer the low lying swampy formations in between hillocks of the tea garden, and often use the ridge lines for

defecation. These hillocks are very low lying and gentle in slope. There are several places where there is sparse or no population between the tea estate and the Bagser RF on one side and Kukrakata on the other side. Three corridors can be carved out, one each at Amguri, Kathalcham and Rangalu. However, since it involves highway crossing, there would be requirement of at least two flyovers, one covering Kathalcham to Amguri, and another at Rangalu. All the tea garden areas and private land falling within the corridors must be procured at market rates. If necessary a few habitations may have to be shifted/relocated.

11.7 Informed Management

Managing the habitat and wildlife effectively would require inputs from several sources of information such as health of water bodies, status of grasslands, wind directions for right burning decisions, soil moisture content, extent of pesticides and bacteria in the water bodies, GIS based inputs on movement of staff, location of camps, roads and bridges, asset management, history of performance of staff and record of their inputs, locations of animal sightings and their movement, just to mention a few. In absence of appropriate management tools, a large force such as 1200 men of Kaziranga National Park would be difficult to manage. A manual management system would leave scope for cutting corners and mistakes.

Therefore, streamlining the administration and logistic support with well informed decision-making is the requirement of today. Though Kaziranga has some history of using certain tools and applications, these are yet to be institutionalized. It is proposed that management must be modernized in phases to keep in sync with the times and enable the decision makers to take the right decisions. Details of some of the interventions suggested is given in some detail in Chapter 12.

CHAPTER 12

12 UPSCALING ANTI POACHING INFRASTRUCTURE

As already outlined in Chapter 7, the anti poaching infrastructure in Kaziranga is limited to anti poaching camps, vehicles, motor boats, weaponry and associated support system. As also described in the same chapter, the poaching strategies have been constantly changing all throughout. To build infrastructure targeted at one specific type of poaching strategy may be short lived and may prove futile in case the poachers change their strategies. There have been several changes in poaching strategies such as pit-poaching, electrocution, trap, gun shot with home made rifles, gun shot with .303, gun shot with .303 and silencer, gun shot indiscriminate firing at a very close range with AK series rifles, shooting on moon lit nights, shooting early dusk or dawn, shooting randomly anytime to mention a few. Time is not far when poachers would start using snipers and grenades. As regards crossing the river, strategies range from using country boats to using tyre-tubes, floating logs, swimming, wading in shallow waters, using long pipes to breath under water and floating downstream along the current. The days when there was no mobile, poachers had fixed timings for their link-men and boatmen to drop them and pick them up at designated points. Burying the boats at some strategic points in the shallow waters, sand and mud is still practiced. However, with coming of mobile, they now are getting picked on demand and situation based. Poachers in single, till now have not been confirmed in Kaziranga, unlike in Kruger National Park. There are at least 3 to 4 persons. The actual numbers could be as high as 6-8. The terrain is such that it may not be possible to negotiate it single handedly. It has been observed in several encounters that even when they are inside they operate in small groups. The groups have been mostly seem to be prepared for at least two to three days stay, as they come with sufficient dry ration and fruits for the entire team.

Though the draft Tiger Conservation Plan of Kaziranga talks of Pre-Entry, Post-entry strategies, However, the same may not work even. There was a time when poachers were scared of gun shots and could run away leaving the horn and everything by hearing gun-shot from the nearest camp. Today these gun-shots tell them where all the patrolling teams are located and what could be the shortest path and safest time gap to scoot from the scene. Earlier poachers fired at the staff occasionally, but today our staff runs the risk of losing their life. Today it matters who shoots first and who has the better fire power.

12.1 Mission Poaching Free Kaziranga

The author is of the strong opinion that poaching is one such menace which can be totally controlled, and is the least of the problems that Kaziranga faces today. If poaching was the only issue plaguing Kaziranga and threatening its survival, I can say firmly that Kaziranga would survive as long as the earth exists in its current shape and situation (discounting climate change altogether here). However, it is not so. Even if the poaching was arrested fully, Kaziranga

would continue to be in danger for reasons already explained in several chapters starting from Chapter 2 to Chapter 7. Poaching can be controlled and hence, must be controlled at any cost, however high that cost may be.

Why to adopt a Mission Poaching Free Kaziranga? Poaching is not only an illegal activity, but also a crime against society, nature, environment, forests and wildlife. Its a crime most heinous and barbarous, beyond description of any words to kill such a magnificent animal as rhino in cold blood and drive the species to extinction. Poaching would become a threat in Kaziranga if the poaching counts exceed 40 per year for several years at a stretch. One cannot allow that to happen at all even accidentally. Anti poaching measures need to be adopted in such a manner that anti poaching operations can be sustained for years together without any casualties. To achieve this a Mission approach is required.

12.1.1 Goals of the Mission

Two goals have been set, namely:-

1. Protection of the rhinoceros and other wildlife by achieving strategic and tactical superiority
2. Enhance management decision making by scientific inputs from the field

12.1.2 Objectives of the Mission

The key objectives are:-

1. To secure the front line staff against possible attacks by poachers with sophisticated arms
2. To arm the front line staff with day and night field surveillance capabilities
3. To equip the front line staff with latest field equipment for scientific inputs
4. To build capacities of the field staff by providing training and management inputs by making them SMART GUARDS
5. To have an Informed Management of the Park

12.1.3 Expected Outcomes of the Mission

The expected outcomes are enumerated below:-

1. Poaching of Rhinos brought down to single digit
2. Least casualties to front line staff
3. Management information on wetlands and habitat
4. Reduce resentment and apprehension among public

12.2 Key Components of the Mission

A series of new initiatives are being organized to achieve the mission "Poaching Free Kaziranga" by modernizing and upscaling the anti poaching infrastructure. The part presented here is confined to anti poaching infrastructure alone. However, the overall strategies for the Park include R&D, habitat improvement, expansion of the Park area, procurement of land, legislation of new regulations, landscape based management. A snapshot of the proposed measures in respect of anti poaching infrastructure alone is being tabulated here:

Sl. No.	Brief Description	Key Features	Possible Funding Sources
Part A	SMART GUARD	NVD, Thermal Scanners, GPS, Range Finder, BP Jacket etc., Uniform	CSR/ Foundation
Part B	SMART COMMUNICATION	Integrated Data, Voice, Video and Wireless	CSR/ Foundation
Part C	ELECTRONIC EYE	8 tall towers with Optical and Thermal scanners, central control room. Towers to be increased to 15 at a later date	NTCA
Part D	Anti Poaching Camps	Adding new camps/ improving/ rebuilding existing and old camps	NTCA, Govt, CSR
Part E	Staff Welfare	Quality Water, Health Care, Recreation, training and capacity building	CSR/ Govt/ NGOs/ Foundation/ Society
Part F	Informed Management	AWS, Water & Air Quality, GIS, MIS, Satellite Imaging, Terrain mapping, Flood simulation	CSR/ Foundation / Govt
Part G	Roads, Bridges, Causeways	Improving existing network of roads/ bridges, adding new patrol paths, building long span columnless bridges, causeways	NTCA/ Govt
Part H	R&D in Anti Poaching & Upgradation of Technologies	Gun Shot Locator, Stealth Vehicles, Ambush Plan, Anti Poaching Camera Traps, Use of Radar etc.	CSR/ Foundation/ Govt./ NGOs
Part I	Vehicles/ Boats	New vehicles, Boats, Maintenance, Fuel, Modern navigation tools, Stealth capabilities	Govt/ CSR/ NGO
Part J	Perimeter Security	Perimeter Security Cameras, Perimeter Watch Towers	CSR, Govt./ Foundation
Part K	UAV & Aerial Surveillance	Aerial monitoring, 24X7 surveillance	NTCA/ Govt/ WWF/ Army

A series of new equipment are being proposed. Several technologies such as night vision devices (BEL models used by the Indian Army), thermal scanners (Flir PS32/ LS 64/ Optix Dali 730), GPS devices (Garmin 785, Oregon 550), Laser

Range Finders, search lights with IR and Fog filters etc. have been short-listed for upscaling the anti poaching infrastructure.

12.2.1 Introducing SMART GUARD:

SMART GUARD, in the context of prevailing situation in the Kaziranga National Park stands for:-

S	Sustain Stamina 24X7X365
M	Motivated
A	Action oriented
R	Ready to Act
T	Trained and Tactically Superior
G	Get down to the poachers
U	Undeterred by Adverse Conditions
A	Always Armed (Weapon, Equipment & Kits)
R	Right Thinking at Right Time
D	Develop Yourself

A SMART GUARD is:

1. Well Equipped
2. Well Trained
3. Well motivated

The proposal is to create an elite force of about 50-75 SMART GUARDs to begin with. Though there is a large number of equipment (in the thought process), initially it is proposed to start with day vision binoculars, spotoscopes, hand held GPS sets, range finders, night vision goggles/ binoculars, hand held thermal scanners, powerful search lights including illumination systems with IR capabilities, bullet proof jackets and helmets. To this is added portable battery packs (as the equipment would need power supplies during long hours of ambush and patrolling). The focus is also on design of a smart uniform with two complete sets of shirt, pants, shoes, belt, cap, decorations and some electronic IR implants to distinguish between foe and friends, especially at night and during ambush.

Introduction of SMART GUARD system would change the patrolling, ambush and surveillance strategies, which would require training and motivation of the front line staff. Therefore, 6 months intensive training have been proposed to make the field staff adopt to the new technologies and systems for better performance.

The WWF-India has already supplied four numbers of Flir PS32 Hand Held Thermal Scanners to the Forest Department, Assam. Of these two scanners have been handed over to Kaziranga by the PCCF(Wildlife) and the Chief Wildlife Warden. The Kaziranga authorities have lined up procurement of a large number of such equipment. A proposal has already been submitted to ONGC CSR for funding of the Smart Guard Pilot Project in Kaziranga. On fructification, this would be first major modernization attempt in a big way in the Park/Tiger Reserve. The original value of the proposal submitted was Rs. 14.63 crores.

This is being revised (upwards) in view of the certain new requirements and price discoveries. The revised proposal would soon be submitted to ONGC for consideration.

12.2.2 Smart Communication

SMART COMMUNICATION, like the SMART GUARD a also a SMART strategy without which an effective anti poaching strategy cannot work. The acronym given below for COMMUNICATION would make sense only if you see through the requirements of a very good communication system. The acronym has been carefully thought to bring home the points of strategic importance that the park must have today. The acronym runs as below:

S	Swift
M	Meaningful
A	Always On
R	Reach All
T	Trouble Free
C	Capable of telling your immediate X,Y
O	Operating 24X7
M	Master has the first right to talk
M	Must obey or get killed
U	Uniformly distributed all over
N	Never allow any unauthorized entry (Kill the unwanted)
I	Include a surprise
C	Catch the culprit
A	Always Available
T	Tell who talked where (and what?)
I	Indicate What's going on
O	Overpower others
N	No to Mobiles when inside Kaziranga boundary

The proposed network is a digital wireless interfaced with data and video capabilities. A new frequency is proposed to be obtained for its operation. It would be run through a network/ mesh of 8 40-45 m towers (of the Electronic Eye), 10-15 towers of 30 meter height, 50 towers of 10 m height, towers/ masts over anti poaching camps, wireless access points, display devices (hand-held and fixed panels), a modern control room and distributed control systems in each of the ranges and beats. Such a network would enable transmission of live images from stealth camera/ trap cameras and other surveillance devices and sensors to the nearest camps/ control rooms. It is proposed to develop an integrated Intranet of Kaziranga National Park/ Kaziranga Tiger Reserve. In the medium term, it is proposed to equip every single staff with the new digital set.

It is also proposed that all the camps where the new technology would be introduced, carrying of mobile sets would be totally prohibited. All such staff shall have to leave their mobile in lockers that would be provided in the Range offices. One locker for every individual in the long run, but to begin with one locker for every such camp. A new protocol for the use of the new technology would be developed and all the staff would be trained in that.

As the new sets would start getting replaced, the old sets would be deployed in the fringe areas/ corridor areas and other areas of the KTR. However, in the long run, another channel would be procured for the rest of the KTR.

A demonstration of such a network has already been done in the month of March, 2014. In the pilot phase about 70 new digital handsets are being proposed with one repeater. A complete proposal on network upgradation costing about Rs. 15.00 crore is being prepared for submission to Oil India Ltd for CSR funding.

12.2.3 Electronic Eye

Electronic Eye is a novel initiative of the NTCA, Ministry of Environment & Forests, Govt. of India, New Delhi, which was first developed and deployed in Corbett National Park. Soon afterwards the scheme was decided to be implemented in Kaziranga National Park for anti poaching activities at the request of the Govt. of Assam. The initial phase of the project was sanctioned during 2013-14 by the NTCA for an amount of Rs. 3.00 crore. The work was initiated towards the end of the last financial year. The project in its current phase consists of 9 nos of 45 m tall towers (one of which shall be the control tower), each mounted with a very high resolution optical and thermal camera. The resolution of the optical camera is such that about 6-8 km radius around the tower would be visible in day light, while at least 3 km visibility would be available using thermal cameras at night. The images would be beamed to the control panels located at the Central Control Room (being developed at Kohora). Arrangements are being made also to enable viewing at the respective ranges and the beat camps where the strike forces would be made available. The camera systems would be interconnected through wiMax connectivity. The electronic eye towers would also double up for hosting wireless and wi-fi infrastructure within the Park.

The nine sites selected are Kohora (for the central tower), Kukrakata Hill top most point, Tunikati river point (in Western Range), Off Bahubil APC Point (in Western Range) to act as relay tower to overcome the shadow effect of the Burapahar hill range, Sitalmari (in Western Range), Arimora (in Central Range), Tinsuti (on the border of Central and Eastern Range), Mahkhuti (Eastern Range) and Tamulipathar (Eastern Range). The execution of the works has already started. The tower at Kohora is already erected. The foundation works for Mahkhuti, Tamulipathar and Arimora also completed and the tower erection is underway. Further works have stopped due to flooding in the channels and transportation of materials and man is now difficult. Three cameras have already arrived. It is expected that by end August, 2014 the electronic eye cameras (3 nos) will start functioning.

12.2.4 R&D Efforts in Anti-poaching and Surveillance

Within a short period several R&D initiatives have already been started towards achieving effective anti poaching advantages over the poachers. One of the key initiatives has been to start a collaboration with the Electronics and Electrical Department of the IIT Guwahati in association with Dr. Anup Gogoi to develop low cost sound sensors, sound amplification and gun shot locators. Dr. Gogoi has made considerable headway already and it is expected that within a month or so, trial for some of the gadgets would be started in the Park.

Another key initiative has been to modify camera trap systems to achieve surveillance during night. It has been observed that while camera traps with white flash are deployed for tiger census operations, they are subject to damage by poachers as they flash at night. As a result considerable information about poachers and illegal entrants in the Park has been lost already. Further, the current camera trap models do not have communication system and one needs to collect data physically over regular intervals. Thus, currency of information and its relevance is lost for anti poaching strategies. A new set of cameras with dual flash system (black flash and also white flash) have been obtained for trial purposes. The issue is that photographs blur at night in low IR flash, and a slight reddish glow also emerges. These issues are being addressed. Additionally trials to convert these cameras by coupling with wi-fi devices, solar charging, IR flood lights etc are being experimented. It is expected that shortly working assemblies could be deployed in the Park. If successful, bulk deployment would be resorted to. These experiments were also shared with the visiting South African Expert team to Kaziranga comprising of Dr. Rodrick B Potter, Chief Wildlife Investigation Officer, South Africa and Dr. Cindy Harper of Pretoria University. The visiting team expressed their satisfaction at the R&D efforts and also offered some valuable suggestions. Another area of R&D has been to develop ambush gadgets for night patrol. Though considerable success has been achieved using Night Vision Device (NVD) coupled with IR torches,, there are issues to be sorted out to reduce the red glow of the IR beam which is discernible from a distance. A solution on this front is also expected within a month or two.

12.2.5 Stealth Vehicles and Boats

It is often necessary to move manpower and equipment in interior areas to reinforce strike efforts when some infiltration/ trespass has occurred. In such situations, movement of staff is closely monitored by the poachers, and they are easily able to escape following the bright lights emanating from search lights and head-lights of the vehicles. In such a situation, use of any visible spectrum light becomes totally unwarranted. There fore, there is a requirement to develop vehicles and speed boats with high stealth capabilities using heavy silencers, IR lights etc.

12.2.6 Perimeter Security and Virtual Fencing

There is a three pronged strategy proposed for perimeter security of the Kaziranga National Park, and later on the same can be adopted for the entire Kaziranga Tiger Reserve (KTR) and other rhino bearing areas.

Firstly, the most vulnerable (often the entire perimeter, if possible) line segments need to be identified and within 800m to 1.5 km radius, a surveillance tower atleast 25-30 ft high needs to be erected. The surveillance tower should be having atleast 6x6 sq ft space/ platform to watch. One such tower using locally available materials such as timber posts, bamboo etc. has been built on the river bank side between Debeswari and Naobhangi Camps. These posts are for 24x7 surveillance and meant to be used as sentry posts. Atleast one or two guards need to man these posts on an 8-hourly basis. Each such post shall be equipped with high quality binoculars/ spotoscope/ hand-held thermal scanner/ solar chargers/ wireless communication systems. The surveillance tower should be so located as to provide clear 360° view of the surrounding area. Any suspicious movement should be intimated to the nearest anti poaching camp for immediate strike and ambush.

However, looking at the terrain and vegetation of Kaziranga, it is clear that this strategy would work best in post burning scenarios and in short grass areas only. Especially when there are woodlands, highlands and tall grass areas, the visibility window of visual and thermal radiations would get narrow. To overcome this, a mix of strategies is suggested as below:-

- IR Camera Traps and IR flood lights in low sensitive areas
- Array of thermal/visual camera with atleast one preset line crossing which would generate alarm in the nearest watch-tower and anti poaching camps
- IR/Laser fence
- Motion Detection Sensors

However, the most sensitive areas, such as certain parts of Burapahar and Western Range along the NH37, southern boundary in the Eastern Range from Dhanbari to Japaripathar, Laodubi area in the Central Range where man-movement is very high and the concentration of villages on the fringe of the Park boundary is maximum, it is proposed to deploy a high level of perimeter security based on ultra high quality optical/thermal cameras in dual mode with provisions of at least three preset lines of defence. One such system on trial basis consisting of a set of 10 Bosch MI612 cameras/ Motorola canopy Wireless systems is proposed to cover a perimeter of atleast 8-12 km stretch in the Burapahar Range starting from Ghorakati upto Baneswar. The estimated cost is about Rs. 4.00 crores. The proposal is being submitted under CSR/ CAMPA.

GSR:

Ground Surveillance Radars are unique products that provide intruder detection capabilities under the most difficult terrain and weather conditions. These are field proven and have been used in a variety of protection models. These radars can operate in varying ranges, over land and water rapidly searching for intruders as small as a crawling person, ensuring that intruders/movements are detected, identified and intercepted before they reach critical areas.

It is proposed that over next 3 to 6 months, some of these technologies would be introduced, tested and then after extensive field trials involving the local field staff in day to day operations would be inducted in the Park for full scale deployment. A right mix of technologies based on local conditions, terrain, suitable power availability, possible integration with other systems need to be adopted. Straight copying and pasting of technologies either from Internet domain, or other places may not work in the manner desired for anti poaching works in Kaziranga. The man behind the machine, the field staff, their level of education, desire to adopt and right kind of incentives for adopting newer technologies need to be given highest priority. What has worked in one place, may not even make an impact in Kaziranga, as field conditions would considerably differ. This statement would apply, in general, for all the technologies mentioned in this report. Trial on some of the technologies have already started.

12.2.7 UAV and Air Surveillance

Though the first trail UAV trial flight in India was made in Kaziranga on the 4-5th April, 2013, the entire matter came to a screeching halt due to orders by the Ministry of Defence. Aerial Vehicles (both manned an un-manned) have been used in the Western countries for surveillance, population monitoring and crisis management. In India, manned aerial vehicles have been used occasionally for animal count (e.g. wild ass population estimation) and forest mapping (e.g. forest survey). In order to offer effective solutions to various problems encountered by the Forest Officials and Researchers, Wildlife Institute of India and National Tiger Conservation Authority (NTCA), in collaboration with World Wide Fund-International (WWF), Conservation Drones, Indian Institute of Information Technology, Allahabad (IIITA), Ohio State University, USA (OSU) and State Forest Department have taken up R&D projects to integrate advance technologies such as use of Drone or Un-Manned Aerial Vehicles (UAV) and Sensor Communication Networks (SCN). These tools and techniques are currently being experimented in Panna Tiger Reserve, Madhya Pradesh. Due to issues of permissions from the MoD, the project could not be launched in Kaziranga.

This technology is becoming powerful across the world in military and civilian purposes, to the extent that even commercial firms are looking at this option to deliver goods. Recently, there was a test run of a local Mumbai based firm who delivered a pizza using a quadcopter. The Un-manned Aerial Vehicle (UAV) or Drone are small to medium sized aircrafts, supported by programmable auto-pilot and telemetry systems, capable of on board recording and live transmission of information. UAV is expected to be involved in surveillance in strategic places and remote areas, night patrolling using thermal cameras, radio-tracking of animals and habitat monitoring. In April 2013, test flight of a small aircraft known as 'Maja' was undertaken in Kaziranga Tiger Reserve, but subsequent training and integration could not be done due to refusal of permission from the Ministry of Defence (MoD). However, MoD has given permission for Panna Tiger Reserve until June 2014, but it is expected to be extended for further years, as there is support from MoD for conservation and research activities. Advanced models of UAV known as 'Caipy' and 'Vanguard' with better aerodynamics and stability are being field tested in Panna Tiger Reserve, with the permission of MoD.

Technically, Caipy has Wingspan of 850mm, Weight of 650g, Flight time of 30mins, Cruise Speed of 45-50kph and can optimally fly about 20km, powered by rechargeable battery. Where as Vanguard has Wingspan of 1400mm, Weight of 2000g, Flight time of 60mins, Cruise Speed of 45-80kph and can optimally fly for 40km, powered by rechargeable battery. These UVAs carry GoPro video camera and other form of data collection units could be integrated. The flight paths could be programmed by marking way points and can also be controlled manually through telemetry modem. Currently, video system is used and in few months time, thermal and mapping cameras would also be used. Usefulness further enhanced by manual launching in the field even in remote places, and powered by rechargeable batteries that could be charged even with car batteries. Other model of UAV that are also effective for short-distance but long duration hovering is 'Quadcopters or Hexacopters' which can carry more payloads and can be effective in documenting events from a static point with high quality information. Tentative cost of the each unit of UAV is Rs. 6-8 lakhs, including transportation and taxes, and will likely be less or more depending on the kind of onboard units required.

Sensor Communication Networks:

This aims to use sensor and communication networks for setting up virtual fences as well as identifying and monitoring selected regions of the forest where the inhabitants of the forest or the environment are threatened. Several sensing modalities are being explored such as Pulse-Doppler Radar (PDR), Passive Infra-Red (PIR), Acoustic and Buried cable. These sensors and communication networks could cover sensitive region or the whole area of the reserve. Each sensors placed at 1km apart is capable of receiving signals of any intrusion or animal activities and transmitting the information to base station that could be either at beat level, range level or at the head quarters. Currently, experiments are being carried out with encouraging results for detecting human intrusion or animal venturing out of the forest boundary, tiger monitoring on trial including noise detection for digging and wood cutting, and detecting road crossing of animals. There are sensors that can detect sound including gunshots and could be transmitted to base station which can be Range Office and to Head Quarters if connected with GSM network. This technology has multiple functions from day-to-day monitoring of activities and for quick response to deal with offences.

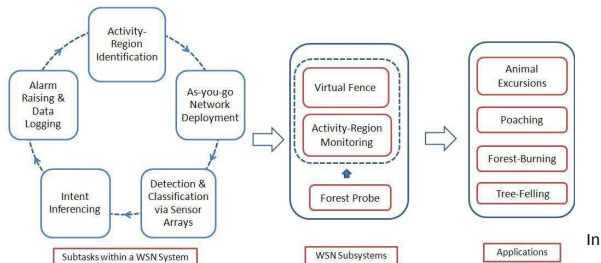


Fig. 1 Overview of Proposed WSN System

the context of Kaziranga Tiger Reserve, integration of these model tools and also involvement of aerial equipments including helicopters may be important, in the line of conservation activities being carried out in western countries. It is possible to integrate such tools since the expertise are already being established by Wildlife Institute of India and National Tiger Conservation Authority, and that this can be one of the key priority activities in the coming years to combat the poaching menace. It is also pertinent to mention that these tools are specially useful if deployed in a targeted fashion to the specific activities, rather than military outlook to the management activities, since there is a need to be inclusive in conservation actions. Involvement of or collaboration with security forces would also be helpful, and also other relevant agencies (e.g. WWF-International) that are involved conservation activities involving technologies. Given the emerging issues and the developing expertises with increasing interest level, technological solution to poaching issues, at least at the level of surveillance and documentation for legal support is likely to become mainstay in the years to come. If handled effectively with specific

expertise, it can become useful tool in the overall management of species populations and conservation.

Quad-Copters

QuadCopter is a heavy lift multirotor, powerful, redundant and versatile solution for aerial Surveillance of the forest areas with autonomous flight capability powered by batteries. QuadCopter comes with most advanced autopilot system combined with a precise GPS navigation, built-in advanced processor and sensor technology real-time operating system, The Autopilot delivers incredible performance, flexibility, and reliability for autonomous flight. With a plug-and-play gimbal compatibility, its swept back front arms and stability in high winds, which is an ideal aerial platform for capturing stable, jello-free imagery in the forest under harsh weather conditions. A robust and easy-to-fly copter with flexible payload options can take off and land anywhere. The QuadCopter is fully configured for portable, and can be readily launched anywhere.



The QuadCopter features:

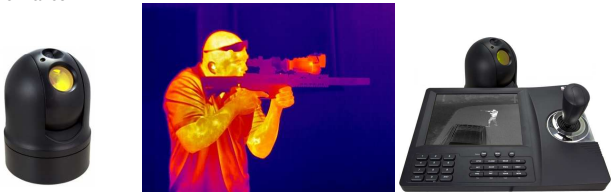
- A full range of autonomous flight modes, including waypoint navigation, loiter, circle, and return to launch
- Mission-planning software enables virtually unlimited waypoints for reliable, repeatable missions, and flight data analysis
- Geofencing and robust failsafes ensure the safest operation

System Components Of Quadcopter:

- Autopilot System
- Power Module
- GPS
- Firmware
- Radio Controller-Telemetry
- Battery pack, battery charger and battery bag
- Average flight time: 1-3 hrs
- Payload : Day & Night Camera (FLIR)
- Command & Control Unit.

Payload On The QuadCopter:

The camera, which is of FLIR make is a rugged military grade all weather PTZ system ideal for Quad Copters, applications. The multi sensor pan tilt camera system is provided in an ultra compact rugged housing. It is an all weather remote positioning system suitable for mounting on a wide range of aerial platforms. Included and integrated within the gimbal turret is a sensitive Daytime Color / Low light camera which offers good resolution with **TELEPHOTO ZOOM** for extended range and with very good Day/Night imaging capabilities that compliments the included FLIR thermal imager camera sensor. Black and white thermal imaging is the industry standard for surveillance imaging systems. The grayscale imaging palette provided with all systems produces crisp accurate imaging profiles of the scene viewed. This advance thermal imaging system offers B/W and color performance.



Command & Control Unit of QuadCopter:

A command and control unit comprises of a vehicle mount receiver for data from the camera along with controls to view zoom, pan tilt etc with a Display as shown below apart from the QuadCopter unit. It is advisable to operate the QuadCopters in pairs (two per site) as they can be programmed for a continued surveillance. In an autonomous mode they can be programmed to take position in time when the endurance lapses. It is proposed that two pairs of Quad-Copters may be procured with thermal and optical scanner payloads. The advantage of Quad-Copters is that they can hover over the area of interest. This would aid tremendously in locating run away poachers as well as stray rhino search operations in the chaporal areas.

Aerostat

Aerostat has already been demonstrated in India during the opening ceremony of the Commonwealth Games, 2010 at new Delhi. This is a device which can keep itself afloat in the air and can carry payloads for aerial observations. Also known as Observation Balloons, these are mobile tactical surveillance systems, consisting of a stabilized day/night electro-optical payload suspended from a helium-filled aerostat that is tethered to a ground control system. By providing an elevated platform, well above the ground/field of operations, the system offers an indispensable, dominating view of the scene below, prolonged, medium-range surveillance coverage. These systems are field proven, easily deployed and serve both for surveillance and deterrence. Since they are visible from a distance, their deterrence effect is tremendous.

Vehicle Mounted Mobile Surveillance

These are mobile watch towers about 25-30 ft high with a observation post at the top, which can be mounted on a vehicle such as 4W drive Maruti Gypsy or Scorpio. The tower would be collapsible, and can be erected manually/ hydraulically wherever required. Observation vehicles are compact systems that dramatically increases the surveillance and protection capabilities of a mobile operational unit. These systems consist of a stabilized day/night payload lifted by a telescopic mast and can be installed on suitable vehicles as required to enable a vital "look-up and see" capability to wide area of security operations. These systems include a simple, smart operator interface with digital map display, recording, GPS targeting etc, and may feature a real-time data link communication. These also could be used for manual scanning and look up, while the mast provides extra height for electronic surveillance of the area.

12.2.8 Informed Management Systems

Currently, there are few management inputs a data collection system operational in Kaziranga. It is no denying that some work has been done in camera trapping of tigers under the aegis of the NTCA, Govt. of India, with active support of WII and Aaranyak. However, the Tiger Reserve does not have camera traps of its own. Only during 2013-14, under NTCA funding about 50 camera traps were procured which are being deployed in white/black flash mode depending upon the requirement. The overall strategy is to have two distinct sets of camera traps, one for tiger census and animal behaviour recording, and the other with black flash and communication and sister accessories for surveillance purposes. In course of time, the entire Kaziranga Tiger Reserve shall be covered under camera traps of both the types.

AWS & Water Quality Monitoring

Similarly, there is no systematic collection of weather data from different parts of the Park or the Tiger Reserve. Currently, there is only one AWS installed in the Central range, which is not very suitable for data gathering and transmission. However, for better management and creating microclimatic data, an array of AWS is required all across the Kaziranga Tiger Reserve, which is currently lacking. An array of AWS has been proposed in the Park for the time being for continuous collection of weather data. Similarly currently there is no systematic monitoring of the health of the water bodies. The water bodies are the life line of the Kaziranga National Park. We require constant monitoring of water quality and pollution levels. These bodies are fed from upstream waters which come through agricultural fields/ tea gardens which use pesticides/ drugs for pest control. Therefore, it has been proposed to acquire equipment for monitoring of the water bodies on a regular basis.

GIS

There is currently no established GIS lab in the Kaziranga National Park. There are a few GPS sets, but there is no systematic effort to collect GPS based ground points as a regular management practice. All the field staff serving in the Kaziranga Tiger Reserve need to be provided with GPS sets. Further, most of the GIS work is outsourced, and hence, there is time lag in any meaningful decision making. It is proposed to set up a GIS lab with work stations, and manpower. The proposed software is GARIASI developed by AMTRON (the Govt. of Assam State Nodal IT Agency) based on Free and Open Source

Software (FOSS). The software would be customized locally to meet the Park/ Tiger Reserve requirements. It is proposed to develop customized terrain mapping, flood simulation, and Kaziranga specific modules, such as Poaching Pattern Analysis, link to criminal database, infrastructure and force deployment etc. to be developed over GARIIASI for quick decision making. It is expected that the proposed GIS lab initiative would enable smart decision making.

Information Technology and Big Data

The current Information Technology set up of Kaziranga is not only rudimentary, but also can be termed as totally lacking without any plans and perspective. The efforts are personalized, person centric and confined to spreadsheet, shp files and Google maps. Till few months ago, Kaziranga even did not have its own portal or website. A portal namely <http://kaziranga.assam.gov.in> was set up in mid march to provide information and collaborate and share inputs. The site is likely to become vibrant in course of time. It is hosted on the AMTRON's Mini Data Center (MDC) on the server and connectivity provided at the MDC, courtesy AMTRON. The Portal is based on Wordpress framework and has inbuilt mySQL database. In course of time the system would be strengthened, and the site would move to the State Data Center (SDC), as and when the same is ready.

It is proposed to have a state of the art IT system deployed at Kaziranga with distributed nodes at each of the 5 ranges of the Kaziranga National Park, areas of the Kaziranga Tiger Reserve such as Laokhowa-Burachapori (and in future Orang National Park, which may become an integral part of the Kaziranga Tiger reserve or the Kaziranga Landscape Authority, whichever is earlier). The plan is to create a hub at Kohora/ Bokakhat with 5 edges within Kaziranga National Park, one each edge at Nagaon Wildlife Division and Orang with a network of towers, wiMAX, Wi-fi, wireless radio systems and an Intranet. A mini data center is also proposed at Kohora/ Bokakhat to support the entire initiative. Subsequently, the system would get linked up with the Assam SWAN and the PCCF (Wildlife Office). The portal is being developed with applications for online bookings, payment gateways, SMS alerts, MIS applications, document management system, electronic filing and decision making. A video-conferencing application over the Intranet in the Tiger Reserve is proposed.

One of the most important things to keep in mind, while designing such a system is that the array of sensors, camera traps, electronic eye, surveillance cameras, AWS, GPS sets etc. would generate huge amount of data in minutes and seconds. A robust system of data storage, archiving, retrieval, crunching, analysis and information generation is required to put in place. Therefore, big data crunching based on Hadoop Clusters is also proposed as a part of the strategy.

The system would collapse, if qualified manpower, consultants, PMU and project teams are not in place. A dedicated team also would be required to look after GIS, MIS. In addition another dedicated team would be required to handle electronics and communication. With a projected core strength of about 1500 field staff which would ultimately constitute the fighting force, would require a lot of ground support staff to work out the infrastructure upkeep, logistics and asset management.

12.3 Solar Power

The anti poaching camps inside the Park/ tiger Reserve have to depend only on solar. However, the solar systems are in disarray. Several camps complain of lack of power. A fresh investment is required in the solar sector. It is possible the the Ministry of Natural and Renewable Energy, Govt. of India may be requested to consider 100% to well equip each of the camps and other establishment with solar power. On the other hand, higher subsidy could be allowed to use solar street lights, solar water heaters, solar lanterns etc. for use in the Forest and Tourism complexes around Kaziranga, the fringe village populations and the family members of the field staff. Possibilities of setting up solar power plants could be explored on elevated platforms.

12.4 Tazer Gun and Other Technologies

It is seen that often the forest staff accidentally come face to face with wild animals such as tigers, rhinos, elephants, buffaloes, bear, wild boar etc. The encounter may result in injury or death of the staff. Though the guard is armed, more than often he would not shoot directly at the animal even to save himself. Such being the situation, casualties are very high in Kaziranga. A list of the dead and injured staff is provided in the Part III of the Report. Nowadays technologies such as Tazer guns are available with deliver a very high voltage to the animal, but no harm comes to the animal. This gives enough time for the staff to either leave the spot or secure himself in a better way. Similarly there are technologies available which can pin point location of a human being within a range of 500 m. Such technologies are required while searching for poachers in the Park who take advantage of the terrain and hide from the staff. There are other such technologies with very specific application. However, these are all proprietary and patented technologies. Being proprietary, these technologies are very costly. There may not be an alternative technology available in the near future, making the purchasing decision difficult. It is suggested that such equipment and technologies first may be purchased in small quantities for proof of concept and trials. If proved effective, bulk procurement should be carried out to empower the staff and secure the Park from poachers and miscreants.

CHAPTER 13

13 The Kaziranga Landscape Conservation & Development Authority

As already explained in detail in Chapter 2 and Chapter 6 that there has been several recommendations in the past, especially from the Kaziranga Biodiversity Conservation and Development Committee and the Local Advisory Committee, both making very specific recommendations which indicate that an overarching authority is the requirement of the day, if Kaziranga and its surrounding areas have to be conserved and protected on a long term basis. Though the idea of a Landscape Authority got seeded in the mind of the author independently looking at the complexities that need to be addressed, and accordingly, the first presentation that was made ready for the Hon'ble Gauhati High Court on the 21st of March, 2014 carried the basics of the new entity. However, the author draws tremendous satisfaction in discovering at a later date, while digging out data for this Report, that the authorities in the past have given a thought and came up with almost similar solution. The only difference between the earlier approached and the current approach is the manner in which land surrounding Kaziranga is treated. The core of the new idea floated is summed up in bullets below:

1. Individuals do need to sell land often under different compelling circumstances beyond their control
2. Vested interest and land sharks take advantage of such situations and exploit local populations into selling their land
3. The current land acquisition process is very lengthy and not beneficial to people, as they need instant cash to sort out their problems at hand
4. If land is given for sake of Kaziranga, it is most welcome; and if necessary, such people may also be given premium over and above the market price fixed by the Deputy Commissioner
5. The Landscape Authority should be empowered to buy land from public at market rates within the landscape boundary, even if the parcels are small and scattered
6. Once sufficient land is clustered together, it could be used to extend the area of Kaziranga, or resettle people as model villages, or create infrastructure for the people in the landscape.
7. One could very much look at buying the fringe tea gardens to extend the area of Kaziranga, retrofit corridors, or to provide alternate livelihoods or people based management systems of the balance of the tea gardens, where labourers are partners and stakeholders in profit.

However, some of the commonalities between the current proposed model and the earlier thought processes are:

1. Zonation of land use around Kaziranga is a must
2. Land-use change must be totally banned
3. Agriculture to non agriculture change of land use must be discouraged totally
4. Mushrooming of dhabas and hotels needs immediately to be halted, if necessary, by a special order of the Government
5. All encroachment from Government land, forest land, however, old it may be, must be evicted
6. Tourism activities must be well planned and allowed within tourist zones only

7. Local employment must be encouraged
8. No to chemical pesticides/ insecticides in all nearby tea gardens

Some of the new ideas that are being brought into the landscape concept are:

1. Green development zone
2. Green infrastructure
3. Green / Organic agriculture
4. Quality Health care, Education & Insurance
5. Development of model villages
6. Sharing of income of the authority with the fringe population
7. Alternate livelihoods and empowerment of the people
8. Green opportunities
9. Low carbon economy, transport & power

Several names have also been suggested for such an authority in the past, notable among them being firstly to convert the Kaziranga Biodiversity Conservation and Development Committee into a permanent body, secondly to constitute a development authority. The KBCDC also recommended promulgation of legislation namely "Assam Land Use Regulation Act for Greater Kaziranga".

Therefore, it is no denying that considerable time has been spent in the past by the concerned stakeholders to look at various pros and cons and accordingly suggest suitable measures to bring a legislation and constitute a development authority to control areas outside the Kaziranga National Park and Tiger Reserve.

Precedence:

If one looks back, one would find that once Chilika lake was also plagued with various issues, land grab, conservation vs development debate; and finally the Chilika Development Authority was constituted in 1991 by the Forest & Environment Department, Govt. of Orissa, with the Chief Minister, Orissa as Chairman, Minister, Forest & Environment as Working Chairman, and the Principal Secretary, Forest & Environment Department, Govt. of Orissa as the Chairman of the Executive Committee. The members include principal Secretaries of the stakeholding departments, including Finance Department as members, collectors of the adjoining districts, MLAs of the concerned constituencies as members.

Looking at the complexity of management and several integration issues, the Government of Assam constituted the Majuli Cultural Landscape Management Authority in 2006 by enacting the Majuli Cultural Landscape Region Act, 2006, with the Chief Secretary as Chairperson and the Commissioner, Upper Assam Division, Jorhat as the CEO.

13.1 Naming the Authority

The name proposed for the new authority for Kaziranga landscape is Kaziranga Landscape Conservation and Development Authority (KLCDA). While Kaziranga is a name attached with the sentiment of the people of Assam, and a word recognized across the Globe as the above of the Greater One Horned Rhinoceros. Adding any other name with it would dilute the issue at hand and give it a very narrow geographic color which is not really desired. Kaziranga is a stand alone word with a complete meaning, history and

significance of its own. The word "Landscape" next to Kaziranga denotes something bigger than Kaziranga National Park, or even Kaziranga Tiger Reserve (which is bigger than the Kaziranga National Park in the first place). The word landscape enhances the vastness of Kaziranga without any specific geographic connotation. In scientific literature, Kaziranga landscape is a common phrase. The word "Conservation" denotes the basic objective of conserving and protecting wildlife (especially the rhinoceros in the context of Kaziranga) which is well understood by all. The word development has been added to focus on the challenges that Kaziranga is facing now and, if not addressed, which may become its nemesis in near future. The words conservation and development together signify the on-going debate on conservation vs development/. However, Kaziranga can become world's best model is showcasing low carbon development, green opportunities for the population inhabiting on its fringe, and giving enough space for the wildlife to thrive and prosper for all times to come. Therefore, it is thought appropriate to suggest the name of the Authority as Kaziranga Landscape Conservation and Development Authority (KLCEA).

13.2 Landscape Approach

Kaziranga landscape is a vast area consisting of the Kaziranga National Park and Tiger Reserve in their current forms, the watershed of Kaziranga, mostly falling southward in Karbi Anglong, the Brahmaputra river from Majuli to Orang National Park and the areas surrounding these geographic entities. Some of these are described briefly in the ensuing paragraphs:-

13.2.1 Watershed of Kaziranga

Watershed Description:

As the Dhansiri river makes the eastern boundary of the Kaziranga National Park, the entire Naga Hills watershed draining into Dhansiri, and parts of Karbi Anglong Hills draining into Dhansiri along with the entire ridge line of Karbi Anglong Hills on the south of Kaziranga upto the westernmost end of Bagser RF form the watershed of Kaziranga. Further since, the entire Karbi Anglong Hills form the landscape complex with Kaziranga through which long ranging animals such as elephants are known to pass, there has been conscious demand from wildlifers and NGOs in the stakeholder meetings to take the entire forested tracks of these hills within the fold of active wildlife and corridor management. However, practically it is not possible. Therefore, it is proposed that the delineated watershed of Kaziranga, of which a map has been specially furnished from the Survey of India topographic sheets, in this Report, and of which a brief description has also been provided hereunder, excluding Dhansiri part, be considered as the most critical Level I (L1) watershed of Kaziranga, which must be protected at any cost, whatever that cost may be. Other areas accordingly should be managed as Level 2 and Level 3, depending upon the distance from Kaziranga and % area that drains into Kaziranga or its nearby areas.

Area Description:

The Level 1 watershed of Kaziranga as delineated from the Survey of India topographic sheets on the southern bank of the Brahmaputra river falls in three districts namely Karbi Anglong, Golaghat and Nagaon districts. The main rivers in this watershed are Deopani and Difaloo. As already discussed, if Dhansiri is taken into account, the watershed area would become much bigger, while the landscape programme may lose its focus. The L1 watershed has been delineated based on the Kukrakata Hill and Bagser RF on the west of the Kaziranga National Park. The boundary then runs along the ridge line of Bagser Hill and

thence to the ridge line of Ruthe Pahar, and then encompassing the watershed of Deopani river and thereafter further east, the watershed of Difaloo river. The watershed line is then artificially closed at the south-east point of the boundary of the Kaziranga National Park.

Since the watershed is being shown as an appendage to Kaziranga, the boundary of the watershed on the north is taken to be the southern boundary of the Kaziranga National Park, thence the southern boundary of the 1st Addition, and from thence to the point where it meets the Kukrakata RF.

The area described above, excluding Kukrata RF and Panbari RF, comes to 74935.12 Ha (748.51 sq km). Out of this, an area of 51166.58 ha falls in the Karbi Anglong District, 12969.52 Ha falls in Golaghat District and 10799.02 Ha falls in Nagaon District. The above facts are summarized in the Table below:-

Sl. No.	District	Area (Sq Km)	% Area
1	Karbi Anglong	511.6658	68.28
2	Golaghat	129.6952	17.31
3	Nagaon	107.9902	14.41
	TOTAL	749.3512	100

Therefore, it is seen that of the total area delineated, 68.28% area falls in Karbi Anglong.

Watershed Characteristics:

All the streams in the watershed were digitised; and streams were assigned stream orders starting from 1. It was observed that the delineated watershed of Kaziranga has streams upto 6 order. The stream orders were assigned to each of streams starting from to 6. Order wise stream length, average bifurcation ratio ($\frac{n_i}{n_{i+1}}$) and length ratio ($\frac{L_{i+1}}{L_i}$) were calculated for the entire watershed. The findings are presented in the Table below:

Stream Order	Number	Stream Length (Km)	Bifurcation Ratio	Length Ratio
1	2875	1433.553	4.3	0.29
2	669	422.1149	4.61	0.59
3	145	247.7906	5.18	0.44
4	28	109.2760	3.5	0.52
5	8	57.13743	4	0.79
6	2	44.89349	2	1
TOTAL	3727	2314.77	3.93	0.61

Some characteristics of the watershed and stream morphology are presented here in the Table below:-

Watershed Characteristics	Value
Mean Stream Length (Km)	0.62
Stream Frequency (Per Sq Km)	4.97
Drainage Density (Km per Sq Km)	3.09
Drainage Texture (per Km)	16.36
Constant Channel Maintenance	0.32
Texture Ratio	12.62
Circulatory Ratio	0.18

Some of the channels in the 4th Order are Kanko Jan, Dhakhichu Langso, Barjuri, Barjan Langso, Dedhara Nadi, Lachin Juri, Thedang Nadi, Dering Nadi, Poru Langso, Bar Diphlu Nadi, Ahang Langso, Kohra Nadi, Haru Kohora Nadi, Haru Deopani Nadi, Deopani Nadi, Langchingre Langso, Theak Langso, Kulapani Langso, Langkangtang Langso, Pan Juri, Tankarbil Nadi, Kangrengding Nadi, Monkro Nadi among others.

The streams in the 5th order are Kanko Jan, Bar Diphlu Nadi, Dedhara Nadi, Kohora Nadi, Deopani Nadi, Bar Katak Langso, Kalpani Nadi among others.

The streams of the 6th order are Deopani River and Difaloo River.

Watershed Degradation:

Photographic evidence partly has been collected to show that hotels, lodges and dhabas have been set up right on the border of the Park and along the animal corridors. The virgin Karbi Anglong hills are now being defaced for constructing more lodges and hotels. Quarrying and stone crusher activities are going on in the Karbi Anglong side undeterred. These areas are very much a part of the Kaziranga watershed. However, as currently there is no law to take the watershed of a forest/ sanctuary/ national park into the protection and management fold unless the same is so notified as Sanctuary/National Park. In absence of such a legislation, the watershed areas of the Kaziranga are being damaged beyond repair. If these damages in the watershed continue unabated, the tributaries and streams that flow through Kaziranga would increase in their sediment supply and destabilize the bank-line, enhance erosion and hasten siltation of the beels and water-bodies which are lifeline of the rhinoceros habitat. Dr. S. K. Lahiri has identified increased sediment load in tributary streams as one of the reasons for instability of the Brahmaputra river.

In such a situation, complete protection of the watershed of Kaziranga comprising of rivers and streams such as Dhansiri, Borjuri, Kohora, Difaloo, Kanchanjuri, Deopani, Kalapani etc. which all originate in the hills of Karbi Anglong is a must.

The issue here is of governance. The Karbi Anglong is a Sixth Schedule area, and is governed by elected representatives of the people. Therefore, the only way is to declare another National Park to the south of Kaziranga.

Communities in the Watershed:

The watershed described above, falling in three districts of Golaghat, Nagaon and Karbi Anglong is dotted all along the foot hills, and at several places in the higher reaches, with rows of human habitation. The finger-prints of human activity is very visibly displayed in the entire watershed. In fact, it is this biotic interference that has forced the author to put in writing in this Report that if the watershed is not protected, nurtured back to its original health, there is constant threat to the very survival of Kaziranga. The watershed is a great reflection of the ongoing conflicts between conservation and development, between protection of wildlife and human needs, between traditional ways of life and modern economic growth drivers.

The valley of the watershed is a bowl of human growth and development, which is rapidly growing by leaps and bound, and today threatens the very survival of Kaziranga. If unchecked, Kaziranga is surely destined to become an island in the sea of development all around. The foothills have started to get the impact of this tremendous development momentum, by way of denudation, cutting, mining, human occupation and construction activities. The higher reaches are inhabited by Karbi tribes who continue to practice slash and burn agriculture even today, allowing to burn up huge chunks of forests.

It is to be reiterated here that the watershed as described in the paragraphs above coupled with the hills covering the Mikir Hills RF, Kaliyani RF and the Singhasan Hills form a single composite bio-diversity hotspot and a unique conservation reserve that must be preserved for all times to come, even if by declaring the entire area as a Tiger Reserve.

However, the brief point to be made here is that there are a large number of stakeholders, communities, villages, community based organizations, village level councils and other local stakeholders within this watershed who need to be made a part of the conservation movement whether for Kaziranga or Karbi Anglong wildlife conservation. A model of conservation and development needs to be evolved by consulting all stakeholders through a series of engagements, role playing and mutual understanding.

Conservancy Regimes in the North Karbi Anglong:

The northern part of the Karbi Anglong, most of which falls in the Karbi Anglong (East) Forest Division has several wildlife sanctuaries namely:

1. East Karbi Anglong WLS having an area of 221.81 sq km constituted vide Notification No. FRW.57/99/51 Dt. 27th July, 2004 consisting of the entire Mikir Hills RF falling in the Dokmoka range of KA(E).
2. Nambor WLS having an area of 37 sq km constituted vide Notification No. FRW.57/99/38 Dt. 27th July, 2000
3. Garampani WLS having an area of 6 sq km
4. Karbi Anglong WLS having an area of 96 sq km constituted vide Notification No. FRW.57/99/42 Dt. 21st July, 2000, which is adjacent to the south of Kaziranga National Park near Sildubi.

The total area under wildlife sanctuary in the Division comes to 360.81 sq km.

In addition, the Division has a number of RF and DCRF areas. These are listed here:

1. Kaliyani RF	207.36 sq km		
2. Nambor (West) RF	166.33 sq km		
3. Jungthung RF	32.57 sq km		
4. Sildhampur RF	21.54 sq km		
5. Chelabor RF	33.55 sq km	Total RF Area:	461.35 sq km
6. Longnit DCRF	114.93 sq km		
7. Patradisa DCRF	67.34 sq km		
8. Jamuna DCRF	113.09 sq km		
9. Hidipi DCRF	20.08 sq km		
10. Mahamaya DCRF	55.81 sq km		
11. Khanbamon DCRF	165.50 sq km	Total DCRF Area:	536.75 sq km

Similarly, southward, the areas fall under the jurisdiction of the Karbi Anglong (West) Division. Marat Longri (meaning "Abode of the Wildlife" in Karbi language) is the only wildlife sanctuary in this Division. Marat Longri WLS covers an area of 451 sq km, constituted vide Notification No. FRW.50/99/14 Dt. 17th April, 2003 spread over the erstwhile reserved forests Kaki RF, Disama RF, Myungdisa DCRF and Inglong Kiri DCRF. It is administered currently under Bokolia Range, Borlongfar and Central range, Diphu.

The Division has got the following RF and DCRF:

1. Dhansiri RF	770.58 sq km		
2. Daldali RF	123.33 sq km	Total RF Area:	893.91 sq km
3. Borlongfar DCRF	77.31 sq km		
4. Matipung DCRF	33 sq km		
5. Tamulbari DCRF	13.86 sq km		
6. Langcholet DCRF	1.60 sq km	Total DCRF Area:	125.77 sq km

There are also several Proposed RFs (PRF) such as Borjuri PRF, Haitha Pahar PRF, Kaziranga PRF, but no records could be made available from the concerned Divisions. However, the total conservancy regime south of the Kaziranga National Park is shown below:

Sl. No.	Division	WLS (Sq. Km)	RF (Sq Km)	DCRF (Sq Km)	PRF (Sq Km)	TOTAL (Sq Km)
1	Karbi Anglong East	360.81	461.35	536.75		1358.91
2	Karbi Anglong West	451.00	893.91	125.77		1470.68
	TOTAL	811.81	1355.26	662.52		2829.59

It is important to mention that Kaziranga is recognized as the hub of the 4th Elephant Range in the country with three Elephant Reserves (ER) under its fold spread over Assam and Nagaland. The three elephant Reserves are:

1. Kaziranga Karbi Anglong ER Area 3270 sq km Notified on 17.04.2003
2. Dhansiri Lungding ER Area 2740 sq km notified on 19.04.2003
3. Intanki ER Area 202 sq km Notified on 28.02.2005

The first two ER fall in the Kaziranga Karbi Anglong conservation complex described above, while the third ER falls in Nagaland. There are more than 2500 elephant population roaming in these reserves. Elephants interact variously with the human habitations and populations as they move along in the landscape. Elephants possess multi frequency short and long range communication capabilities [Garstang, 2004], have definite memory map or even working memory [Byrne et al, 2009]. Some local inhabitants of Kaziranga informed that they could tell by behaviour whether the elephant was a resident of Kaziranga or not. On the other hand research studies in South Africa [King et al, 2014] show that Elephants could distinguish between friendly tribes and inimical tribes. Elephants are long range animals and clearly define the necessity of conservation over landscape level, in absence of which we run the risk of losing our most treasured wildlife.

Possible Governance Mechanisms of the Kaziranga Watershed:

The Kaziranga watershed falls in three districts. Since Golaghat and Nagaon districts are within the general areas of the State, there is little or no issue in administration of these areas. However, the majority of the area falls within the Karbi Anglong Autonomous District Council (KAADC) which is a Sixth Schedule area. Though technically, Reserved Forest and Protected areas do not come under control of the Council, the administration is practically controlled by them. There could be constitutional challenges in bringing the watershed areas along with Kaziranga Tiger Reserve under a single administrative control, which is highly desirable.

Several other possibilities are suggested here in order of preference:

1. Declare the watershed along with Mikir Hills RF and Kaliyani RF as a National Park (it may require resettlement of communities)
2. Declare Kaziranga Watershed, Mikir Hills RF, Kaliyani RF, Sinhasan Hills as a Tiger Reserve
3. Protect the entire watershed as a wildlife sanctuary
4. Form a Wildlife division in Karbi Anglong and hand over the watershed areas to this division by declaring it an Eco-sensitive Zone of the Kaziranga Tiger Reserve

Whatever be the governance structure, the protection measures must be extended in full measure in the watershed areas either by Kaziranga authorities, or by the Council authorities or jointly by both to ensure that:

1. No rhino poaching occurs
2. No killing of wild animals occurs for meat consumption
3. There is free passage between Kaziranga and Karbi Anglong for wild animals
4. Elephants can become resident in Karbi Anglong
5. No mining or cutting of hills is allowed
6. No felling in the forest is allowed
7. No fresh breaking of forest land is allowed
8. Additional population (in the future) needs to move out of the watershed

13.2.2 Tea Gardens around Kaziranga

Since landscape concept is based on broader geographical approach over land parcels under various types of ownerships and land-uses, tea gardens become a very important component of the Kaziranga landscape. It may be noted here that the tea estates that may eventually fall within the proposed Kaziranga Landscape would be required to be brought under the regulation so that co-existence of human and wildlife in these parts can be better managed. The tea estates likely to fall within the landscape are:-

1. Amgoorie Tea Estate
2. Anandpur Tea Estate
3. Behora Tea Estate
4. Bokakhat Tea Estate
5. Borchapori Tea Estate
6. Burrapahar Tea Estate
7. Diffloo Tea Estate
8. Hatikhuli Tea Estate
9. Jagdamba Tea Estate
10. Kaliabor Tea Estate
11. Methoni Tea Estate
12. Nahorjan Tea Estate
13. Sagmootea Tea Estate
14. Seconee Te Estate

The Table below gives some of the key statistics of the tea gardens:

Name of the TE	Y.O.E	Area (Ha)	Tea Area (Ha)	Last 3 Yrs Production (MKg)	Workers	Families
1	2	3	4	5	6	7
Amguri	1880	143.61	65.58	0.298	114	73
Anandpur	1930	100	88	1.058	120	45
Behora	1905	671.53	381.19	1.276	777	601
Bokakhat	1877	414.95	304.39	1.898	1023	611
Borchapori	1879	1189.72	784.42	4.228	1063 P+1605 T	823
Burrapahar	1938	284.53	216.90	1.666	1020	668
Diffloo	1890	676.37	491.34	0.934	1454	613 R+ 73 NR
Hatikhuli	1904	674.65	474.57	1.705	896 P + 1230 T	563
Jagdamba	1876	515	227.52	1.65	1112	278
Methoni	1914	656.74	461.64		2418	851
Nahorjan	1895	995.35	688.75	1.105	1038 P+600 T	625
Sagmootea	1935	632.93	442.29	1.050	890	625
Seconee	1880	423.35	319.39	1.257	794	634

Though it cannot be denied that these gardens have been existing (atleast some of them) prior to formation of the Kaziranga Reserve Forest in 1908, yet it cannot be denied that most of these gardens were once upon a time virgin forests that were felled and planted with tea. It is far beyond in time now to ask questions about the rational and wisdom in felling large forest tracts and converting to plantations of tea. However, today in the wake of threats of climate change and rising temperatures that may lead to several periods of drought and floods, migration of species, inundation of land, rising of river beds etc., there is an urgent need to do a complete rethink on how to reclaim of these areas back into the fold of forestry and wildlife as a future shield of protection. Climate change is also linked with appearance of new viruses, new diseases, and rise in unknown health issues. Economically backward sections of society, especially the tea garden communities may become one of the most vulnerable sections of society in the near future where effects of climate change could be most evident. Therefore, new set of strategies need to be adopted, at least as experiments within the Kaziranga landscape, where the tea garden communities have better socio-economic model to follow in lieu of what the community has been used to for almost a century.

This is also no denying that the rhinos of Kaziranga need more land to survive, and the tea plantations are potential candidates for the same. However, a very well thought of strategy needs to be evolved by way of which, not only an alternate viable economic growth model emerges for this economically backward community, but also some additional land is made available for the rhinos. Thus, the tea gardens surrounding the Kaziranga Tiger Reserve are key in resolving the conservation vs development paradigm. ***It must be mentioned that there is an example of tea garden land being acquired for Kaziranga National Park in the 4th Addition areas. It was in 2008 when the Burrpahar Tea Garden was sold out at a price of Rs. 5,81,25,000.00, and at the same time the Department acquired 221 Bighas 0 Katha 8 Lessas of the Burrpahar Tea estate land at a compensation of Rs. 1,51,50,071.00 being the cost of land and trees. The land was finally taken over on the 25th October, 2010. Of this the land cost was Rs. 57,48,080.00, and the cost of tea bushes and standing trees was Rs. 49,20,984.00. Rest being taxes etc.***

However, buying a tea garden is not just about land and tea bushes. Its more about communities that derive their sustenance from them. Before we go to new strategies, it would be worthwhile to understand the basic principles that govern the livelihoods in the tea garden areas.

Labour Welfare:

All the regulation in respect of labour and workers employed in a tea plantation are governed by the Plantations Labour Act, 1951. The Act defines "worker", "family" (and including dependent parents of a male worker), and lays down the welfare measures that must be adopted by the management of a tea garden. These measures include facilities of drinking water, latrines, medical facilities, canteen, creche, recreation facilities, education facilities, housing (and compensation resulting from collapse a house). It also provides for smaller amenities such as umbrella, raincoats and blankets for the workers.

The Act defines wage as per the section 2(h) of the Minimum Wages Act, 1948. The workers are permitted to work for not more than 48 hours a week (and overtime to be paid at twice the rates of the wages for extra work done not exceeding total of 9 hours of work in a day, and 54 hours in a week. The workers are entitled for paid leave of 1 (one) day for every 20 days of work performed.

The Plantation Labour (Amendment) Act, 2010 also additionally talks of safety in handling chemicals such as insecticides and pesticides, and lays down provisions for providing infrastructure for washing, bathing and cloak room facility.

Cost to Company:

The tea companies have to follow the provisions of the Plantation Labour Act, 1951. Though the actual implementation of the Act may vary from garden to garden, depending upon local situations (and often historical reasons) and the overall philanthropic and welfare policies of the company itself. The tea companies provide a large basket of goods and services to their workers which include subsidized ration (such as rice and atta), health care, housing, education, leave benefits etc. The ration is supplied on fortnightly basis to the workers. The tea management purchases the food grains from the Food and Civil Supplies Department at concessional rates and distribute the same to the workers at further subsidies as a part of the wage. In Assam, for example, the Govt allocates about 7000 metric of tones (MT) of rice and 5000 MT of wheat per month to the tea gardens. Rice supplied by government costs Rs 830 per quintal and while wheat costs Rs 610 per quintal. In open market the rice will cost Rs 2000 and wheat Rs 1750 per quintal. As reported by Milli Gpoal [2013], an adult is entitled to receive 0.276 gram rice @ Rs. 0.47 / kg. and 0.276 gram wheat @ Rs. 0.54/kg. and his dependent(s) receives 0.225 gram rice and wheat per day @ Rs. 0.54/kg. In addition labours are allowed collect fire-wood.

Though it is normally said that wages of the tea garden workers are low, the cost to company could be as high as Rs. 185.00 per day, against the carry home cash wage rate of Rs. 94.00 per day. The wage rates (for the Brahmaputra Valley) in the past are shown in the table below:

Year	Wage Rate (Rs.)
2011	66.50
2012	84.00
2013	89.00
2014	94.00

Socio-Economic Conditions of the Tea Workers:

Several books and research studies have shown that the socio-economic condition of the tea garden workers is not very good. Noted among the works are that of Saikia Biswajit [2009], Singh S.N. Et al [2006] who wrote 'Political Problems of Tea Gardens Workers- A Study of Assam'- a book very relevant for the Barak Valley tea gardens. Quoting from Milli Gopal [2013], the various research studies summarized show very poor economic condition of the tea garden workers. To quote various authors, Joshi [2005] observes that

they are still living under the state of practical slavery. A labour has no means of freeing himself from his serfdom, no education to be self reliant. They have few schools in the tea gardens and out of nearly 10,00,000 labours on the tea gardens only 5000 are literate, while Singh [2006] states that their economic base was without any solid foundation which made their life most sorrowful. The economic development could not take place; consequently, development in other socio cultural segments remained stagnant for long. G.K Medhi et al [2006] highlights prevalence of malnutrition among tea garden school age children (6-14 years). Prevalence of wasting, stunting and underweight was 21.2%, 47.4% and 51.7% respectively among the children in the age group of 6-8 years. Prevalence of stunting and thinness was 53.6% and 53.9% respectively among the children in the age group of 9-14 years age group.

Socio-economic backwardness on one side, the other important facet is the ill effects of using large amount of chemicals, pesticides, insecticides and fertilizers in the tea gardens that has started to threaten not only the serenity of the local climes, but also health of the communities around the tea gardens. A study by Goswami [2013], in his study on small tea growers, highlights these aspects of the tea gardens very well. According to Goswami, "Every 200 respondent use different types of chemical fertilizers (urea, Murate of Potas, Super phosphate), pesticides, insecticides, growth promoter for their production purposes. Different types of insects are Red Spider, Tea mosquito Bag(Helopelotis), Looper etc. For these insects various insecticides are used such as Monocotophos 46%, Ethian, Thaiodin, Desis,etc. For control of grasses and climbers the Glyphosate is the only remedy. These are sprayed with the help of sprayer after proper dilution. Growth promoters are Multiplex zinc high, Agrimic, YTD mixture, etc. Among the respondent 5% are used organic manure (Max soil care, Max crystals etc.) and organic pesticides (Max cannon super, Max stick, Max flash etc.). All these organic product are from Maxgrow Biotech Pvt. Ltd. and the main motto of these products is to save the earth and save life. But due to non availability and highly expensive of the organic product the growers are not interested to use. Moreover, they also know about the harmful effects of chemical fertilizers and pesticides which may cause different types of human diseases(such as cancer, heart disease, high blood pressure, skin disease etc.), destroy the natural organism of the soil, polluting the environment." He further says, "Most of the growers and workers have severe pain on the stomach, headache, indigestion, skin diseases. Birth defects, nerve damage and genetic mutation are also seen and these are identified by medical practitioner is that pesticides enter in the human body through inhalation of aerosols, dust and vapor that contain pesticides and harms the human body. Moreover, soil erosion, tank and river water is polluted near the tea garden area are also seen in that particular area of Golaghat district. Chemical pesticides contaminate the ground water in polluting the primary source of our drinking water. In these areas living organism are also reduced due to use of chemical fertilizers and pesticides."

According to Medhi [2006], there are several health and hygiene related issues plaguing the community namely nutritional problems like underweight among children (59.9%), thinness among adults (69.8%) and micro-nutrient deficiency disorder like anemia (72%) are widespread. Some of the common infections diseases prevalent among the community are worm infestations (65.4%), respiratory problems (6.7%), diarrhea (1.7%), skin infections, fileria (0.6%) and pulmonary tuberculosis (11.7%). The other diseases found

prevalent were hypertension (45.9%), senile cataract (25.3%), epilepsy (7.3%) and back pain (8.7%).

Development and Welfare Schemes:

There are several welfare schemes which are statutory in nature, especially related to the social security such as Assam Tea Plantations Provident Fund Scheme 1955, Pension Scheme 1967, Family Pension Scheme 1972, Deposit Linked Insurance Scheme 1984. Most of these schemes call for contributions from the employees, employers and often the contributors. However, the pension schemes are unique in the sense that the resources for building the pension fund come neither from the employee nor the employer. Rather, the fund is built up out of surplus interest from investment and contribution from the Govt. of India. The Board of the ATPPF & PF Scheme and Govt. of India contribute at the rate of 2-1/3 % and 1-1/6% respectively of the total wages of the members at the Provident Fund scheme. In addition to these two types of pension benefits as mentioned above, a member is paid Invalid Pension @ Rs. 100/- p.m. if the member becomes invalid while at work due to accident or any unforeseen reason. However, the main issue with the PF scheme is the pending liabilities of the defaulting gardens as a result of which the workers are deprived of the benefits under the scheme.

In order to achieve socio-economic development of the tea tribes people, the Government of Assam implements welfare schemes through a separate Directorate viz. Directorate for Welfare of Tea and Ex-Tea Garden Tribes, Assam which was established during 1983-1984. To further strengthen the delivery mechanism and speedy implementation of welfare schemes, the Government of Assam created Tea Tribes Welfare Department in 2004 as a separate Department vide AR&T Department Notification No. AR. 32/2004/34 dated 31-09-2004. The mandate of the Department in short is as follows:

- To accelerate the socio-economic development of the Tea Tribes of Assam, to enhance the gainful employability of the tea tribes manpower.
- To gear up the activities for spreading out institutionalization of education at different levels viz. primary/secondary and higher etc.
- To coordinate with other development departments for providing basic amenities like health and hygiene, sanitation, safe drinking water, electricity etc.
- To monitor and assess all development works undertaken by various departments in areas inhabited by tea tribes or ex-tea tribes.
- To create awareness among women for creating women Self Help Groups in coordination with various organizations including voluntary organizations.
- To monitor and coordinate with the management of the tea gardens for providing Eco-friendly working environment.
- To develop appropriate network between Government departments and other various organizations with a view to enabling the speedy disposal of matters relating to tea garden tribes.

During the 11th Plan period, the allocation and expenditure for the Department stood as follows:

Sl. No.	Year	Plan Allocation (Rs. In Crores)	Expenditure (Rs. in Crores)
1	2007-08	23.00	19.57
2	2008-09	37.00	37.00
3	2009-10	23.00	23.00
4	2010-11	47.95	49.95
5	2011-12	21.00	21.00
		151.95	150.52

Then, there are several infrastructure related grant schemes of the Tea Board of India such that grants for school buildings and hospitals in tea garden areas, improvement of sports, disability grant, scholarships, book grant etc.

Suggested Strategies and Roadmap:

Therefore, the key challenges that a tea garden in the Kaziranga Conservation and Development Landscape may throw open are:

1. Special rehabilitation and alternate livelihood packages for communities that part with substantial chunk of the tea garden land in the interest of Kaziranga.
2. General socio-economic uplift of the tea garden communities through well orchestrated green growth and low carbon strategies.
3. Compensation packages (could also mean annually) for tea gardens that come forward to go green and ready to suffer losses for sake of Kaziranga and to reduce ill effects of chemicals on health of communities and local environment.
4. A complete and wholesome skilling package for existing workers, the youth and women.
5. How to ensure that general well being parameters such as IMR, MMR, institutional deliveries, incidence of anemia, 100% education for all etc. in the Kaziranga Landscape can be made equal to or better than the national averages.

In the opinion of the author, the following scenario-strategies may emerge after a careful study of the facts and circumstances concerning each of the gardens in question:

1. Economically unviable tea gardens may be procured by the Authority
2. All garden areas falling in the corridor, must be procured wholly or partially.
3. Highly profitable gardens (with long track records of profits and good governance for the workers and their families), subject to limitations of serial 2 above, may be allowed to continue to function with added conditions of adopting green and organic growth strategies.
4. A garden in future becoming unviable, may have to go the way indicated in serial 1 above.

The strategies for enhancing livelihoods and alternative economic opportunities for the tea garden communities, whose gardens get taken over by the Authority, need a sound thought process and thorough study. However, certain ideas are presented here for further studies and debate:

Education:

1. All students who secure very good marks in schools, need to be identified, tracked, supported with scholarships, books, uniform, study tours, project works and assignments.
2. After 10th class, efforts should be made to fully sponsor them to study in good schools and colleges outside the landscape areas; and tutoring them for medical and engineering streams must be carried out.
3. All students who pass well in 12th must be fully supported for their medical, engineering, law and science, arts and commerce graduation studies.
4. Tying up for employment opportunities, skilling and grooming should be done at this level.
5. Those who fail to make it, should be taken in the fold of vocation education stream as suggested below.

Vocational Education:

1. According to the author, vocational education should be divided into two verticals with possibilities of cross-over at certain levels.
2. The students who are not able to perform altogether should be brought into the fold of National Vocational Qualification (NVQ) Framework, whereby they are taught purely job traits such as qualified drivers, plumbers, electricians, stitching, car mechanic etc. with minimum scholastic inputs (only enough for basic communication oral and written skills). The students in this vertical should be offered only vocational degrees, as per the norm of the vocation concerned.
3. The students who are mediocre, should fall in the National Vocational Education Qualification (NVEQ) Framework, wherein the students has an opportunity to get a normal scholastic degree such as HSLC or HSSLC or B. Sc. While having certain subjects or courses from vocational streams. IT Software, hardware, networking, help desk operator etc. are some of the job profiles that match this category. The vocational streams that require a good amount of scholastic inputs such as good knowledge of electricity etc. should be brought under this fold. However, such students would typically get employed after passing their 12th or graduation in various IT companies (just to mention as an example).

Health:

Health and well being of the tea tribe communities inhabiting within the Kaziranga landscape should be one of the prime concerns. Though the issues of health shall be separately covered in more generic way in the Chapter 15, here only a few points are being covered. The following suggestions are being forth here specific to the tea garden communities:

1. Baseline health survey of all age groups of the tea garden communities within the landscape
2. Provision for clean drinking water
3. Awareness for hygiene
4. Health insurance
5. Prevention of malnutrition among children
6. Prevention of anemia among women, especially pregnant women
7. Ensuring 100% institutional delivery by incentivising the stakeholders
8. Strengthening the institution of Asha Workers
9. Pre-natal and Post natal care

10. Strengthening of existing Govt and tea garden health care machinery for prevention of malaria and communicable diseases
11. Use of plant based insect repellants

Housing:

Though housing is a part of the welfare measure to be undertaken by the tea garden management, it may not be out of place to mention here that most of the housing has been described merely as "labour lines", meaning a row of joint houses with a couple of rooms each. Most of these labour lines are often found in dilapidated condition, haphazardly built and definitely serves only as bare minimum accommodation. These lines are often attacked by elephants moving along the corridors, being attracted by liquor, leading to, sometimes, death of people.

The tea gardens which shall contribute more than 50% of their area under tea cultivation for the sake of Kaziranga, should deserve a very special compensation package in terms of modern/green housing for all the families residing within the garden land. Since all such land would be part of the corridors for animal movement, the housing projects would need special consideration. The houses could be on raised platform, more open for sunlight and air, usage of solar lighting, provision for aesthetic design, multi-storeyed, space for gardens/parks, community life etc.

Livelihoods:

It is often said that children of tea garden community go back to the garden as labour when they grow older. There has been earlier provision for child labour in the tea gardens with wage rates reduced for children. However, the Plantation Labour (Amendment) Act, 2010 strictly, and correctly so, prohibits child labour completely. In the tea tribe community one needs to ensure that there is 100% enrollment, and every child is tracked, as per the education strategy suggested in the earlier paragraphs. Within the Kaziranga landscape effort should be to ensure that maximum possible children of the tea garden community are given opportunities that are available to children elsewhere in the country, and that every child has the potential and capacity to choose his or her vocation to the best of his or her abilities.

As regards the adult population, the adage is that a tea garden worker is fit for nothing else as the system is so well oiled that he has very little motivation to walk away from the established rug ma-roll of the tea gardens chores, wages and perks. It is interesting, however, to note that Singh [2006] points out that certain workers get to earn more than others as they are more enterprising and generate additional avenues of income. Therefore, for the existing workers and youth, there could be two ways to look at the issue of livelihoods. Firstly, the ways in which more livelihood options could be provided for the workers, such as temporary workers, enabling them to generate more income. Secondly, extensive skill development programmes for the uneducated/ educated unemployed youth of the tea communities for alternate options of livelihoods.

13.2.3 Brahmaputra River and Chapories

The stretch of the Brahmaputra river from the easternmost part of Kaziranga National Park to Orang National Park is about 150 km spanning across as many as 45 major chapories. Part of these areas fall in 6th Addition to the Kaziranga National Park, amounting to 401.50

sq km. The area covered from the west of Kalia Bhomora bridge to Orang National Park comes to 479.74 sq km. Thus, the total area under the Brahmaputra river covered comes to 881.24 sq km. Of the 45 river islands surveyed, 29 fall within the 6th Addition areas.

Within the 6th Addition areas, about 16 islands bear signs of human activity in form of cattle rearing. There are graziers who rear cattle (mostly water buffalo) by erecting temporary huts called *khutis* on the chapories. The number of grazing huts may vary from 5 to 15, while the livestock population may vary from 250 to 3000 numbers. The typical area of a khuti could vary from 0.5 sq km to 9 sq km. The total livestock population within the 6th Addition area was about 20,300. Each of the settlements of khutis has about 5-25 number of people managing the livestock.

However, west of Kaliabhomora, most of the islands are having human habitation. Most of the settlers were engaged in agriculture, while some of them also work as daily wage earners. There are more than 3000 households in these islands, and the estimated human population may be around 26,000. The livestock population is estimated at around 16500.

Signs of Wildlife Movement:

The river since time immemorial has been used as movement corridor by wild animals such as rhinoceros, tigers and elephants. However, scientific documentation efforts have started only few years back after wide spread use of GPS, sign survey and camera trap mark recapture (CTMR) technologies in the wildlife areas.

GPS locations of rhino citing between Kaliabhomora and Laokhowa WLS from 2008 to 2013 showed that rhinos were located at 29 different locations within this landscape. This clearly establishes that rhinos from Kaziranga do migrate to Laokhowa WLS/ Burachapori areas and from thence to Orang.

The WWF in association with the Forest Department conducted a detailed survey of the Brahmaputra river corridors for signs of tiger and other carnivores in February-March, 2014 using established techniques of sign surveys, presence absence index etc. The team carried out about 132.75 km transect walks, with a minimum of 1 km and maximum of 13 km. The mean encounter rate (number sighted per km) was found to be 3.61 ± 1.47 . The team detected presence of tigers in 18 islands, and sighted a tiger in the Hatibalu Char. Signs of tigresses with cubs were also found. This indicates that during breeding time, tigresses search for safer heavens for their cubs.

The Eastern Swamp Deer have been observed to swim across the Brahmaputra river channels and cross over to the char areas. The wild buffalo, elephants and rhinos are well known to cross over to the islands and wander around. Foot print of the rhinos have often been found in several of these chapories.

It must, however, be admitted that the current protection system is confined to the core of 430 sq km of the Kaziranga National Park, leaving most of the area vulnerable to poachers. Using the landscape approach, it should be possible within next 2-3 years to give complete protection to these areas in phased manner as follows:

1. Core of Kaziranga Tiger Reserve in next 6 months to be fully protected
2. 6th Addition areas should be made fully safe in next year and half.

3. West of Kalia Bhomora to Orang National Park should be made safe for wildlife in the third phase within a period of 1 to 1½ years.

13.2.4 Corridors

The corridors have been mentioned in some detail in the Chapter 2 and certain strategies have been suggested for corridor retrofitting in Chapter 11. Chapter 11 talks about notification of the identified corridors (structural as well as functional), especially along the rivers on the north bank. These notified corridors shall also be an integral part of the Kaziranga Conservation and Development Landscape. The regulation of zonation, and development strategies shall equally apply in these areas as well.

13.2.5 Animal Migration in the Landscape

The large mammals such as tigers, rhinoceros, elephants, wild buffalo etc. have long range migrations in and around Kaziranga. Through camera trap techniques, it has been established that tigers are indeed moving to Burachapori, Laokhowa, Karbi Anglong and Nameri. Similarly over several years, it has been established that rhinoceros migrates to Laokhowa, Burachapori, Karbi Anglong and chapories (river islands mostly comprising of sand and primary growth of grasses) of Majuli, the largest river island of the world. Elephants are known to migrate to Karbi Anglong.

Due to fragmentation the migration corridors have been broken at several places. This has led to exposure and increase in the animal-human interactions. More frequent number of such incidents only leads to trapping/ capture of wild cats and relocating them to zoos/ or killing of animals by the angry mobs. Whatever the consequence, the gene-pool in the wild is being lost. In my opinion, leopards are the biggest victim of the broken corridors. Like the Cheetah, one day leopards would become extinct from the wild.

For effective management of the fragile habitat of Kaziranga, healthy migration of wildlife is a necessity. If migration is stopped, Kaziranga habitat would not only wither away, but also the animals would perish in course of time. To me, confinement of large mammals in such a large population itself is a bigger threat to the survival of rhinoceros and elephants than poaching.

I do not buy the argument of research biologists and wildlife experts who say that the productivity of Kaziranga is so high that it can sustain wildlife in the long run. Such arguments would ultimately go against the conservation values that we are fighting for. When Kaziranga was constituted in 1908-1917, it finally had an area of 430 sq km. Of this, today 150 sq km is in the river Brahmaputra. There were only 40 rhinoceros then, and today 2300 or more. How much area we have been able to add onto the Park. All additions put together, we have total area no ore than 848 sq km. Per sq km area (per capita area) available for the rhinoceros is only 0.2 (against 1.48 in Kruger). Though the calculations can be fine tuned to show that we have effectively more area for the rhinoceros in Kaziranga, but this does not serve any practical purpose.

We have to target somehow to provide an area of at least 2000 sq km to the rhinoceros, if the future of the species is to be secured.

13.3 The KLCDA Framework

The KLCDA would require a new legislation altogether. However, a brief outline is provided here:

1. Aims and Objects
2. Governance Structure
3. Executive Structure
4. Funding
5. Powers and Functions

13.3.1 Aims and Objects

The aims and objects of the proposed KLCDA may be:

1. To protect Kaziranga landscape
2. To protect the Greater One Horned Rhinoceros
3. To conserve the floral and faunal biodiversity of the Kaziranga landscape
4. To usher the era of low carbon growth and green development in the landscape
5. To work for economic uplift of the population residing within the landscape and
6. To showcase to the world community a unique model of conservation and growth

There also could be missions such as:

1. Mission "Poaching Free Kaziranga"
2. Mission "Green Growth, Green Development, Green Kaziranga"
3. Mission "Green Management, Clean Management"

Whereas the 1st Mission is very clear that the effort of the management should be that no rhino (and no other animal) is poached within the jurisdiction of the authority, the other two missions point towards development issues surrounding the Park/ Tiger Reserve. The 2nd Mission talks of new ways of ushering development, employment and growth opportunities within the landscape for the economic uplift of the fringe populations of the Park/ Tiger Reserve, ensuring that the people are not deprived of modern amenities and development. However, all such growth and development should be low carbon, green and organic. The 3rd Mission talks of introducing adopting low carbon strategies and technologies in day to day management, infrastructure creation and growth of the Park/ Tiger Reserve.

13.3.2 Governance Structure

The proposed governance structure may be as follows:

1. A Board of Governors headed by the Chief Minister Assam, Minister Environment & Forests, Govt of Assam as Co Chairman and the Chief Secretary as Vice Chairman and following members:
 - MLAs of the surrounding LACs
 - CEM of KAADC
 - NTCA, Govt of India,
 - PCCF & HoFF
 - PCCF(WL) & CWLW
 - Principal Secretaries of stakeholder Departments (Forest, Revenue, Finance, P&D, Health, Home & Political, Power, P&RD, Agriculture, AH&V, Transport, PWD, WPT&BC etc.)
 - Addl PCCF/ CCF/ CF (Karbi Anglong, Sonitpur & Jorhat)
 - Commissioners, Upper Assam Division & Lower Assam Division

- Deputy Commissioners of Golaghat, Nagaon, Sonitpur and Karbi Anglong
 - Superintendents of Police of Golaghat, Nagaon, Sonitpur and Karbi Anglong
 - DFOs (EAWL, Nagaon Wildlife, Orang, Golaghat, KA(E), Nagaon, Sonitpur(E))
 - SDO © of Bokakhat, Kaliabor
 - Local members
 - EDC Presidents (On Rotation)
 - International Members
 - Conservation Bodies' Representatives
 - Chief Executive Officer & Director, KNP/ FD, KTR as Member Secretary
2. An Executive Council headed by the Minister, Env & Forests, Govt. of Assam as Chairperson and the following members:
- Principal Secretary (Forests, Revenue, Home & Political, P&RD, Agriculture, AH&V, PWD, WPT&BC)
 - NTCA, Govt of India,
 - PCCF & HoFF
 - PCCF(WL) & CWLW
 - Addl PCCF/ CCF/ CF (Karbi Anglong, Sonitpur & Jorhat)
 - DFOs (EAWL, Nagaon Wildlife, Orang, Golaghat, KA(E), Nagaon, Sonitpur(E))
 - SDO © of Bokakhat, Kaliabor
 - Local members
 - EDC Presidents (On Rotation)
 - Conservation Bodies' Representatives
 - Chief Executive Officer & Director, KNP/ FD, KTR as Member Secretary
3. The Authority may have the following permanent Committees
- Conservation and Development Council headed by the Chief Secretary and (with Expert members)
 - Finance Committee headed by the PS, Env & Forests, Govt of Assam
 - Land Advisory Committee headed by the PS, Revenue & Disaster Management
 - Development Committee headed by the PCCF(WL) & CWLW
 - Working Committee headed by the CEO
4. The KTCF may continue to function with modifications such that the Executive Council of the Authority shall be deemed to be the Governing Body of the KTCF, and the Working Committee shall be deemed to be the Executive Committee of the KTCF.
5. The Local Advisory Committee shall continue to function as a Committee of the local stakeholders.
6. The KNPSWS shall continue to function in its current form.

13.3.3 Executive Structure

The following executive structure is proposed for the Authority:

1. The CEO to be the Chief Executive of the Authority
2. The CEO to be assisted by two Addl CEO and four Deputy CEOs
3. Each Deputy CEO to be assisted by two ACFs
4. The territories of the landscape shall be in command of respective DFOs (including a new Karbi Anglong North (WL) Division that may be created to see over the watershed areas of Kaziranga falling in KA district
5. There will be four wings headed by one Deputy CEO namely:
 - Eco-Development & Eco-Tourism
 - Wildlife Crime Detection and Prosecution.
 - Logistics and Support Services (IT, Electronics, Engineering)
 - Administration & Management
6. The DFO, EAWL may be restructured as discussed separately in the next chapter
7. There shall be Management Units consisting of expert NGO members and professionals (atleast 3-4 expert members in each group) on the following:
 - Low carbon sustainable growth strategies
 - Research and Development (Wildlife, Humanities, Infrastructure)
 - Project Planning and Management (including procurement)
 - Budget and Finance
 - GIS, MIS & Audit
 - HR
8. There would be support staff and a management and professional cadre to support the authority as per requirement.
9. The Accounts of the Authority shall have at least two level audit namely:
 - Internal Audit
 - Statutory Audit
 - CAG Audit
10. The Authority shall not be a profit agency.

13.3.4 Funding

The funding sources may include:

1. Grants from the Govt. of Assam
2. Grants from the Govt. of India
3. KTCF Funds
4. KNPSWS Funds
5. Donations from India and abroad
6. CSR funding
7. Project funding
8. Income of the Authority (including income from investments, rent and levies)
9. Gifts and Bequeaths

13.3.5 Powers and Functions

The following powers and functions may be awarded to the Authority for smooth functioning:

1. Power to buy and sell land in its name

2. Power to bequeath land for Kaziranga National Park/ Tiger Reserve
3. Power to set up and run enterprises within the landscape
4. Power to levy toll and taxes, penalties and collect cess within the landscape or on its borders
5. Power to invest moneys in safe instruments/ bonds
6. Power to buy land on premium within or on the periphery of the landscape
7. Power to prepare Master Plans/ Zonation Plans.
8. No unwarranted constructions/ projects/ industries to be allowed within the boundary of the landscape.
9. Use of pesticides/ insecticides to be banned within the landscape
10. The Authority shall have the first right of refusal in case of sale of any land within the landscape
11. Property to be purchased by the Authority from the people at market rates, as determined by the concerned Deputy Commissioners.
12. If someone wants to leave his property for good, the Authority shall offer premium and buy that parcel of land.
13. All Govt. land falling within the boundary of the landscape to be property of the Authority.
14. Income of the Authority to be shared with the EDCs and recognized bodies within the landscape as grants-in-aid/ soft loan/ guarantees for financial instruments for public well being/ development of local institutions/ building of green infrastructure etc.

13.4 Constituents of the Proposed Kaziranga Landscape

The Kaziranga Landscape may consist of:

1. Kaziranga National Park
2. All additions to Kaziranga National Park
3. The identified Watershed of Kaziranga (this may be constitutionally difficult as the area falls in Karbi Anglong)
4. All Tea Estates around the Kaziranga National Park (about 10-12 in number)
5. Entire Brahmaputra river stretch from western tip of Majuli (Bhakte Chapori) to Orang National Park (with the rider that any new area/ landmass created by the river in future would be the property of the Kaziranga)
6. Bagser RF, Kukrakata RF and the adjoining hills such as Hatimura (may be difficult, as lot of population settled near Silghat)
7. Kalia Bhomora Hills
8. Burachapori and Laokhuwa sanctuaries.
9. Orang National Park.
10. The Eco-sensitive Zones around the Burachapori/ Laokhuwa & Orang National Park
11. All civil areas falling within these boundaries.

13.5 Proposed Master Plan and Zonation Outline

The following areas shall be clearly earmarked and zonation to be carried out after consultation with the stakeholders:

1. Wildlife Core Areas
2. Wildlife Corridor Areas
3. Production Forestry areas

4. Acquired/ remaining Tea garden areas outside the serial 1 to 3 above
5. Habitation and Development areas
6. Highways, Roads and Communication areas

The master Plan shall address each of these issues in great detail.

13.5.1 Land Use Classification

In addition to the applicable land category classification followed by the Revenue Administration, the following land use classification may be proposed for the landscape areas:

1. Wildlife Core Areas (including structural Corridors)
2. Open Functional Corridor Areas
3. Open Areas (including Agriculture, public parks etc.)
4. Water Bodies, Reservoirs and Water Channels (for public and wildlife)
5. Residential Areas (Rural, Peri-urban and Urban)
6. Commercial Areas
7. Institutional Areas (Schools, Colleges, Local Clubs etc.)
8. Industrial Areas (permitted Industries only, if any, as per the ESZ Regulation)
9. Tourism Zone
 1. Hotels and Eateries
 2. Parking Zones
 3. Shopping and Commercial Areas

13.5.2 Building Regulation

There shall be a set of guidelines for building construction, color-code, green design and low carbon foot print. Further, the Master Plan shall mark areas for building zonation such as:

1. No Building Zone
2. Riased Platform Building Zone
3. 1-3 Story Building Zone
4. Multi Story Building Zone

13.6 Possible Activities to be funded by the Authority

The funds of the Authority among others may have to be also used for the following purposes:

1. Gap funding for all green structures and development works, which can be termed as Green Gap Funding to ensure that the landscape area continues to retain low carbon foot print
2. Subsidization of losses on adoption of low carbon/ organic means of production (especially in the tea garden areas)
3. Model housing and other infrastructure creation for displaced/ disadvantaged communities wrt providing wider berth to wildlife.
4. Expenditure on alternate means of livelihoods, training and skills building
5. Institution building within the landscape (Quality Education, Recreation, Health and Office and Commercial Infrastructure)
6. Project Grants to local institutions within the landscape
7. Awareness generation and public campaigns
8. Capacity building and training of local bodies, local youth

9. Research and development activities
10. Consulting and expert advisory, Proof of Concept studies etc.
11. Maintenance works

While achieving the above, every effort should be made to take full advantage of all the on-going schemes of the various Govt agencies at the State and central level. The following line of action is suggested:

1. Effort should be made, first, in consultation with the concerned Department/ Agency to modify their part of the scheme as a special consideration to match with the perspective of the Kaziranga landscape.
2. If the above does not work out for certain reasons such as fund constraint, legacy policy issues, the gap should be identified, and the scheme should be revised within the local perspective with additional funding from the Authority
3. Only in the areas where there is no intervention currently, and the same is very essential for the landscape, then, a de-novo scheme should be prepared for implementation.
4. All such schemes however, should be posed for funding from existing sources to the extent possible.

CHAPTER 14

14 Management Strategies

Among the most important anti poaching strategies is to realign the forces, infrastructure and strategies to meet the Mission "Poaching Free Kaziranga". As already stated in Part I of the Report, Kaziranga has got quite some infrastructure, and it cannot be denied; and when poaching continues to take place despite that then a rethink is must. A brief of the organizational structure, manpower and associated infrastructure has been described in part I. The Part II, the Chapter 12 deals with technologies that are required to be adopted to be successful in stopping poaching altogether. However, it has already been mentioned that man behind the machine is equally, often more, important than the equipment itself. This Chapter deals with all aspects of field staff, field formations, capacity building and training, staff welfare so that the Mission Poaching Free Kaziranga can be achieved. The following key areas have been addressed here:-

1. Organizational Restructuring of DFO, EAWL
2. Realignment of Anti Poaching Camps
3. Roads and Bridges
4. Infrastructure Creation
5. Field Staff Capacity Building and Training
6. Staff Welfare

14.1 Organizational Restructuring

The Eastern Assam Wildlife Division was set up in 1966 and has grown from strength to strength. This is the Division which must be given the credit of ensuring that Kaziranga could see a century of success in rhinoceros conservation, now a legend in the world. There have been many a DFO, Range officers, Foresters, Forest Guards, Game Watchers, mahouts who have contributed to this saga of success. The staff strength has grown from a few tens to more than 500 numbers. Kaziranga also grew from Reserved Forest to Game Sanctuary to National Park and now Tiger Reserve status since 1908. If all goes well, it may well be the first land based Protected Area (discounting Chilika lake) to move onto a landscape approach. It would not be out of place to mention how the area of Kaziranga grew over the years. Though it started with 430 sq km during 1908-1914 period, when the Kaziranga RF was declared and several additions, deletions were applied to it, but there was no change in its area till 1974 when it was declared a National Park. It is also little surprising to note that the boundary of the final Kaziranga RF and the National Park do not match (atleast on the northern part). It is very much possible that when the maps of Kaziranga National Park were drawn in 1974 based on the Survey of India topographic sheet of 1972, the river Brahmaputra had already devoured almost 40 sq km of landmass of Kaziranga. Yet, the area shown somehow did not change from the original 430 sq km. By 1985, the area near Burapahar was fully regained from the Brahmaputra river, and the 1st Addition to Kaziranga was appended with 67 sq km of additional land. In 1990, the Burapahar range was opened to extend protection to the 1st Addition areas. By 1987, the sanctioned staff strength stood at 532.

The foresight of the then authorities in charge was that they proposed almost to double the area of the Park to 880 sq km by a series of additions. Unfortunately, most of these additions did not materialize at all till date. Even though the additional areas officially never

became a part of the Park, certain areas such as the 6th Addition areas were already having substantial rhino movement, and became haven for poachers. The Park authorities were forced to open camps and move staff (however scanty that was) by opening the 5th Range called the Northern Range.

If one looks objectively, prior to 1st Addition, about 532 no of sanctioned strength looked after 430 sq km, i.e. 0.8 sq km area per staff. Immediately after taking over the 1st Addition, the per capita responsibility increased to 0.90 sq km per person. In 2010, when the 6th Addition areas were started to be looked after, the per capita responsibility increased to 1.55 sq km. However, to this, the additional support staff in terms of AFPP, Home Guards and Casual Workers have not been added. Today the total staff figure stands at about 1200 (all strengths put together), bringing the responsibility ratio per staff back to 0.74 sq km per person. The situation today is somewhat better than what it was in 1987. However, if one looks at the poaching statistics of late eighties and early nineties, one would find that record number of poaching cases happened. The highest being 48 (a record which is yet to be broken, thanks to the devotion and sacrifice of the field staff all these years). Therefore, the period of late eighties and today have a parallel, namely lowest responsibility ratio and highest number of poaching cases in both the periods.

In order to arrive at the correct picture, another parameter needs to be taken into account. The staff deployment in Kaziranga does not direct linkage to each person. There is no direct responsibility given to any staff to look after a certain defined compartment (as is the practice in most of the states in the country). Here staff is deployed in groups to look after a given area, and a minimum to 3-4 persons are deployed together. Assuming that on an average per anti poaching camp, 3 persons are deployed, one can arrive at the responsibility ratio in a better way. In 2000, there were 120 camps, in 2005 there were 154 camps and in 2014, as of now there are 174 camps. The total staff strength can be assumed to be 562 for all practical purposes all this while.

The per camp responsibility ratio was 4 sq km in 2000, which became bettered in 2005 to 3 sq km, but got worsened despite adding substantial number of camps, in 2014 to 5 sq km. This statistics can also be directly correlated with poaching cases. By 2013 and 2014, the same number of staff started to be responsible for more areas in 2013 and 2014. Further, availability of staff per camp was 4.67 in 2000, which got reduced to 3.67 in 2005 and further got reduced to 3.22 in 2014. Now, adding the total strength today of 1200 staff, we see that per camp staff deployment comes to 6.9, which must be one of the highest so far. However, this needs to be taken with a pinch of salt, as the fringe camps and sensitive areas require not less than 7-10 persons to do patrol duty. Further, one needs to keep in mind that after induction of semi automatic weapons in AFPP, of which the strength is about 200 in Kaziranga, the minimum deployment of staff with these weapons has become 3-5 for sake of security of the arms. With this compulsive grouping of staff deployment, which cannot be broken down in smaller numbers, the effective deployment has decreased. For example, 200 semi automatic weapons would require atleast another deployment of 400-600 personnel just to make a safe unit, meaning, about 600 armed staff are actually equivalent only to 200 or less of staff in real terms. Therefore, though seemingly staff strength has increased from all sources, due to change in deployment strategy (to safeguard arms from snatching), the effective staff strength today in Kaziranga

is not more than 600. This leaves us with only 3.44 equivalent personnel available per camp.

Another remarkable change in strategy that was effected in 2014 was to erect "Tongi" and watch towers at vulnerable places. In Burapahar alone 4 new Tongi and 1 watch tower were made operational, for which it was very difficult to spare staff. Personnel were thinned down from some internal camps and in conjunction with some casual workers and home guards, these posts are being managed. The effect is that poaching in these areas have substantially come down.

Another change in strategy during 2014 was to offer sustained resistance to poachers. Operations against them were continued for several hours stretching to more than 24 hours anyway, and often stretching to 3-5 days together on 24X7 basis. This led to introduction of fatigue among the field staff. If today, we cannot give sufficient strength to have a flexibility of at least 12 hours deployment (8 hourly deployment does not make much sense in jungle warfare) in the field, sustaining anti poaching strikes would become very difficult to achieve.

There is possibly another way to look at the staff deployment in terms of number of manpower per capita rhinoceros. We need to take two periods i.e. 1987 when the staff strength was 532 and 2013 when the staff strength is 562 (and total manpower is 1200). The rhino population in 1987 can be safely estimated to be at 1020 (given the direct count results of 1984 and 1991), whereas the population figure for 2013 is 2329. Applying sanctioned strength criteria, the manpower per capita rhino in 1987 was 0.52, whereas the same got reduced to 0.24 in 2013, which is little less than half of 1987. [If one takes total deployment of staff in 2014, including AFPF etc, which is 1200 in numbers, the ration would be 0.52, same as in 1987]. The decade of 1970s was, as per available statistics from 1965, the period of least poaching, with exception of 1971 (when 8 poaching incidents took place). The total poaching during the decade 1970 to 1979 was only 27 with two poaching free years. What an achievement, 2.7 poachings per year. The staff strength was 90 in 1971 which constantly grew to 213 in 1979. The rhino population count for 1972 was 658 and 939 for 1978. The rhino population for 1970 can be easily calculated to 562, and for 1979 comes to 940. Therefore, the manpower to rhino ratio for 1970 comes to 0.16 and for 1979 comes to 0.23. Thus, there does not seem to be any clear indication of best possible manpower ratio per rhino from the past management history of the Park. However, the best manpower ratio was in 1987, which should be maintained also in future. Since data for armed forces such as AFPF etc. was not available for all the years, this comparison has been done only with sanctioned staff strength.

In order to arrive at required staff strengths to manage Kaziranga, the following parameters can be used:

1. **Boundary Conditions:**

At the outset, the boundary conditions of possible area and number of rhinos (as ECC) needs to be worked out, even though hypothetically. The same is given below:

- **Area of the Park/ Tiger Reserve:**
Since the existing area of Kaziranga National Park with all its additions comes to only 884 sq km, it is most unlikely in next few

years that this area would cross 1100 sq km north of the NH37. Therefore, the area for arriving at staff positions should be taken at 1100 sq km

- **Ecological Carrying Capacity:**

Though Ecological Carrying Capacity (ECC) has not been calculated, the estimates of the author by indirect methods and field observation says that it may be taken as 3200. However, assuming 0.40 sq km per rhino space is made available, 3200 rhinos would require 1280 sq km of space. Since in the first point, possibilities of area, of now seem only 1100 sq km, the ECC of the Park would get reduced to 2750 rhinos. Therefore, for 1100 sq km, the target population is 2750.

2. **Ratio of camps vs area:**

With automation and technology introduction, it would possible to monitor effectively an area of 5 sq km per anti poaching camp with added appendage of one or two watch towers/ Tongi.

3. **Man-power per camp:**

In order to perform 24X7 duty on a regular basis, each anti poaching camp needs to have 8 persons plus one cook, taking the strength to 9.

4. **Beats:** Each Range must have two to three beats with double the staff strength of an anti poaching camp for out of the routine duties, supplementing in an operation, and sustaining long duration operations.

5. **Range HQ:** Each range must have at least a strike force of 15 members well equipped in respect and well versed in Jungle war fare.

6. **Divisional HQ:** The Divisional HQ also needs to have at least two strike forces for surprise duty and sustaining operations against poachers.

7. **Support Staff:**

In addition to the front line staff, support staff is required such as:

- Drivers
- Mechanic
- Speed Boat/Motor Drivers
- Mechanical Equipment Wing and Workshop personnel
- Civil, Mechanical and Electrical Engineers
- Agriculture and allied sector experts
- Electronics & IT Support
 - Electronics and Computer Engineers
 - Electronic equipment trouble shooting
 - Wireless equipment trouble shooting
 - Network Engineer
 - IT support team
 - Solar panel trouble shooting
 - Systems Analyst/ DB Manager
 - Data Center Support Staff
 - Power back up and Generator Operators
- Central Control Room manpower (6 persons)

- Control Room manpower (4 in each Range)
 - GIS expert
 - Computer Operators
 - MIS expert
8. Executive Officers:
- ACFs
 - Forest Range Officer
 - Research Officers
 - Field Veterinary Officers
 - Public Prosecutors
 - Specially trained Investigating Officers for Wildlife crime
 - HR management
 - Advocacy and Media Managers

14.1.1 Proposed Staff Strength

Currently the area managed is little less than 880 sq km. The number of anti poaching camps required for this area comes to 176, which is just two more than what we have currently. With 176 camps, the required field staff strength comes to 1689 field staff, against existing 1200 deployed, leaving a gap of 489. Additionally, there appears to be a requirement of 10 to 15 executive officers.

This can be achieved as below:-

1. Raise the sanctioned strength of EAWL Division from 562 (last revised in 2001) to 1132 by adding 565 additional posts as per break provided below.
2. Carry out recruitment in AFPF to fill the existing vacancies, and deploy additional armed strength of 150 personnel.
3. Pick up local communities volunteers about 150 (and during flood times about 250) and organize VDP kind of patrol along NH37 and boundaries of the Park close to the villages.
4. Raise the Special Tiger Protection Force (two companies)

There could be arguments against such high staff numbers, which are unique for Kaziranga. One could also argue for withdrawal of staff rather than augmenting the same. However, it must be kept in mind that Kaziranga now has 5.4 rhinos per sq km. If the staff were to perform regular protection and management duties alone, it would be a Herculean task, as animal densities are very high, and staff has necessarily to move in groups of two to three at a time. As already stated, 7% staff are injured and invalid, and vacancies run to another 17.3%. To that if one adds leave and absence of about 15%, the actual staff strength on the ground comes to only 61% of the sanctioned strength. These factors also need to be taken into account while taking any decision. Further, it is to be noted that as of now there are few camps (almost all the new additions in 2013-14) for which there are no regular staff available for posting. These are being manned by casual workers and home guards.

For every 50 sq km area added to the Park/ Tiger Reserve, the manpower strength needs to be revised, especially wrt FrI, Fgd, Game watcher, Boatman etc. For every 80-120 sq km addition, the posts of FR, Dy FR, driver, motor boat driver etc. should be upwardly

revised; and a new Range should be added with its own anti poaching camps and beats. The staff strength of EAWL Division has not been revised since 1987/2001. The proposed sanctioned strength of staff for EAWL for 2014 is given below:

STATEMENT SHOWING CREATION OF POSTS UNDER EAWL BOKAKHAT				
SI No	Category of Post	Staff Strength 2001	Additional Posts Proposed 2014	Total Strength
1	DCF	1		1
2	FVO	1	1	2
3	WLRO	1	2	3
4	ACF	3	6	9
5	FR	6	6	12
6	Dy. R/G. Keeper	10	10	20
7	Forester-I	45	75	120
8	Forester-II	19	75	94
9	Hd G. Watcher	5	25	30
10	Forest Guard	212	150	362
11	Game Watcher	58	30	88
12	T. Driver	2	10	12
13	Driver	15	15	30
14	M. L. Driver	6	8	14
15	Head Mahut	1	10	11
16	Mahut	34	25	59
17	Grass cutter	34	20	54
18	Boatman	63	50	113
19	Head Asstt	1	1	2
20	Accountant	1	2	3
21	Sr Asstt	4	2	6
22	Jr Asstt	8	12	20
23	St Asstt	1	7	8
24	Peon	7	5	12
25	Chowkidar	11	5	16
26	Mali	3	5	8
27	Khansama	2		2
28	Paniwalla	1		1
29	Handiman	1		1
30	Vety F. Asstt	1	5	6
31	Radio Techn	1	4	5
32	Electrician	1	4	5
33	Sweeper	3	5	8
	TOTAL	562	570	1132
	Cumulative	562		1137

14.1.2 Reorganization of EAWL

There has already been a move to split the EAWL Division into four parts by placing four divisions in charge of the current territories. However, such a splitting of the existing territory may not be of any use in achieving anti poaching strategies for the following reasons:

1. The Range Officers, especially on the north and the south banks shall have tremendous coordination issues, as they would belong to two/ three different DFOS. The single command on the ground would break down.
2. Cohesion among the ranges on the north and south is of utmost importance, breaking of which may see actually rise in poaching.
3. In the current Kaziranga National Park with its 1 to 6 additions, there must be single command structure, as this is the most vulnerable to poaching and must be under a single DDO command for effective management of the territory.

Therefore, instead of splitting the EAWL Division in 4 units, the following revised plan is submitted:-

1. One ACF each to be placed in charge of the affairs of Bokakhat, Kaliabor and Biswanath Sub Divisions having jurisdiction respectively over Eastern and Central Range (Bokakhat), Western Range and Burapahar Range (Kaliabor) and Northern Range (Biswanath).
2. One ACF to be placed in charge of Legal cell and Wildlife crime
3. One ACF in charge of EDCs
4. One ACF in charge of Administration and Logistics
5. Each of the above three ACFs to be assisted by one FR and 2 FrI.
6. Two beats to be created, one each at Kalia Bhomora and Gohpur under a Dy FR. These posts may be later upgraded to FR.
7. Other supporting staff, as indicated above, can be taken on contract basis or

However, if the Bagser RF is brought into the fold of Kaziranga Tiger Reserve, the following strategies are suggested:

1. Create a new Range for Bagser RF which is 33.67 sq km in area, but would need a bigger infrastructure and full time dedicated units for its effective anti poaching management.
2. The Range could look after the entire right side of the NH37 starting from Jakhlabandha to Deosur and then the hill side behind it.
3. However, the Bagser RF must be sanitized by searching every cave (these caves are hideout of militants and poachers, and highly impregnable) and neutralizing it.
4. It would require strengths of two platoons of armed guards to to keep it sanitized, in addition to a large force along the NH37.
5. The biggest advantage of controlling Bagser RF would be that poaching would get decimated from this part of Kaziranga.
6. Bagser RF would need three major camps on its east, centre and west with one platoon in each, in addition to a platoon for the NH37 stretch. These must be set up on vantage points along the ridge line, and well equipped night vision devices and thermal scanners.

Strengthening of the Range Offices:

The range offices need to be strengthened. It is, therefore, proposed, to add the following manpower at RO level in Kaziranga:

1. 2 Nos range assistants / Jr Asstt to be posted per range
2. 2 Dy RO at HQ
3. One record keeper/ Statistical assistant
4. 1 Control Room Operator and one Computer Operator

14.1.3 Vacancies in AFPP

There are two battalions of the AFPP who are providing commendable service to the cause of protection of the forests and wildlife. Maximum staff strength from the two battalions is deployed at Kaziranga. However, there is requirement of more AFPP personnel.

Currently, there are several vacancies in the two battalions. The vacancy position of the 1st battalion is as below:

1. II I/C	1
2. Asstt Commandant	4
3. AB Inspector	6
4. Havildar	42
5. Naik	6
6. Lance Naik	6
7. Constable	88
8. Driver Constable	11
9. Gr IV	15

Similarly, the vacancy position in 2nd battalion is as below:

1. Inspector	9
2. ASI	22
3. Havildar	164
4. Constable	29

It is also to be noted that promotions in the rank are due for a long time. Assuming that promotions would be effected soon in near future, the actual vacancies at constable level would be more than that indicated above. Adding the vacancies of havildar, naik and lance naik of both the battalions, to that of the constables of both the battalions, the total vacancy at constable level comes to 335.

Therefore, there is an immediate requirement of recruitment of 335 constables in the forces. It is proposed that atleast 150 of the new recruits could be posted in Kaziranga.

14.2 Realignment of Anti Poaching Camps

As can be seen from the calculations from the previous paragraphs, the number of camps required to administer the existing areas of the Park (and not the Tiger Reserve) comes to 176. We have already 174 camps. However, looking at the geography, the following additional camps are suggested:-

1. Bhumoraguri APC under NR
2. Ghahigaon (Gohpur) APC under NR
3. Melbazar APC under NR
4. Silghat Riverside APC under BP
5. Hatimura APC under BP
6. Kaliabhomora APC under BP
7. Rohita Chapori APC under BHQ

However, it is seen that against 5 sq km area per camp, there are camps where its more than 10 sq km and even there are camps where it is less than 5 sq km. Still then, what is

lacking is camp to camp visibility, access, patrolling paths, clear demarcation of lines of responsibility. Realigning all the camps de-novo can be a very big challenge, and may pose disruption of patrolling and anti poaching activities.

Therefore, the following strategies are suggested for making effective use of the anti poaching camps:

1. A sensitivity map of the Tiger Reserve to be prepared, which needs to be updated at regular intervals.
2. Based on historical knowledge, all pathways which have been used in past by poachers to be identified and mapped.
3. Based on the current locations of the camps, gaps should be identified, if any.
4. All camps which are in dilapidated condition should be reconstructed afresh based on well thought strategy keeping in mind gaps, sensitivity, out-reach.
5. Each new site of a camp should have maximum visibility all around.
6. No new camp should be constructed unless its strategic requirement is high or it fills a gap.
7. A Camp map should be prepared for each camp showing the next camp locations in all directions around this camp with
8. One anti poaching camp in each Range needs to be identified as "In House Training Camp" with infrastructure for accommodating at least 20 trainees, two faculty, a main training hall with all equipment and two break out rooms. For example Rangamatia in Eastern Range, Holalpath in Central Range, Difaloomukh in Western Range are good candidates for such activities.
9. These camp sites shall have additional barracks for the strike force as required.
10. At least one more camp should be developed with additional infrastructure to house strike forces.
11. All the camps on the border (either northern side or southern side) shall be identified as "Border camp", and shall be so designated.
12. Each of these border camps shall implement two lines of defence: firstly, how to stop trespassers right at the border, and secondly, the second line of defence which a trespasser should not be able to cross.
13. All such lines of defence should be clearly demarcated on map for each of these camps based on ground configuration, terrain, water bodies and vegetation.
14. Based on the line of defence and ground strategy, each of the border camps shall be equipped with adequate and appropriate technology to detect trespass.
15. Direct lines of sight would be established, in all feasible areas, by setting up watch towers/ Tongi atleast 20/30 ft high. Such towers would be managed 24X7, each with atleast two staff to ensure that no trespass happens.
16. The strategy could be a mix of towers/ equipment based on ground feasibility conditions.
17. Behind the border camps, a line of inner camps would be identified who would see that in case the 2nd line of defence is breached, trespassers are not allowed to cross beyond the third line, which shall be maintained, wherever possible, by the inner camps.
18. Each camp may operate a set of remote camera traps, motion sensors, night vision devices and thermal scanners, depending upon terrain and need.
19. Atleast two camps shall be identified and designated as "Beats" in each Range.

14.2.1 Additional Role & Responsibilities of Range HQ and Beats

In addition to the duties of protection, the Range HQ and Beats shall have the following functions:-

1. To ensure that ration has reached each camp
2. To ensure that all consumables have reached designated camp
3. To ensure that all equipment are functional and in working condition
4. To ensure that weaponry is in working condition, and all precautions and formalities in case of fire arms are strictly observed
5. To ensure that camp diaries are being filled up regularly
6. To ensure that no staff leaves camp without valid authority
7. If there are perimeter security systems installed, the control view shall be provided to the Beats and Range HQ. They shall have to take immediate action in case of any suspicious activity.
8. Electronic Eye (EE) feed shall be provided to the Range HQ/ Beats who shall monitor their EE towers closely on 24X7 basis for any possible trespass.
9. Field level MIS/ GIS shall be fed from the Beats and Range HQ

14.2.2 Additional Incentives to Personnel Posted in Wildlife Areas

For the personnel posted in the wildlife areas, especially the rhino bearing areas face the maximum risk to life, chances of bodily injury and disease are very high, 24X7 alertness, duty in very hostile condition, night patrolling in highly hostile conditions, no Saturdays and Sundays, no holidays and no festivals, to perform duty by being away from family and children and maintain dual establishments. In Kaziranga Tiger Reserve, the job is comparable to that of the Indian Army in hostile conditions, but limited or no facilities. There are few hazardous jobs in the Government of Assam compared to a posting in Kaziranga National Park. However, the current amenities are basic minimum. The following welfare measures are suggested to be implemented:-

1. Every personnel posted in wildlife area should be given the next higher pay scale for the duration of his posting in wildlife.
2. 30% of Basic pay to be paid extra for all in rhino bearing areas, and 15% in other wildlife areas.
3. Complete Accident-cum-Death benefit for Rs. 5.00 lakh for each employee, from bottom to top
4. Cashless Medical treatment facility for the front-line staff worth Rs. 5.00 lakh annually.
5. Free ration for all
6. The present ration allowance of Rs. 500 per month to be converted into a monthly incentive as Rhino Bearing Areas Allowance; and should be in addition to the Tiger Allowance.
7. Clean and potable drinking water to be provided in all camps/tongies
8. Annual free medical check up to be made compulsory
9. One Week/ two weeks allowed with family (on rotation basis), all paid expenses for family members (Spouse/ two children/ dependent sister/ dependent parents) to visit the Grooming center and stay together and messing allowed for all.
10. The above would apply equally to the AFPP personnel posted as well.
11. There shall be no discrimination between the staff posted in the camps in terms of amenities and welfare, so that duty become the primary focus of all.

14.2.3 Family Welfare Measures

The following family welfare measures are suggested for the staff of Kaziranga:

1. Cashless Medical treatment facility for the family members together worth Rs. 5.00 lakh annually.
2. Annual compulsory medical check up of family members
3. School education fee for the children of field staff to be exempted.
4. Annual grant for books.
5. Scholarships to be awarded for deserving and meritorious students till graduation/ post graduation
6. In case of unfortunate death of any staff while on duty/patrolling/shoot-out, suitable job to the spouse as per educational qualification to be provided.

14.2.4 Vehicles

The following additional infrastructure is proposed under vehicles:

1. Stealth Vehicles 2 per range
2. Mobile Communication vehicles 1 per range
3. Motor bikes 10 per range
4. Highway Patrol – 4 vehicles per range
5. Rescue van – 1 per range
6. Mini truck – 2 per range

14.2.5 River Patrol

For strengthening river vigil and to stop poachers from entering from the North Bank, the following strategies are suggested:

1. The Brahmaputra river shall be mapped immediately after the floods every year
2. The mapping methodology could be UAV/ Quadcopter/ Helicopter based payload
3. An analysis of areas lost and gained would be carried based on the air reconnaissance.
4. Doppler sounding of the river channel shall be done after the floods.
5. Maps would be prepared for river patrol showing possible navigation pathways
6. Lines of defence (first and second) would be drawn on map with possible patrolling combinations to ensure that no trespasser can cross the river by boat or otherwise
7. Each floating camp and patrol boat/ speed boat shall be equipped equipment such as night vision devices, thermal scanners (long distance scanners as well), binoculars etc. for easy monitoring of the river lines.
8. River patrol shall be in constant touch with the nearest border camps.
9. As a long term measure it is proposed to erect a series of permanent watch towers in the river Brahmaputra to create a line of defence. Each tower may cost about Rs. 1-3 crore depending upon platform width and utility.

Infrastructure under river patrol is proposed as below:

1. Floating camps additional 2 more
2. Vehicle launch additional 2 nos
3. Speed boats 4 per range
4. Rubber boats 2 per range
5. Mechanized boat one per range
6. country boats 3 per camp

14.2.6 Dog Squad

It is proposed to have at least 3-4 Dog Squad and K-9 units placed at strategic locations for quick reaction. Two units are in the process of being raised at 2nd AFPF HQ.

14.3 Roads and Bridges

As already described at several places, Kaziranga is criss-crossed by several streams and water bodies, making straight and rectangular grid planning impossible in the Park. This also increases the time to reach a spot in the crisis time. To this woe can be safely added the lack of adequate number of all weather bridges, because of which communication gets disrupted during the rainy season. As the water from Brahmaputra river inundates various channels in the Park, communication gets cuts off for the rest of the rainy season and in some cases where channels are deep, much beyond the winter season as well.

The roads play dual role, firstly by allowing communication and secondly by acting as highlands during floods. However, it has been noticed that all roads constructed against current have resulted in siltation of water bodies. As roads are essential for north-south movement, certain amount of siltation cannot be avoided. However, further expansion of road network in low lying areas needs to be avoided, or if the road is very essential, long span columnless bridges must be made part of the scheme. It is possible to achieve about 90-100 m span of such structures without any intervening columns in between allowing free movement of water underneath.

It is also essential to adopt a strategy of converting ecologically well aligned road sections into major highlands by raising their height and increasing the width. This would give shelter to the animals during flood. NH37 is an excellent highland, but highly disturbed by moving vehicles.

Therefore, the most critical part of the communication are the means of keeping communication open across the flooded channels. As already stated earlier, interventions against the direction of current cause siltation and may not be prescribed against flow of water in main water bodies. Therefore, successful communication for all weathers can be achieved only by using This can be achieved by using technologies such as suspension bridges, bailey bridge and causeway (in small streams and channels).

As a short and medium term measure, it is proposed to undertake the following works:

1. Convert at least 20 km of road segments into highlands by doubling their width and increasing the height suitably.
2. Building 6 nos of baily bridges such as one at Hotalpath over major rivers in th Park.
3. Build 10 nos of suspension bridges upto 100 m span in critical water body habitats
4. Build 20 bridges of 30 m or less span
5. Construct about 100 causeways with very good foundations in various streams with a dual purpose to cross the stream and also hold water in the stream once the floods recede. This would help in overcoming water crisis in the park/ Tiger Reserve.
6. Number of the causeways, if successful, should be increased in order to hold water at different levels and also to allow passage.
7. One all weather road behind Kukrakata RF from Banesarwar to Difaloo

8. All central paths to be connected with one another
9. From Burapahar to Agoratoli at least one all weather road

The proposed infrastructure would ensure that areas of the Park/ Tiger Reserve do not get disconnected during floods.

14.4 Key Infrastructure

Though not directly linked with anti poaching, there are certain infrastructure and facilities required in Kaziranga for better management and long term conservation of wildlife. Some of the proposed activities under this head are:-

- 1. State of the art Veterinary Hospital:**

One state of the art veterinary hospital is required at Kaziranga with specialization in wildlife and especially large mammals such as rhinoceros and elephants. The CWRC situated Borjuri is acting as a rescue center with a good team of doctors and experts. However, it lacks equipment and infrastructure. As there is sufficient land at barjuri, the CWRC should be expanded with more doctors, equipment and laboratory. The post mortem protocol for wildlife needs to be strengthened, and all test facilities for vicera etc. should be made available locally so that prompt results can be obtained.

Since there is a large cattle population surrounding the Kaziranga Tiger Reserve, veterinary units are also required at few more places so that cattle immunization, and cattle improvement programmes can be implemented in the fringe villages.

- 2. Hospital at Kohora:**

There is no hospital or good medical facility on the southern side of the Tiger Reserve. There is requirement of at least one good hospital. This could be done in Govt. or joint sector. Further, there must be first aid units in all Range HQ and Beats and the staff should be trained in administering first aid.

- 3. State of the Art Strong Room:**

Kaziranga requires There is one strong room at Kohora where collected rhino horns are kept. This infrastructure is very poor with no modern facilities/ access control and security systems. The storage is also in old fashioned manner and highly unscientific. There must be a modern strong room with physical/ electronic security along with temperature and humidity controlled conditions.

- 4. Kaziranga Mini Data Center:**

The Kaziranga Tiger Reserve (and the proposed Authority) would be generating a lot of data from so many sensors, electronic eye, camera traps, AWS etc. These would be required not only to be stored but also archived, retrieved and analysed in Big Data streams, as the chunks making the data would very diverse, varied and numerous ranging from text strings, number strings, text and image files, video and CSV file to mention a few that would be generated from hundreds of systems/ sensors working on 24X7 basis. Therefore, it is proposed to have a Mini Data Center at Kaziranga either at Kohora or Bokakhat. This is proposed to be connected with the State Data Center (SDC) of the IT Department, Govt. of Assam

at Dispur. The Kaziranga MDC (KMDC) would be full fledged Tier II+ data center with complete physical and electronic access control, connectivity and power back up for (seven) days. The Data Center would be housed in a three storey building structure fully compliant with Seismic Zone V Building Code. The Strong room can be housed in the second floor of this building, with ground floor for total physical security control, reception and building management, fire control etc. The schematic of the KMDC is shown in Part III of the Report.

5. Modern Infrastructure in the Range Offices

Though Kaziranga handles more than one lakh tourists annually (during the six months of the tourists season), none of the four range offices in the south side namely Eastern Range, Central Range, Western Range and Burapahar Range are in any condition to provide adequate and satisfactory services. These offices were built even before the period when tourism pressure was as less as 10000 visitors or even less than that. The volume of visitors have increased more than 10 times, but the range office infrastructure has remained the same. This often leads to harassment of the tourists who come from far distances. Problems are faced also very seriously in case of foreign tourists who find the amenities highly lacking, given the world wide fame of Kaziranga. Further, there are no modern Banking, ATM and payment facilities through Debit card/ Credit card etc. In view of the above, it is proposed to build modern office structures for the four range offices on the south side. The design shall incorporate adequate office spaces, strong rooms with safe for cash and other valuables, armory, cells, interrogation rooms, conference rooms, public facilitation centres, control rooms, wireless and communication room, computer and EDP cell, EDC facilitation center etc.

6. Interpretation Centre

The Interpretation Centre at Mihimukh was built during the centenary celebrations in 2005 at Mihimukh. However, its a small center which cannot accommodate large number of visitors. It is proposed to set up an upgraded version in a new building showcasing the wildlife, interactive lights and sounds of Kaziranga, diorama displays, tableaux depicting life of rhinos. It is proposed that this Centre may be named after P.N. Lahan, the first Director of the Park who primarily shaped the existing management strategies of Kaziranga.

7. Upgradation of K.C.C.C.

The Kaziranga celebrated its 100 years of successful conservation history in 2005. A new convention centre called Kaziranga Centenary Convention Center (KCCC) was built on the open grounds below the Kaziranga Range Office at Kohora. It has a big field in the front, and it houses one big conference hall in theater mode, a small seminar hall, and a reception room with a small hall. The centre is run by the Kaziranga National Park Staff Welfare Society. The KCCC is badly in need of repairs and renovation. It is proposed that the three halls be converted into international class convention centre. The main hall can be named after Lady Curzon, whose far-sightedness and vision brought Kaziranga into existence and saved the rhinos from extinction. The second hall could be named after Mihi Chandra Miri, the Imperial Forest Service officer from Assam. The third hall could be named after E.P. Gee who brought Kaziranga on the world map. The sitting room

could be named after Balam Hazarika, who accompanied lady Curzon during her visit to Kaziranga and entreated her for conserving rhinos. The reception area could be named after A.J.W Milroy who opened the Park for visitors in 1938.

8. IMAX Theatre and 3D Films on Kaziranga

Tourism in Kaziranga lasts from November to mid May. However, requests from tourists come pouring even after that. Currently there are no off-season activities for the tourists. Additionally, the tourists have not much activity during evening times. In order to promote tourism during off season months and also to give a very good visiting experience of Kaziranga wildlife thrill, it is proposed to have a digital 3D/ IMAX Theatre at Kohora. 3D IMAX is a large format cinema with 70mm X 48.5mm film. The average screen size is 60 ft x 80 ft. There are at present six IMAX theatres in India namely at Mumbai (big Cinemas), Chennai (Luxe IMAX and Palazzo IMAX), Ahmedabad (Gujarat Science City IMAX 3D), Hyderabad (Prasad's IMAX Theatre with largest 3D screen in the world 72 ft x 90 ft) and Bengaluru (PVR IMAX). It requires special camera for shooting of 3D films. The 3D theatre would provide visitors with thrilling adventure of feeling proximity with the rhinoceros, elephants, tigers and birds, among other animals. In order to see a three-dimensional image on screen, two separate images are also required. The 3D projector simultaneously projects two strips film, one for each eye, onto a special silver 3D screen. Each strip of film contains images from two slightly different vantage points. The audience must wear special 3D glasses, which channel the right-eye image to the right eye and the left-eye image to the left eye. The brain fuses the two images together to create a three-dimensional image. The results make the screen virtually disappear and the images seem to float around the theatre. Another option which is more cost effective is the Dolby 3D technology. The Dolby 3D is a big draw with children and adults alike.

9. Staff Grooming Cum Recreation Center:

The Kaziranga field staff along with the officials Forest Ranger and above are all so very tied up with carrying out protection duties with sincerity and diligence. The staff are mostly separated from their spouse and children for long periods, and are not able to share moments of joy and sorrow many a times. Mostly during important festivals, they have to abstain from joining their family members due to pressing protection duties and a great feeling of comradeship. There are also no recreational opportunities such as news paper, television or games for the front line staff, year after year. This results in severe isolation, introversion, desolation, sickness and feeling of aloofness leading to frustration. There is also no place, such as they have in Army or Police Mess where all can meet and share their joy, sorrow and grief. There is a great need to dissolve such ill feelings and make all the frontline staff feel that the Park/ Tiger Reserve management thinks for welfare of themselves and their loved ones. It is proposed to establish a central Staff Grooming Cum Recreation Centre at Kohora/ Bagori where 15-20 staff can be regularly brought out from field and allowed to spend a week or fortnight with their comrades and families. The Centre shall have all infrastructure for messing, dining hall, library, indoor sports living rooms. Once built, the center could be run by the Kaziranga National Park Staff Welfare Society.

10. **Pilkhanas:**

It is for the better management of the domestic elephants owned by the Park, a well structured Pilkhana (a local apbhransa of the original Urdu word-"Philkhana", meaning a place where elephants are kept and tendered. Pilwan is another word for mahout- the driver of the elephant). The Pikhana at Mihimukh would be large and spacious to be able to accommodate atleast 20 elephants in a go who can be cared and fed at the same time together. Another, smaller in size, Pilkhana is proposed to be built at Bagori.

11. **Upgradation of the CWRC**

To address the welfare needs of the wildlife in and around Kaziranga, especially during floods, the Center for Wildlife rehabilitation and conservation (CWRC) was established in 2002 for attending and executing rescue and subsequent rehabilitation activities for wildlife in Assam. CWRC is a joint initiative of Assam Forest Department, Wildlife Trust of India and International Fund for Animal Welfare (IFAW). CWRC and its Mobile Veterinary Service (MVS) units attached to the centre has so far handled 3490 cases (till February 2014) in Assam and around 60% of them have been released back to the wild. CWRC's animal release percentage is better than many other such facilities around the world. Over the years, CWRC has been successfully hand raised many orphan animals including elephant calves, rhino calves, tiger cubs, leopard cubs etc. and rehabilitate them back in the wild where they serve the biggest conservation benefit. CWRC is recognised by Central Zoo Authority (CZA) and is considered as a unique facility of rescue and rehabilitation in the country now. CWRC has formulated protocols for long term rehabilitation of species like Asian Elephants, Greater One Horned Rhinoceros, Clouded Leopards, Hoolock Gibbon over the last 10 years and more. CWRC is run by the donations mainly from individual donors. WTI-IFAW partnership has put some tireless efforts to gather the funding requirements to run the facility. The current annual budget of CWRC is about 90 lakhs. CWRC has not got any Government fund except 20 odd lakhs in 2001 to start the construction and land in Panbari. The Centre required further upgradation with improved and some new infrastructure so that the services offered by it can continue to benefit the cause of wildlife rehabilitation. It is now proposed to add the following support to the Centre:

- 1 Interpretation cum training centre and landscaping activities
- 2 Leopard enclosure
- 3 Primate rehab enclosure
- 4 Bird rehab enclosure
- 5 Large animal nursery
- 6 A working laboratory for diagnostic and research purpose of the various wildlife disease etc
- 7 An annual grant to run the facility

12. Upgradation of 2nd AFPF HQ Infrastructure

The 2nd AFPF HQ at Seconee has turned out to be a very good advantage point for Kaziranga. It is also doubling as HQ for the Anti Rhino Poaching Task Force under the Afdl D.G. (P), STF. The Seconee HQ is also acting as training hub for the front-line staff. Therefore, it is proposed that the current infrastructure at Seconee be upgraded to include a Guest House, a training block, a trainees mess, an Officers' Mess, a small firing range (if possible, by acquiring more land). The existing wall should be raised further high, and sentry posts should be built. There should be a weapon repairs workshop required inside for repairing all range of weapons.

13. Intranet based Video Conferencing System

The 45 meters towers of the Electronic Eye project would prove to be very beneficial to the Park/ Tiger Reserve in terms of infrastructure. It would provide a robust 300 Mbps Intranet spread over 9 towers. This would be relayed further down using several 30 m towers, two of which have already been built. It is expected that a good network would be established in the Tiger Reserve, with the completion of the Electronic Eye and the Smart Communications Project. It is proposed to run an Intranet based video conference system with all the camps for effective management of the Park/Tiger Reserve.

14. Satellite Based Monitoring

The Kaziranga Tiger Reserve requires constant monitoring of the landscape, including the Brahmaputra river. However due to cloudy weather most of the time, it is not possible to get good satellite images at frequent intervals (or at least twice in a year). It is proposed to develop hyper spectral capabilities so that hyper spectral analysis can be used to get the terrain information on a regular basis. This is very important from the point of monitoring the Brahmaputra river, floods and erosion, and also constantly updating the terrain model of Kaziranga.

15. Flood Management and Disaster Management Control Room

Each range must be equipped with disaster management infrastructure such as control room, rescue vehicles, early warning systems (floods/ wind/ epidemics etc.), quarantine, relief and rehabilitation, first aid infrastructure.

16. Extension of the Management Practices to the Landscape

If the landscape comes into existence, and the aim would be to secure the entire landscape so that the rhinos can roam around freely without any fear of being poached, chased or harmed in any way, then the strategies of management suggested in this Chapter would have to be translated in medium and long term over the entire Kaziranga Tiger Reserve and the Landscape for which adequate financial provisions should be made.

CHAPTER 15

15 Kaziranga Landscape Green Growth Framework

This Chapter explores the possible strategies for development within the Kaziranga landscape. When we talk of Kaziranga, there are several stakeholders, a snapshot of which is given briefly in Chapter 8 (Part I) of the Report. This chapter is exclusively devoted to the local population residing within the Kaziranga landscape. Though stated variously in Chapters 4 and 13, for sake of reiteration, it needs to be mentioned here that the local inhabitants of Kaziranga deserve a special mention as a stakeholders, as their lives are intimately connected with the Park/ Tiger Reserve. The 'No Development Constraints' of Kaziranga such as the "Eco-Sensitive Zone", "No-Development Zone", and the proposed Regulatory premises of the KLCDA would leave little options for economic growth and development of the region in the commonly understood sense of the word economic development. If the growth path of the people residing within the landscape is not taken care of, conservation of the rhinos would gradually become a tougher task, and would be rendered impossible at some point of time in future when the competition for land and other resources become very fierce.

We must recognize for a person living within the landscape, when compared to a person living outside Kaziranga, the constraints of growth and development are so many that he may never be able to come out of abject poverty and think of leading a normal economic life. The economic opportunities before him would continue to be so very limiting that at some point of time, his love for the rhinos and Kaziranga may be gotten better of by the desire to be economically prosperous. Such a conversion of heart is highly undesirable. This Chapter explores the possibilities of a new path of economic growth for the landscape, where the citizen within the landscape has access to the better health, hygiene, education, employment, business and growth opportunities as compared someone outside the landscape. The path chosen is that of green growth which initially may not be cost effective, but would, in the long run not only provide the best environs for the inhabitants of the landscape, but also give better opportunities for conservation of wildlife. However, as a society, we the other stakeholders, outside the landscape, must recognize the constraints of the people within and reach out to them in a positive manner.

The proposed Kaziranga Landscape Green Growth Framework (KLGGF) is a set of loosely connected policies, technologies either established or emerging, and an approach of implementation taking the local stakeholders in confidence. No attempt has been made to work out either the policies or technologies in any great detail, as the same would be out of scope of this Report. However, the proposed Authority is expected to take the framework as the guiding principle and develop the policies for implementation, show the Proof of Concept (PoC) of the new technologies, and through an iterative and consultative process start implementation/ replication, with a continuous evaluation and impact analysis. The Framework would, in course of time, lead to evolution of a set of policies, principles, methods and technologies that would have been used and tested and would mature for replication elsewhere in the State or the country. As has already been stated, towards the end of Chapter 13, every development project that is intended within the Kaziranga landscape by any Department of the Govt. of India or the State Government must pass through the scanner of the KLGGF, and if any thing lacking is found in it, that

must be very liberally retrofitted so that revisited scheme is good enough to pass through the "Green Channel" of the Framework.

15.1 What This Framework is Not About?

Several concepts have evolved in the recent and not so recent past that point towards green growth strategies, their evaluation and measure. Notable among them are Enjoyment of Life by Nicholas Gerogescu-Roegen Payment of Ecosystem Services by Costanza and Daly, Polluters Pay Principle, Green GDP etc. However, the Framework presented in this Chapter, though draws elements from these concepts somewhere lightly and somewhere heavily, yet it should not be seen as emulation of any particular school of thought.

This framework is not about Payment of Ecosystem Services. Ecosystem services, as conceptualized by Costanza and Daly [1992] are about human derivable benefits from the ecosystems. If the service offered by the ecosystem exist regardless of whether humans exist or not, then it is not considered an ecosystem service [Costanza et al, 2011]. What all services Kaziranga may offer, but if the humans do not take benefit from it by way of manipulating the natural capital by combining with other forms of capital that require human intervention to build and maintain, then it is no ecosystem service. This Report by no means relies on the valuation of any of the ecosystem services offered by the Kaziranga National Park or the Kaziranga Tiger Reserve. However, it must be mentioned that the NTCA has already listed KTR as one of the first few tiger reserves in the country for which the ecosystem services evaluation exercise is going on with the help of IIFM, Bhopal.

The framework is also not entirely based on "Polluters Pay Principle", at least at this stage. The future levies and incomes of the Authority may depend upon how the low carbon growth model has been implemented. For example, if the authority is able to achieve a sustainable low carbon transport system within the landscape, every new entrant which is a high carbon system may have to pay heavily to enter into the landscape. Such a foreign body within the landscape may have to cough up fines in hours (to be reduced to minutes later) of time spent within the landscape.

The proposed framework is not entirely Integrated Conservation and Development Project (ICDP) model. Though the two words namely conservation and development are very much a part of it, there are some fundamental differences between the two. The Kaziranga Conservation and Development model is not based on "Use It or Lose It" principle. Unlike biodiversity conservation programmes, there are no directly derivable goods and services from the Park/ Tiger Reserve (unless the rhino trade is legalized, in which case the use it or lose it principle becomes highly applicable). Secondly, it is not entirely compensation based approach for the benefits forgone by the local communities due to the protected area. Kaziranga and the one horned rhinoceros are an integral part of the larger cultural ethos of the Assamese society. In that sense, the local communities and the local stakeholders (including the front line staff) are actually the sentinels of this great cultural heritage. Therefore, in case of Kaziranga, the stakes are much bigger than the normal compensation that one would think of in case of an ABC protected area. Implementors of ICDP have often been charged for not having a comprehensive governance model and inter-disciplinary approach. On the contrary, the Kaziranga model is about governance and

multi-disciplinary approach. The similarities between the two models chiefly are alternate agriculture and livelihoods and enhancement of the value of the landscape. It also includes the concepts of eco-development and eco-tourism as an integral part of the framework. This is also in compliance with the NTCA guidelines issued on tourism in Tiger Reserves.

15.2 The Basic Principles of the Green Growth Framework

The principles of development adopted in this Report are meant for a small scale application, and may prove ideal for experimentation within a landscape of 2000-3000 sq km with well defined constraints imposed by geography and the ecosystems within the landscape unit.

The identified constraints in Kaziranga landscape are:

1. A sanctum sanctorum of about 1200-1500 sq km of Kaziranga and its neighbourhood inviolate habitat of the Greater One Horned Rhinoceros
2. Biotic activities of mining and logging in the upper reaches of the watershed would induce severe erosion and flash flooding in the 4th to 6th order streams, leading to disturbances downstream in the river system.
3. River Brahmaputra is a life giver as well as threat to Kaziranga
4. There is only 235 sq km of plain land available between the hills on the south and the Kaziranga National Park for any developmental activities including the corridor areas end to end.
5. About 34 sq km of structural corridor area is inviolate in all respect.
6. About 60 sq km of functional corridor area has to be maintained necessarily as agricultural or agro-pastoral land use.
7. A 500 meter buffer is required to be maintained between the population and the Park/ Tiger Reserve at identified places
8. The NH37 passing through the landscape needs to be managed with well planned zonation and land use on either side of it.
9. Overlapping constraints imposed by the No Development Zone
10. Overlapping constraints imposed by the Eco-sensitive Zone around the Kaziranga Tiger Reserve and other protected areas within and surrounding the landscape.
11. Major part of the watershed in the landscape falls in the 6th Schedule area.

These geographic and ecosystem constraints have direct bearing on development strategies to be adopted, as the people living within the landscape are subject to such forces of nature that may not be visible elsewhere. A cross-section of population may also be subjected to displacement or loss of property for the requirements of conservation needs of future. Therefore, compensation is not a correct word to be used in this context, as the landscape imposes additionally certain socio economic constraints as well. A person cannot just cannot establish an economic venture or come up with a scheme on his own, as the "No Development Zone", "Eco-Sensitive Zone", or Kaziranga landscape zonation restrictions would apply and affect most of his economic activities. Therefore, the person living within these constraints belongs to a special class with reduced opportunities and hence, must be treated exclusively and suitably so that he is equally, nay, better placed than any one else outside the landscape. This is the basic philosophy on which the recommendations of this Chapter are based upon.

Keeping the constraints in mind, the basic principles on which the green growth framework has been worked out are as below:

1. Respect and admiration for wildlife and recognition of growth and development needs of the fringe population
2. Green economy should be the mantra
3. Low carbon development should be the key formula
4. Renewable sources of energy should be used extensively
5. Organic Agriculture should be promoted
6. Low impact buildings alone should be constructed
7. Ecological Footprint of a building should be as small as possible
8. Transportation should be green and futuristic, including the road infrastructure
9. A better mechanism for stakeholder consultations

These basic tenets are explained in some detail in the ensuing paragraphs with examples and some of the best practices followed elsewhere in the world. These are a mix of policies, principles and technologies. However, no attempt has been made to separate them at this stage. Some of the policies may find place again in the next Chapter.

15.2.1 Respect and Admiration for Wildlife

The basic guiding principle is that the people of the areas surrounding Kaziranga have deep love and respect for the wildlife, and have sacrificed whatever they could, in the past, for conservation of the Greater One Horned Rhinoceros which is their pride. The people take pride that visitors come from all corners of the world to see the famed rhinoceros of Kaziranga that thrives so well in their backyard. The local people are the true custodians of this great heritage that Assam possesses. The local populations have been providing unconditional support to the forest personnel, barring a handful of miscreants and criminally minded persons, in discharging their duties for protection of the rhinoceros. This love and respect for wildlife must be passed on from generation to generation so that man and rhino can coexist together till eternity [or till climate change induced phenomena do not get better of us]. The people in the past have sacrificed most of their land for sake of conservation of the rhino without getting much in return, other than "compensation" for the land lost. The respect and admiration for wildlife today is on the anvil of test, as on one hand reduced growth opportunities in the surroundings of Kaziranga are fast becoming stark realities, and on the other hand even opportunities for communication such as the NH37 are in the danger of being lost. In the wake of "No Development Zone", "Eco-Sensitive Zone" and other restrictions that are already in force, and more likely to be imposed, the local people are living in fear and uncertainty of their future prospects of growth and development. The foundations of love and respect for the rhinoceros and Kaziranga are on shaky grounds today. If the love for rhino gets mired in the tentacles of economic growth, conserving the species in the long run would become very challenging.

However, economic growth and development, a glimpse of which can be seen all around Kaziranga today, appears like an ugly monster raring to engulf Kaziranga in few decades from now. Therefore, such unsustainable growth and development needs to be demystified to the people. It must be clearly spelt out and well understood by all, including the local residents, that what we see around Kaziranga today is no growth, and cannot be even termed development. If this be development, its better we go back to the stone age. If this development, then there is something grossly wrong with ourselves, our planners and

economists, and the people on the fringe of Kaziranga. If this is development, then our aspirations, policies and priorities are misplaced. The development around Kaziranga cannot be allowed to be let loose like a neoclassical economics monster. Kaziranga needs a different perspective, a different design board and scientific planning, whatever be the cost of it. The only question is – are we prepared to pay? The people around Kaziranga need to understand very well that it is time a new approach is adopted, it is time that we look back and realize “Are we doing any good to ourselves, our future progeny and to Kaziranga?”. The dilemma of Kaziranga today, would be problem of all humanity tomorrow. So, it is in the interest of all stakeholders that new scientific experiments must begin here and now.

15.2.2 Green Economy

The aim of this chapter is not to initiate a debate on “Whither Economics?” or on the merits and demerits of “Homo Economicus” as variously defined by John Stuart Mill or Adam Smith, or give a detailed picture of the neoclassical economists and theorists and their systematic demolition (though not complete as yet) and emergence of Environmental Economics, Ecological Economics, Resource Economics or Green Economics. The aim of this Chapter is also not to elucidate the finer nuances and differences of these emerging or already emerged branches of knowledge. However, it is worthwhile to mention that we need to talk about the people as well as the planet in the breath, and that is what makes green economics as the most appropriate foundation for this Chapter. Concepts such as “De-growth”, “Zero Growth”, “Prosperity without Growth”, “Gaian Economics”, “Convivial Economics”, or “Steady State Economy” could also mean more or less the same thing. Some of the names that must be mentioned here are Nicholas Georgescu-Roegen (1910-1993) [and his train of followers such as John M. Gowdy, Herman E Daly, Kozo Mayumi to mention a few], E.F. Schumacher (1911-1993), Kenneth Boulding (1910-1993), Hazel Henderson, James Lovelock, Richard Douthwaite, Karl-Henrick Robert to mention a few who have contributed to the new theories growth and development.

Kenneth Boulding used the concept of earth as space ship and tried to work out a short term and long term solutions to some of the “succession of mounting crises” such as pollution. He said in his essay “The Economics of the Coming Space Ship Earth” [1969], “...for unless we at least make a beginning on a process for solving the immediate problems, we will not have much chance of solving the larger ones”. [The earth as a spaceship is amazing: just consider these two facts: Firstly, can you guess at what speed we rotate every 24 hours, say at the equator? Its 1600 km per hour. Think of it, our commercial jets only fly at 1000 km per hour. So, we have been spinning faster than the jet planes all this while, every moment. Secondly, at what speed we make one round of the Sun from 1st January to 31st December every year? Its amazing 108000 km per hour. We are hurtling at such great speed in the space, and even do not feel the slightest jerk. Voyager 1, the farthest man made object in space travels only at 62134 km per hour]]

Nicholas Georgescu-Roegen is perhaps the biggest protagonist of the new theories, who applied the laws of thermodynamics to economics. His magnum opus “Entropy Law and the Economic Process” [1971] gave birth to the Ecological Economics and other newer sciences. He demonstrated that the infallibility of the Second Law of Thermodynamics (also known as the Entropy Law) also was equally applicable to Economics. Thus, he demolished the production theories of the neoclassical economists.

15.2.3 Green Politics is Here to Stay

If green be the economics, can politics be far behind. Here is what Lord Beaumont of Whitley of Green Party, UK, spoke on the 27th November, 2006 in the British Parliament, "The major changes include the melting of the Greenland icecap and the resultant 6 m rise in sea levels that this implies. The upshot of this is that if London, New York, Shanghai, Mumbai are to be saved and the cost and suffering of the refugees to be avoided going for CO₂ concentrations of 550 ppm as the Government is doing is really not enough." he goes further to say, "...The Green Party on the other hand believes we must begin to localise our economies into more efficient and sustainable units, to guarantee the future of our planet and economy".

15.2.4 The Alaska Dividend

The Greens have one dream, which looks highly improbable and uneconomical, the Unconditional Basic Income (UBI) of the citizens which is a sum of money given to each citizen, irrespective of whether the citizen concerned has any income sources or not, without expecting any work in lieu of it [*other than filling up forms and annual registration*]. There is a very strong UBI movement going on the European Union countries. Details can be had from <http://basicincome2013.eu/>. Currently signature campaign is going on by the UBI activists in the member countries in support of the basic income. If the activists are able to gather 1 million signatures from amongst the 500 million inhabitants of the EU, then the matter of UBI would be taken up by the EU and would go for a public hearing in the EU Parliament. However, Alaska has been running something of a UBI for last 30 years. The Permanent Fund Dividend was created in 1976 through which a small portion of the out of the oil revenue was converted into deposits. Until 1982, nobody knew what to do with the funds, when it was decided that the annual returns of the investment would be equally shared among all citizens of Alaska. In 2008, the dividend per family was \$3,269 (translating to \$16345 for a family of five). After the financial meltdown post 2008, it reached as low as \$878 per person in 2012. The fund is moving up again. This is one scheme which has found a large political support as well.

15.3 Permaculture Principles

Permaculture is a word coined by Bill Mollison and David Holmgren, two Australians in 1978. The word originally was meant to refer to permanent Agriculture, but now refers to permanent Culture. In the words of Holmgren, Permaculture is "Consciously designed landscapes which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre and energy for provision of local needs." People, their buildings and the ways they organise themselves are central to Permaculture. Thus the Permaculture vision of permanent (sustainable) agriculture has evolved to one of permanent (sustainable) culture".

15.3.1 Permaculture Design Principles

Holmgren has come out with 12 design principles of Permaculture. These are enumerated below:

1. Observe and Interact (*Beauty is in the eye of the beholder*)
2. Catch and store energy (*Make hay while the sun shines*)
3. Obtain a Yield (*You can't work on an empty stomach*)

4. Apply self-regulation and accept feedback (*The sins of the fathers are visited on the children unto the seventh generation*)
5. Use and value renewable resources and services (*Let nature take its course*)
6. Produce no waste (*A stitch in time saves nine. Waste not, want not*)
7. Design from patterns to details (*Can't see the wood for the trees*)
8. Integrate rather than segregate (*Many hands make light work*)
9. Use small and slow solutions (*The bigger they are, harder they fall. Slow and steady wins the race*)
10. Use value and diversity (*Don't pull all your eggs in one basket*)
11. Use edges and value the marginal (*Don't think you are on the right track just because it is a well beaten path*)
12. Creatively use and respond to change (*Vision is not seeing things as they are, but as they will be*)

15.3.2 Six Natural Principles of Birch

As stated by Mollison, there are six principles of Louis Chales Birch, a noted Australian population ecologist. The comments in brackets are of Mollison.

1. Nothing in nature grows for ever. (*There is a constant cycle of decay and rebirth*)
2. Continuation of life depends upon the maintenance of global bio-geochemical cycles of essential elements, in particular, carbon, oxygen, nitrogen, sulphur and phosphorus (*Thus we need to cycle these and other minor nutrients to stimulate growth, and to keep the atmosphere and waters of earth unpolluted*)
3. The probability of extinction of population or a species is greatest when the density is very high or very low (*Both crowding and too few individuals of a species may result in reaching thresholds of extinction*) [*This is very much applicable in case of rhinos of Kaziranga, which is having the highest density of rhinos in the world. Even if we do all the stratagems to control the poaching, the rhinos still may disappear. This is what all the stakeholders must understand: Its not poaching that's the greatest threat to the rhinos, but the lack of a bigger habitat is.*]
4. The chances that species have to survive and reproduce is dependent primarily upon one or two key factors in the complex web of relations of the organism to its environment. (*If we can determine what these critical factors are, we can exclude, by design, some limiting factors, eg frost, and increase others, eg shelter, est sites*)
5. Our ability to change the face of the earth increases at a faster rate than our ability to foresee the consequences of such change. (*Hence the folly of destroying life systems for short-term profit*) [*or some moments of false pleasure, say when hunting game. How I wish there were a species that would just hunt human beings for pleasure as a game, as we hunted and sent so many species to extinction...*]
6. Living organisms are not only means but ends. In addition to their instrumental value to humans and other living organisms, they have an intrinsic worth. (*This is the life ethic thesis so often missing from otherwise ethical systems*). [*This could be the basis of a new ecological jurisprudence – capital punishment for killing wildlife, and life imprisonment for killing fellow humans*]

15.3.3 Permaculture Design Principles of Mollison

Mollison considers that the systems we construct should last as long as possible, and take least maintenance. These systems, fueled by the sun, should produce not only their own needs, but [also]the needs of the people creating or controlling them. Thus, they are

sustainable, as they sustain both themselves and those who construct them. We can use energy to construct these system, providing that in their life time, they store or conserve more energy than we use to construct them or to maintain them. Based on these considerations, he distilled five design principles for use in Permaculture:

1. Work with nature rather than against it (*for example, if we spray for pest infestations, we end up destroying pest and predators that feed on them, so the following year we get an explosion of pests because there are no predators to control them. Consequently, we spray more heavily, putting things further out of balance. Unfortunately, all the pests are never killed, and the survivors breed more resistant progeny*)
2. The problem is the solution (... *that only our fixed attitudes are problems...*) [Look differently and the problem is gone, its just got converted into a wonderful solution]
3. Make the least change for the greatest possible effect
4. The yield of a system is theoretically unlimited (*The only limit on the number of uses of a resource possible within a system is in the limit of the information and the imagination of the designer*)
5. Everything gardens (everything makes its own garden or everything has an effect on its environment. ... When we examine how plants and animals change ecosystems, we may find many allies in our efforts to sustain ourselves and other species.)

15.3.4 Permaculture Design Features

There are numerous design features that could be visible in a permaculture design, mostly picked up from nature such as layers, patterns and zones. Canopy could be used to create a multilayer system such as top canopy trees, middle canopy, lower canopy, shrubs, herbs, ground cover (ground creeper and short grasses), sub soil surface (root crops such as potatoes and edible tubers), and vertical layer of vines and creepers. Patterns could be spiral, honeycomb, sigmoid, helical, sine wave intersections, squares etc. These are recognised into the design as relationships in space and time, creating edges (or ecotones). Sectors are taken into consideration by examining the various energy zones such as insolation and wind energy. Zoning is a very important concept and briefly outlined in the next section. Guilds are cohorts or togetherness of different species and the way they interact with each other. Elements are the actual objects that are used or a part of the design and could be anything from species, domestic cattle to rock outcrop.

15.3.5 Permaculture Zonations

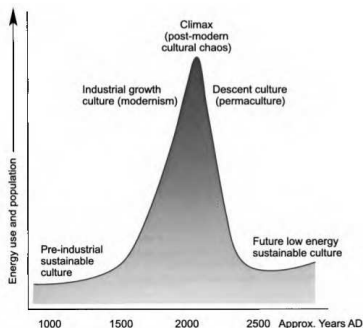
Permaculture identifies 5 zones apart from the Zone 0 which is the housing/ built up area which has the most intense human activity. As the zones go further up, the human activity gets reduced. A brief of various zones adopted from Ross Mars in "The Basics of Permaculture Design" [2003].

Zone	Key Features
0	House or human living areas
1	Intensive sheet mulched food gardens, pond, shade-house, greenhouse, rainwater tank, tool shed, some fruit trees such as lemon and low windbreak around the garden

2	Garden beds, animals such as chickens or other poultry, earth-worm farms, rabbits or guinea pigs, Aquaculture, hedges, compost heap, fruit orchard and nut trees
3	Larger-scale orchards and geese, living mulches, goat-pen, bee-hives, fodder plants, wind breaks, fire breaks
4	Woodlots (long term development), dams, agro-forestry (extensive culture), shelter belts, windmills, farm stock, swales, drains, dams and other harvesting strategies
5	Wilderness, natural forest, catchment area, flora and fauna preservation, wildlife corridors etc.

15.3.6 Industrial Culture vs Sustainable Culture

According to David Holgren, the future lies in sustainable culture, and the prevailing industrial culture is reaching its global climax. As we slip down this climax, on the other side of the curve, its permaculture all the way till we hit the low energy sustainable culture.



Holgren has identified the cultural shift from the prevalent industrial to sustainable culture. This shift is, according to him, largely contributed by permaculture. The differences between the two cultures are given below:

Characteristic	Industrial Culture	Sustainable Culture
Energy base	Non renewable	Renewable
Material flows	Linear	Cyclical
Natural assets	Consumption	Storage

Organization	Centralized	Distributed network
Scale	Large	Small
Movement	Fast	Slow
Feedback	Positive	Negative
Focus	Centre	Edge
Activity	Episodic change	Rhythmic stability
Thinking	Reductionist	Wholistic
Gender	Masculine	Feminine

15.3.7 Fryers Forest Eco Village

Fryers Forest is an eco-village situated near Castlemaine, central Victoria, Australia, set up by David Holgren, the co-founder of permaculture. The site is said to have been degraded by 50 years of gold mining. Mining started in these areas as early as 1851. Using the natural landscape, the site demonstrates use of keyline feature of permaculture design to store water. Of course, there has been no evaluation of these systems in terms of actual "cause and effect".

15.4 The Natural Step

Dr Karl-Henrick Robert [20002], a doctor by profession, certain scientific principles of long term sustainable approach to maintain the earth's ecosystems. The Natural Step lays down the basic principles and approach using which businesses and society can operate within the natural cycles operating in the earth system. These principles are:

1. matter and energy cannot be destroyed [*The law of Conservation of Matter and the First Law of Thermodynamics put together*]
2. matter and energy tend to disperse so that sooner or later all matter introduced by man will be released into the natural system [*The essence of the Second law of Thermodynamics*]
3. Material quality can be characterized by the concentration and structure of matter – we never consume energy, only its exergy.
4. Net increases in material quality on earth can be produced by sun driven processes. Disorder increases in all closed systems, therefore an exergy flow from outside the eco-sphere is needed to increase order.

Material quality as expressed by Robert would mean more usefulness [*though usefulness is subjective, but we need to look in economic sense of it*]. For example iron is more valuable than iron ore. Original source material would be more useful than the waste generated in the manufacturing process.

15.5 Low Carbon Development

Carbon is 4th most abundant element on the earth, and basic constituent of all living plants and animals. Therefore, to be "low carbon" or to get "zero carbon" are both misnomers and actually have no physical significance. However, these terms are used more often to mean reduction in carbon emissions (actually CO₂ emissions). Carbon is also associated with

carbon sequestration phenomenon by which the atmospheric CO₂ is recycled into glucose by the plant bodies, thereby reducing the Green House Gases (GHG) in the atmosphere. Since the phrase "low carbon" is catchy and conveys the sense of both the phenomenon equally well, the same has been used in the Report to mean reductions in CO₂ emissions. Reduction in CO₂ emissions can be achieved either by reducing the processes that convert C into CO₂ or increasing the processes that convert CO₂ into C. All the economic activities and development processes that encourage these phenomena would be actually the low carbon processes, or we can term them as low carbon development.

According to Germanwatch [2004], the sea level rise in Bangladesh due to plate tectonics alone is 4-8 mm per year. This translates to 4-8 cm per decade. According to IPCC [2013], the best case scenario by the end of the 21st century would be 0.26-0.55 m rise in water level under the RCP2.6. According to UCS [2011], Bangladesh stands to lose 25% of its territory. If the situation continues like this, ocean will be at the door step of Assam at the end of next century.

15.5.1 Climate Change and Human Society

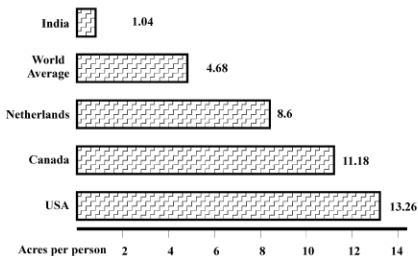
It is said that about 6 million years ago, chimpanzees and humans split. However, it was only 100,000 years ago that the first Homo sapiens started to live in Africa. If one looks at the Milankovich cycles and somehow reconcile the 100,000 year climate change peaks, it is obvious that the human race has seen the major ice age right at the beginning of the race, and a few smaller cycles in between, till the climate stabilized about 10,000 years ago. Therefore, for all practical purposes, the modern human race shall have to learn ways of coping with climate change all over again. Projected populations for 2050 are 9,550,944,891 against the estimated population of about 4,000,000 in 10000 BC, an increase of roughly 2400 times. Therefore, it is certain that climate change is going to create ecological refugees in large numbers in a few of decades from now. Such calamities cannot be averted unless there is focused and conscious action at local communities all over the world. It is the sum total of these millions of actions across the globe that would enable the human race as a whole to swing to mitigation of the ill effects of climate change. Local action becomes the key to all mitigation strategies in climate change. In the light of the above, the proposed development model for the Kaziranga landscape assumes a great significance.

15.5.2 Is Being Green Anti Development?

As foresters, who are said to be custodians of large chunk of land, we are often seen as anti development, and a "no no" species, whereas the others want to bring electricity, factories, townships, millions of jobs and what not. The contribution of forestry to GDP is negligible, and so is also the budget and fund allocation of the Governments for forestry. This indeed is a very sad state of affairs as it truly does not reflect the actual picture. The economic development and growth that we are talking off is itself an illusion, and a poison for the masses that we all consume gladly, just because the West, the so called developed countries, have already swallowed it deep inside and want others to believe in them. So we have little option but not to follow suite. This reminds me of the "Politics of Cartography". Cartography is the way we represent the land and water features of the spheroid earth on a plane paper using projections. The Chief Cartographer, Terry Hardaker of oxford Cartographers, UK, says in the cartographic introduction of the Peters Atlas of the World [1989], "we have come to accept as natural a representation of the

world that devotes disproportionate space to large-scale maps of areas perceived as important, while consigning other areas to small-scale general maps. And it is because our image of the world has become conditioned, that we have for so long failed to recognize the distortion for what it is – the equivalent of peering at Europe and North America through a magnifying glass and then surveying the rest of the world through the wrong end of a telescope.” If you have not looked at the Peters Atlas of the World, you may not appreciate this point of view, which is very important and relevant for the economic world as well.

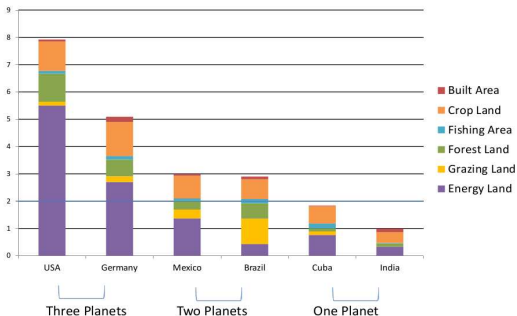
Mahatma Gandhi, when asked if, after independence, India would attain British standards of living, replied, “...it took Britain half the resources of the planet to achieve its prosperity, how many planets will a country like India require?...”. What Mahatma Gandhi told in 1947, the climate scientists have started to think on those lines after half a century. The ecological foot print of some of the countries including India [Wackarangel & Rees, 1995] shows the true picture of the World.



Comparing the foot print in terms of the number of planets required, The diagram below actually echoes the words of Mahatma Gandhi. India must define its own development parameters. What the western economic progress has done only is to create monster nation states and parasite economies. It is no development to eat into the flesh of one's own mother, rather its cannibalism and nothing more than that. India must chalk out a different path of progress and prosperity. We need to invest in research and development to provide for all clean power, clean transport, clean information and clean agriculture. We need to look for ways to provide good health, quality education and right skills, ethics and moral values.

Therefore, there is a need to experiment with new processes that are closely linked with our own ethos and cultural values. We need to define parameters of quality and achievement differently. We need to set new standards of growth and development before the world.

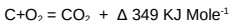
Comparison of Footprint Size



15.6 Renewable Energy

Energy is the source of all development. Energy in the universe is either derived from gravitation or from nuclear fission or fusion. In case of gravitation, its derived by virtue of mass directly, and in case of nuclear fission or fusion, its arises from the mass defect in the fission or fusion process from the Einstein's famous relationship $E=MC^2$. Energy from mass is directly by way of its position (gravitation), or its movement (kinetic). In case of movement, it could be four types, translation, rotation (about an external axis), spin (about its central axis) and vibration (to and fro movement from its mean position). The stars such as the sun derive their energies from the fission reaction where two smaller nuclei combine together in producing a third nucleus, and in the process there is small loss of mass, which in turn generates energy. Mass and energy are governed by two basic principles namely the Law of Conservation of Energy, the First Law of Thermodynamics: Energy neither can be created nor destroyed, but can only be transformed from one form to another; and the law of Conservation of Mass: Total mass before and after a chemical reaction remain the same, meaning the mass of the universe is constant. The law of conservation was given by the French Chemist Antoine Lavoisier in 1789. According to Walther Nernst, the first law was discovered by three scientists namely James Joule, Meyer and Helmholtz.

The consequence of mass and energy conservation can be explained from the "most wanted" equation of combustion of carbon:



When 12 g of carbon combines with 32 grams of oxygen, it gives rise to 44 g of CO_2 and 349 kJ mole^{-1} of energy. Now this is where we need to make a departure and think

differently. An industrialist may buy coal to burn in order to run the factory, but he is not buying the oxygen which is more than two times the weight of the coal he purchased. Nor is he paying for the pollution he is causing by pumping CO₂ more than three and half times of the coal that he purchased into the atmosphere. Every time you buy fuel (petrol/ diesel) and ignite the engine of your car, you are also consuming oxygen free of cost more than twice the weight of the fuel that you purchased. Just imagine, if you were also to buy a cylinder of oxygen/ air to run your vehicle. That's where the common sense economics fails and has landed doing much damage to the environment. No one is paying for the actual cost of the natural resources used in production of goods and services. Just as we do not account for the contribution of forests in our GDP, so do we not account for the free oxygen (that's ultimately supplied by the trees and the forest). So much so for the economics of development. Its actually economics of exploitation.

On the earth, other than gravitational and nuclear, all sources of energy are derived from the sun. The emits about 1361 W m⁻² energy per second. For an area of size of Kaziranga, the amount of solar energy received is 18455 peta Joules annually. Compare this with the world production of energy in the economic system which is only 551 tera Joules, which is 33500 times less than what nature gives to Kaziranga alone without charging any premium. Therefore, even if we are able to harvest this energy with least possible efficiencies, we shall be able to cut down on carbon emissions considerably. The economic cost benefits are today against renewable energy technologies due to many factors. However, Kaziranga as a landscape unit can be conceptualized where considerable impact may be made by using renewable sources of energy such as solar and wind.

Energy has two other aspects in the sustainability side, firstly energy efficient devices. An energy efficient device is one which has overall lower energy consumption in its life cycle assessment (LCA) i.e. energy consumed while producing it and during operation and maintenance phase, compared to a conventional device. The energy efficient devices cost more (because less demand and hence high cost), difficult to procure and often are not available off the shelf. There is no awareness among the public. In a subsidized system of energy bills, it would hardly make a difference. Secondly, the renewable energy systems should be owned and managed by the communities. If its one sided supply driven or vendor driven scheme, it would fall flat, just as many other solar installations have fallen to disuse and abuse (lifting of battery by miscreants). It should be rather an income generation and employment generation scheme. To compete against conventional fossil fuel based energy is a uphill task. Therefore, there has to be a conscious policy level understanding and targets of increasing renewable energy annually until sustainability is achieved.

15.7 Climate Smart Agriculture

Agriculture, since eternity, has been an activity [*which contributes to carbon emissions substantially*] which is highly dependent on weather and local climates. It is subject to boom or bust depending upon so many climatic conditions of rain, drought, frost, hail, wind and storm. In event of severe climates changes, agriculture is expected to suffer, endangering food security for all. In face of scarcity, the prices of essential commodities may go up, making it unavailable for the lower strata of the society. In view of this, the World Bank has come up with the concept of Climate Smart Agriculture. According to World bank, "Climate-Smart Agriculture (CSA) is an approach to managing landscapes—

cropland, livestock, forests and fisheries—sustainably in the face of climate change. It aims at 3 goals:

1. **Increasing productivity:** Produce more food to improve food and nutrition security and boost the incomes of 75 percent of the world's poor, many of whom rely on agriculture for their livelihoods.
2. **Enhancing resilience:** Reduce vulnerability to drought, pests, disease and other shocks; and improve capacity to adapt and grow in the face of longer-term stresses like shortened seasons and erratic weather patterns
3. **Lowering emissions and/or emissions intensity:** Pursue lower emissions for each calorie or kilo of food produced and avoid deforestation from agriculture.

The CSA approach includes reducing livestock emissions, alternate wetting and drying of rice crops, agro-forestry, soil carbon sequestration and a number of other integrated approaches and practices.”

15.7.1 Organic Agriculture

Conventional agriculture, in the post Industrial revolution scenario in the world, and in the post green revolution scenario in India, is heavily dependent upon high doses of fertilizers, chemicals, pesticides, irrigation, and High Yielding Variety seeds. Heavy use of chemicals has led to killing of micro flora and fauna, has destroyed the natural prey and predator relationships in the natural food chains, contaminated food grains with carcinogenic effects. Organic agriculture sprang up as a reaction to artificial and harmful means of growing food. Use of super-phosphate and ammonia based fertilizers were already prevalent in the western world during the 18th century. The ill effects of chemical fertilizers were already started to be felt as early as beginning of the 20th century. The organic farming movement was led by Sir Albert Howard (1873-1974), noted English botanist educated at the Cambridge University. The other early leaders included Rudolf Steiner (1861-1925) from Australia, Lady Eve Balfour (1899-1990) of the UK, J.I. Rodale (1898-1971) of the USA. Lady Balfour wrote "The Living Soil" which helped in early spread of the movement. Later, natural farming techniques were made popular by Masanobu Fukuoka (1913-2008) through his now famous book One Straw Revolution.

The key differences between conventional farming and organic farming is give below:

Conventional Farming	Organic Farming
Apply chemical fertilizers to promote plant growth	Apply natural fertilizers, manure, compost, vermi-compost
Apply insecticides and pesticides to control pests and disease	Restore prey-predator relationships, Multiply friendly creatures such as birds
Use chemical herbicides to control weeds	Rotate crops, mulch, till and manual weeding
Give anti-biotics and growth hormones to promote growth of plant and animals	Give organic feed and balanced diet

Organic cultivation techniques involve traditional and nature based techniques such as no till method, mulching, use of compost, vermi compost, crop rotation, herbicides etc. Organic agriculture is no more common sense agriculture. Synthetic chemicals and inorganic fertilizers are totally avoided.

Worldwide 37.2 million hectare of agricultural land is under organic farming. Of this, Australia has the maximum land under organic farming, extending to 12 million ha. India ranks 33rd in the world in organic farming having 4.43 million ha under organic cultivation. In India, the Government is promoting organic farming by providing incentives to cultivators of organic food products under the National Horticulture Mission at Rs 10,000 per hectare for maximum area of four hectare per beneficiary, setting up of vermi-compost units at 50 percent of the cost, subject to a maximum of Rs 30,000 per beneficiary and organic farming certification at Rs 5 lakh for a group of farmers covering an area of 50 hectare.

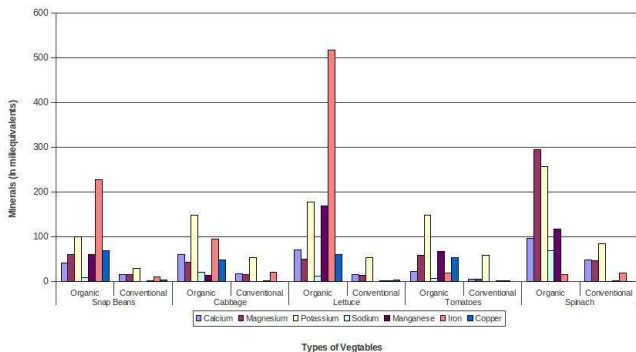
Worldwide organic agriculture is now regulated through an international confederation of members and member countries under the umbrella of International Federation of Organic Agriculture Movements (IFOAM) set up in 1972 at Bonn. The IFOAM has currently more than 700 members across 160 countries. Globally, organic food market accounts for \$57.2 billion. This is expected to grow to \$104.4 billion by 2015 with a CAGR of 12.8%. Organically certified products are able to earn a premium of 20-25% over conventional products globally.

15.7.2 Organic Certification

The word "Organic" cannot be used commercially on any product without certification. Several countries have set up their federal bodies for enforcing organic certification, such as in USA its Organic Food Program run by USDA. The farmer has, in addition to his works of production, has to maintain whole lot of documentation and audit trail for third party inspection and verification of his farm, for which he is required to pay certain amount of fee as well. In US and Canada, this fee could be typically between \$400-2000 per year depending upon the third party agency and the size of the operation. IFOAM runs Organic Guarantee System (OGS) is designed to facilitate the development of organic standards and third-party certification worldwide and to provide an international guarantee of these standards and organic certification.

In India, an organization called INDOCERT which is a nationally and internationally operating certification body accredited by National Accreditation Body (NAB), Government of India, as per National Programme for Organic Production (NPOP). It offers organic certification as per USDA-NOP standards for products destined for export to the United States. It is accredited as per ISO 17021 & ISO 22003 by National Accreditation Board for Certification Bodies (NABCB, QCI, India) for providing Food Safety Management System Certification Based on ISO 22000:2005. It also has accreditation from National Accreditation Board for Education and Training (NABET, QCI, India) for conducting awareness training programme on Food Hygiene (GMP/ GHP). Besides, INDOCERT holds international accreditation issued by DAKKS, Germany, for certification for plant production, animal husbandry, aquaculture, food processing, sub contracting and export of these

Mineral Content of Organic Vs. Conventional Vegetables



products according to the regulations of the importing countries. It also functions as a platform for training, awareness creation and information dissemination.

15.7.3 Organic Agriculture: North-east India and Assam

Fertilizer use in the North-east India is very low, averaging to 20 kg/ ha / year. The Assam average comes to 31. Assam government is promoting organic farming in a big way. Ginger, chilli and turmeric have already been identified for organic production on a large scale, including processing and exports. Pilot schemes were floated in the districts of Udalguri, Sonitpur and Lakhimpur. Organic farming is underway over 91 ha of land involving 154 farmers. Through these schemes of promotion of organic farming, already 133 MT of organic Joha rice was achieved in 2007, and 60 MT of aromatic rice in 2008. These have been certified and exports have started. In commercial cultivation, effort has been made to promote organic tea cultivation as well. A brief description of this effort is given below:

The Hatikhuli Organic Cultivation Experiment:

The Amalgamated Plantations Pvt. Ltd (APPL), the new concern taking ownership of the tea gardens earlier belonging to the Tata Tea Ltd, is one of the largest producers of tea in the country. The company owns 25 tea gardens, of which 4 gardens namely Difaloo, Hatikhuli, Sagmotea and xxxx lie within the Kaziranga landscape. In order to prevent any further degradation of the surrounding environment of Kaziranga, the management consciously started to convert the Hatikhuli TE into a fully organic farm. The work of conversion started in 2007 and was completed in 2011. The garden ran through short term losses in profits and productivity. They had to discontinue the artificial chemical inorganic

fertilizers and agro-chemicals. It led to increase in pest attack manifold. The company also had to change the policy framework and field level guidelines and practices. The wage bill of the company also increased due to additional employment of manpower to handle increased number of activities. There was 57% drop in yields from the pre-conversion period. The company faced operational losses to the tune of Rs. 12.5 crore in 3 years, averaging to a loss of Rs. 4.00 crore per year. However, the organic tea from hatikhuli was received well in European countries, and the company was able to get good premium despite the losses and drop in production. The Hatikhuli tea in 2006, prior to organic conversion fetched a price of Rs. 67 per Kg, but now fetches a price of Rs. 145 per kg in the post conversion scenario. Such efforts in the Kaziranga landscape should be supported by financial assistance till such units make profits. Such efforts could be supported by the Authority for 2-4 years, till the process matures and the enterprise is in a position to face competition. This could be applied across the agricultural sector, including progressive farmers who are willing to switch over to organic mode of farming.

15.8 Low Impact Buildings

Buildings or housing units, as we may call them, are needed to provide the living comfort, right lighting, right temperature, quality air, safe drinking water and a pollution free enclosed space for living or working or both. As buildings get more insulated, their requirements of energy go up very high. Buildings such as computer data centres may use up as much energy as 2-5 MW alone in a built up space of 30 to 50 thousand square feet. These buildings generate a lot of heat due to stored computing systems and data storage systems. On the other extreme, a rural household may be totally off-the-grid (not by choice, but by compulsion). Between the two extremes, the built up space from the time of start of construction to occupancy and usage of the space, every building has considerable requirement of energy. However, energy is only one of the considerations in a low impact design which is basically indicative of lowest possible emissions. Low impact design could include features such as passive solar power, wind energy, use of recycled building materials, use of locally available building material (consider the amount of carbon emissions involved in transporting building materials from long distances, even abroad, to a building site), natural cooling and heating, ventilation and proper use of aspects for maximum day light etc. The six main focus areas of green buildings are:

1. Energy useful (as low as possible/ or as much renewable as possible, best is off-the-grid)
2. Land and water use (minimum coverage, greenery, nature-scaping, gray water, black water separation and recycle, rain water harvesting)
3. Materials (local materials, recycled materials, least distance of transport)
4. Construction methods (low energy systems, local and indigenous methods)
5. Integration with community (local needs and respect for local value systems and customs, green design charrettes and developing green communities)
6. Indoor environment quality (air quality, optimum lights, sound levels, body comfort and temperature control, waste management)

various facets of low impact buildings, design and certification have been discussed in the subsequent paragraphs.

15.8.1 Embodied Energy Analysis

While talking of low impact housing, the calculation of the carbon emissions can become very critical. The Life Cycle Assessment (LCA) of a building may not be done correctly, if embodied energy considerations have been omitted. Embodied energy is the total energy used in manufacturing/ producing the building material and transporting the same to the construction site. For example, unfired earth has a very low embodied energy compared to a fired brick. Unfired earth can be used to make compressed bricks, or rammed to make walls, or mixed with straw, or even cement. Unfired earth products and construction methods will have a very low embodied energy unless the earth is transported from some great distance away from the site. On the other hand, fired bricks not only use huge amount of energy in baking, but also in stacking, loading and long distance transportation. Similarly, lime as a building material will have less embodied energy compared to cement. Lime is more environment friendly and kind of absorbs atmospheric CO₂ in a process known as carbonation. Lime continues to breathe and absorb CO₂ and its strength also increases over the years as it ages. [Woolley 2013]

15.8.2 LEED Certification

LEED stands for Leadership in Energy and Environmental Design. It is a programme offered by the US green Building Council, Washington DC. LEED offers certification sustainably built structures such as schools, houses, offices and business establishments. These constructions, all need not be new. LEED has certifying scheme for nine different types of structures namely, new buildings, existing buildings, commercial buildings interiors, building cores and shells, retail, schools, health care facilities, homes and neighbourhood development. LEED has four levels of certification depending upon the number of LEED points required. Platinum is the highest certification level with 90-136 points, followed by Gold (75-89), Silver (60-74) and Certified (45-59). The features include parameters such as energy savings, use of recycled building materials, water efficiency, heating and cooling efficiencies, zero or near zero waste generation, indoor air quality etc. LEED certification is not static. The US Green Building Council keeps on updating its requirements in all point categories with new sustainable technologies.

15.8.3 GRIHA

GRIHA stands for Green Rating for Integrated Habitat Assessment, the Indian equivalent of the LEEDS developed by TERI and accepted by the MNRE, Govt. of India, as the national green rating system of buildings in India. All buildings above 2500 sq m in built up area are eligible for certification under the scheme. GRIHA is a 100 point system covering 34 criteria elements, some of which are optional. The highest rating is 5 Star (91-100), followed by 4 Star (81-90), 3 Star (71-80), 2 Star (61-70) and 1 Star (50-60).

15.8.4 Net Zero Building

It is known by various names, such as zero energy or zero net energy, all meaning that shows the energy balance of the building in terms of consumption and production of energy. If the building produces more energy than it consumes, its called energy positive building. Ultra low energy buildings consume a little more than what they produce. However, when the sun is not shining or the wind is not blowing, the energy production would be nil. In such cases the buildings use captive generation based on fossil fuel such as diesel. However, some buildings would only import energy from another connected grid

supplying green power alone. In India, the Indira Paryavaran Bhawan at Jor Bagh, New Delhi housing the Ministry of Environment & Forests, Govt. of India, is the first certified net zero building, which was dedicated to the nation by the prime Minister of India on the 25th February, 2014.

15.8.5 Off-the-Grid Housing

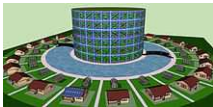
A 100% Off-the-Grid (OTG) house is difficult to imagine in an urban scenario. However, in most rural India where development has not touched, houses would be all OTG. Humanity for thousands of years, everywhere, have lived only in the OTG manner, for there was no electricity, piped gas or water supply to connect to. Grid housing is post industrial revolution and post invention of electricity. Today a typical urban house would be connected to electricity supply grid (and the grid is also expanding to rural areas, with a dedicated programme to connect all unelectrified villages under the Rajiv Gandhi Vidyutikaran Scheme). Let us tarry here for a while and ponder: assuming India has 250 million households, and each household needs just 100 W of energy (one bulb of 100 W) for 8 hours during night time, the requirement of energy would come to 73 tera Joules, which is one seventh of the world's energy production in 2013. If the demand is just increased to 10 such bulbs per household, keeping rest of the assumptions unaltered, India alone would require 730 tera Joules of energy, meaning there would be complete darkness in rest of the world. The kind of carbon emissions that it will be associated with can be imagined. Therefore, providing a bulb or a computer or a television set to every Indian household is not the correct way to grow. We need to look for solar and wind energies with concepts of "OTG Communities and Villages", which in short we can call OCV. Each of the OCVs would have its own grid of solar/wind power and would be connected to other nearby grids for exchange of clean energy. Storing energy in batteries (Lead Acetate) may not be the sustainable way in the long run, as it may prove hazardous. However for such concepts to be developed, one needs to design model villages with low impact housing, but all the comforts of a modern urban house. Technically the OCV grids would be connected, but each would otherwise be independent in power requirements. The OCVs could have common source of drinking water, gray water and rain water harvesting systems. Of course, OCVS may not be able to solve all the problems such as cooking fuel, cattle and poultry management, which may require further development and understanding within the community for cooperative structures to grow and mature.

In the west, OTG living has caught up in a big way. There could be more than a million people living in the OTG homes in USA, Canada, UK and Europe. However, there are certain traditional "Indian" communities in US and Canada which are yet to be connected to the grid supplies. They are also counted in OTG living. However, the difference is that these "Indian" communities have not been connected as so called infrastructure has not reached so far remote, and as a result these communities resort to using diesel fuel to generate electricity. The fuel has to be carried long distances by trucks etc and often proves hazardous. Therefore, such communities are excluded when we talk of OTG living which is purely from environmental considerations to cut down on emissions.

15.8.6 Model Villages

The Kaziranga landscape needs to develop good concepts with low impact housing designs and renewable energy supply models for its villages, especially if a community is likely to be displaced due to some reasons such as natural calamity, erosion or shifting for habitat

improvement. In such cases, energy efficient OCV concepts may be tried. One such community OTG living concept has been given by Eric Wichman, who is an inventor working for OTG home designs. He has designed several homes with "containers". He has also designed a water dispenser which takes moisture from the air and outputs clean drinking water. Wichman's concept of OTG communities is worth looking at.



The community can grow as well. The design uses renewable sources of energy, on-site water source, and most interestingly, it also incorporates vertical farming. Vertical farming is a model which uses the sky scraper concept to grow food and vegetable using solar energy and moisture. Its a kind of multi-storied green house. The central facilities and the farm are located in a central tower, and the communities live on the periphery. It has been variously argued that conventional farming may not be all that good for long term survival of human beings, and ever increasing populations. If vertical farming is not resorted to, we may not have sufficient space to grow food for all in the coming times. Further, conventional agriculture is also seen as disruptive to other species.

15.8.7 Grey Water

Grey water is a concept applicable mostly in urban areas, apartments and hotels where all water from the sinks, washing machines and laundry, bathroom, showers, heating and cooling systems [but not the water containing feces] can be re-used. A person on an average uses about 75 litres of water daily. Most of this water, other than that used for flushing, can be reused without much treatment. Gray water may contain detergents and soaps, shampoo, oils, salts and other pollutants. Therefore, it is not advisable to allow this water to "run off" or drain into streams and river channels. The water may not also be stored beyond 24 hours, as the organic/ inorganic molecules contained in water may break down, reducing its nutritional value for plants. The water can be used to recharge ground water, or used for irrigating lawns and gardens. It can also be treated for better use of the water again for washing etc. However, there are associated energy costs, and the overall foot-print may go up, defeating the basic purpose of the recycling. In several countries there are gray water use codes and guidelines, and often the residents need to take permits for installing gray water systems. However, in few states in the US, mere following the guidelines is seen as good enough enforcement. In the context of Kaziranga landscape, gray water becomes important for the tourist zones and model villages.

15.8.8 Rain Water Harvesting

The importance of rain water harvesting (RWH) cannot be emphasized more when one is talking of low impact housing and reducing the ecological foot print of the building. Rainwater is soft, as against gray water which is hard. It does not require any, or may require a little, treatment before use. Often the falling water from the roofs is guided through directed and well sloped gutters along the roof's edges to carry the rain water to storage tanks. The storage tanks could be above ground or under ground. The water can be directly used for washing and cleaning. It can be also used for drinking provided it is

passed through a set of filters (carbon filter for removing organic matter and membrane filter for particle removal). The stored water is often used for fire-fighting and irrigation purposes as well. The urban building bye laws now, under the JNNURM, being revised to make RWH mandatory. The RWH primer of JNNURM says, *"The main objective of making rainwater harvesting mandatory in all buildings is to recharge groundwater and augment overall water availability. This measure will ensure that the rain falling on all buildings is tapped and directed to recharge groundwater aquifers or stored for direct consumption/ use by occupants of buildings. With increasing population in urban areas, the municipal bodies and other public agencies are increasingly finding it difficult to supply water in adequate quantities to citizens. Often citizens use private tube wells to supplement the municipal supply for their daily needs. Recharging ground water will raise aquifer levels and will help municipal and other public agencies to have access to larger quantities of groundwater. In alluvial areas, energy saving for 1m rise in ground water level is around 0.40 kilo watt per hour. Recharging aquifers will also reduce the requirement for additional financial resources for augmenting water supply."* Therefore, rainwater harvesting must be a part of any building design in the landscape.

15.8.9 Waste Management

Waste management is another key component of any low impact housing design and is a hall mark of a green building. For green buildings, waste management starts from the inception of construction and how the building material waste is handled, including their transport and re-use. The building should have the management streams for handling food waste, paper and other recyclable waste such as textiles and plastics, liquid waste especially water/ gray water and solid human wastes. Composting toilets are gaining acceptance as a safe way to remove solid wastes and reduce health hazards. There are also vermi-composting toilets. There are systems under development that use solar heat using optical fibres to help digest the solid waste. Through these treatment processes, the solid waste is converted into usable fertilizer for plants. The black water (water containing feces) can be separated from the solid waste, and treated for use for irrigation purposes. However, such systems may prove costly, difficult to install and maintain. Specialized wetland also can be created near such communities where partially treated black water along with solid waste is treated for safe decomposition of the waste.

15.8.10 FAR or Building Carbon Footprint?

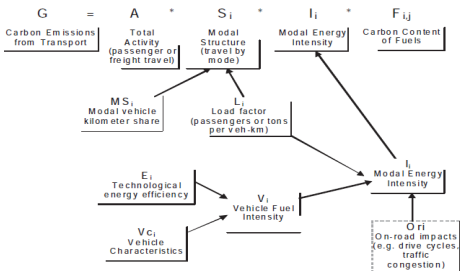
The normal way to ration built up space in an urban area is allowable Floor Area Ratio or Floor Area Index. FAR is the ratio of the total built area to the area of the plot. For example, if there is a plot of size 200 sq yards in a zone where the allowable FAR is 2, then the owner of the plot can build maximum of 3600 sq ft in construction. The urban bodies allow different FAR depending upon the zone, site or purpose of the building (such as IT buildings may be allowed double FAR). FAR controls the total constructed space. FAR is used also in conjunction with other parameters such as maximum covered area of a plot may not exceed 75% of the total area, forcing the owner to leave 25% of the area as green cover/ lawn. Often height regulations such as only 1-storey building or two storey buildings allowed. FAR controls broadly the densities of population in a given area. In residential area, a FAR of 4 may lead to population densities as high as one lakh persons (actually with 75% area to be covered, the exact number of 1200 sq ft flats would come to 25000 in a sq km area with FAR of 4). Whether the said zone or area or city or site can afford water, electricity, roads, transport, emergency evacuation, sewerage, shopping and

recreational requirement of more than 1 lakh residents or not must be examined before arriving at FAR.

However, we must consider this rather seriously that every square foot of the earth's virgin surface that is covered with concrete and tar is actually a crime against nature. A building is an act against nature. A building directly makes some proportion of the earth's surface organically sterile by covering it over, rendering that area of soil incapable of producing those natural resources that require the interaction between soil, sun and water [Cooper & Curwell, 1998]. Now let us consider the above hypothetical case of designing 25000 flats in 1 sq km of space on 75% of the area with FAR 4 and each dwelling unit of 1200 sq ft, and assume that the city has all the requisite infrastructure to host a lakh of people over that piece of land. if we were to cover all the 75% of the space, we would build 6250 flats per floor and go upto 4 floors. Else we could also use 50% of the available space and build 8 storey structures, or save 75% of the earth's surface by building 16 storey structures, so on and so forth. Where should we ideally stop? The answer to this question should be provided by calculating the carbon foot-print of the building, with a premium on land saved from concreting in the process. Lesser the ground area covered, the better it is from ecological point of view. However, vertical expansion can be a challenge from infrastructure view point such as availability of standby power, lifts beyond the 4th floor, parking and road network, transportation etc.

15.9 Green Transportation

The transport sector is one of the main polluters and contributor to carbon emissions. India ranks as the fourth largest contributor of green house gases. However, India being world's second largest population, its per capita emissions are less than half of the world average. The transportation sector is the second largest contributor of GHG emissions in India. [UNEP, 2013]. Calculating GHG emissions from transport sector is also a very complex process. Schipper et al [2000] worked out a model called AISF Model on a bottoms up approach, according to which, the total emissions from the transport sector is worked up from bottom to top as depicted in the schematic diagram below:



15.9.1 Actual Fuel Cost

Fossil fuels are the biggest polluters of the environment. The fossil fuels include coal, oil and natural gas, and their derivatives. Globally 57% of the total GHG emissions are caused by combustion of fossil fuels alone. As per USDE, the use of fossil fuels has serious ramifications for the environment. The burning of fossil fuels produces around 21.3 billion tonnes (21.3 gigatonnes) of CO₂ per year, but it is estimated that natural processes can only absorb about half of that amount, so there is a net increase of 10.65 billion tonnes of atmospheric carbon dioxide per year [one tonne of atmospheric carbon is equivalent to 44/12 or 3.67 tonnes of carbon dioxide]. The fossil fuels are of three types, namely solid fuel such as coal, liquid fuel such as petrol, diesel, kerosene and aviation fuel, and gaseous fuel such as natural gas [Boden et al, 2012]. To these three sources, gas flaring and emissions from cement are also added, making a total of 5 sources of fossil fuel based emissions. As per IPCC, 2007, the contribution to emissions from solid fuels was 39%, and liquid fuels was 37%. As already explained, burning fuel is only one part of the economic activity, the supply of free air is not accounted for. Neither are the emitted CO₂ quantities accounted for in any pricing mechanism today. Here an attempt has been made to arrive at actual environmental costs of fuel from an economic point of view (but not from the angle as to how much would it cost to remedy the situation).

Environmental Cost of Diesel Fuel:

Assuming that a 45 L cylinder of compressed air costs \$45, translating to cost of portable air a \$ 1 per litre. Assuming cost of 1 litre of diesel to be Rs.55.00, let us find the actual cost of diesel. 1 liter of diesel weighs 835 grammes. Diesel consist for 86,2% of carbon. Therefore, 720 grammes of carbon is contained per liter of diesel. In order to burn this carbon to CO₂, 1920 grammes of oxygen is needed. Therefore, the amount of CO₂ produced is $720 + 1920 = 2640$ grams per liter of diesel. Further assuming that 1 L of air weighs 1 gm (actually at STP, its 1.238 gm), 2 kg of air would be required to burn 720 gm of carbon. Therefore, the total fuel cost comes to Rs. 55+120 (2 L of air at @ \$1=Rs. 60.00), i.e. 175.00 per L of diesel. Further, since for every 12 gm of carbon, 44 gm of CO₂ is released, which is 3.67 times the fuel, we need to levy 3.66 times the cost of fuel as "Penalty", which comes to Rs.183.50. Therefore, the total cost of 1 L of diesel comes to Rs. 175+183.50= Rs. 358.50. Therefore, Rs. 358.50 is the price that every user of diesel should pay per litre of diesel. This could be the environmental cost of diesel, the price of which, otherwise, every human being shall have to pay in coming times at the cost of their lives and future progeny.

Environmental Cost of Petrol Fuel:

Assuming that 1 litre of petrol weighs 750 gm and contains 87% of carbon, we know that 1 litre of petrol contains 652 gm of carbon, which would require 1740 gm of oxygen to produce 2392 gm of CO₂. Following the arguments used for diesel price calculations, we assume the price of 1 litre of petrol to be Rs. 75.00. Further, roughly little less than 2 kg of air would be required to burn 652 gm of carbon. Therefore, the total fuel cost comes to Rs. 75+120 (2 L of air at @ \$1=Rs. 60.00), i.e. 195.00 per litre of petrol. Just as we did for diesel in the paragraph above, we need to levy 3.66 times the cost of fuel as "Penalty", which comes to Rs.183.50. Therefore, the total cost of 1 litre of petrol comes to Rs. 195+274.50= Rs. 469.50. Therefore, Rs. 469.50 is the environmental price that every user of petrol should pay per litre of the fuel.

15.9.2 Safe Walkways

The Green Party of New Zealand has announced in March, 2014 that they would invest \$200 million to build infrastructure in next 3-4 years around the schools. The Vancouver city has drawn up an ambitious programme of green transport by 2020 including "Open Street" program under which initiated in four different neighbourhoods with Summer Spaces- closed streets to cars and opened up the asphalt to a whole range of activities including badminton, salsa dancing, street hockey, art lessons, choirs, food carts, lounging on couches, and much more...." Salt Lake City's Green Transportation Plan 2015 provides for walkways for public, school children and neighbourhood walkways to commercial and market places by promoting "Walkable neighbourhood" program and "Safe Route To School" programmes. They also provide walking resources, information and maps for all.

However, the road planning in India does not seem to take into account safe walking. The roads are mainly meant for connectivity. The Pradhan Mantri Gram Sadak Yojana (PMGSY) was launched on 25th December, 2000 to provide all-weather access to unconnected habitations. The PMGSY is a 100% Centrally Sponsored Scheme. The funding comes from the Govt of India, and 50% of the Cess on High Speed Diesel (HSD) is earmarked for this programme. The recommended road width is 7.50 m in plains and 6.00 m in hill sections. The carriageway is 3.75 m, and there is a shoulder of 1.875 m on either side. Therefore, it is clear that the PMGSY roads are not meant for pedestrians. To make them pedestrian friendly, especially in the Kaziranga landscape, the following are suggested:

1. All roads including PMGSY roads should have pedestrian foot paths within the Kaziranga landscape.
2. Since as per the IRC:103-2012 guidelines of the Indian Road Congress (IRC), the width of a footpath cannot be less than 1.8 m, therefore, an additional 1.8 m pitched with should be added on either side of the carriage way. This would make the road profile as below:
 1. Carriageway width 5.500 m
 2. Footpath on either side 1.800 m
 3. Earthen Shoulder (either side) 1.000 m
 4. Total width of road 11.100 m
3. Within Jakhlabandha to Bokakhat, the NH37 should be padded with 2.5 m on either side for pedestrian and bike traffic.
4. Within Jakhlabandha to Bokakhat, the fly overs on the NH37 should have adequate provision for on either side for pedestrian and bike traffic, which should be at least 2.5 m on either side.
5. Certain areas in Kohora and Bagori should be developed only for pedestrians and cyclists with exclusive right of way.
6. All the roads within the Kaziranga landscape should have adequate pedestrian infrastructure such as shade trees on the sides, bench with shades, zebra markings, bollards, Π shaped bollards, signages and blinking lights etc.
7. The infrastructure should be disabled friendly.
8. The norms of PMGSY may be revised accordingly for Kaziranga landscape.

15.9.3 Safe Cycling

Cycling is being promoted in a big way in major cities of the world, and efforts are on by most of the Governments in the west to chalk out ways in which the numbers of people

cycling could be increased or ways in which better infrastructure and more road space could be provided to the cyclists. Copenhagen, for example, has come with a bouquet of measures to promote cycling. Copenhagen's Bicycle Strategy, 2011-2025, which replaced the earlier Cycle Policy 2002-2012, states, "...In other words, cycling is not a goal in itself but rather a highly-prioritised political tool for creating a more liveable city. Copenhagen is already a fine bicycle city. Every single morning hundreds of thousands of Copenhageners choose the bicycle as the most natural thing in the world. It is amazing to many foreigners and the source of great interest for journalists, researchers, politicians and urban planners from every corner of the world." Copenhagen has already 1,50,000 cyclists going to office or school everyday. The City Mayor wants to increase the current modal share of bicycles from 36% to 50% by 2015, which means encouraging another 55,000 citizens to cycle. Some of the strategies being adopted by the authorities are:

1. Making certain streets one way for cars in order to create improved space for better cycling conditions
2. Adding new types of bikes parking – including cargo bikes
3. Create infrastructure like footrests, air pumps along the road
4. Communication campaigns
5. Use of LED Lane lights for cyclists

The city is currently running an Intelligent Traffic System (ITS) including installation of LED lights in asphalt to have a better lane management for bikers.

In contrast are the Indian roads, which are neither meant for pedestrians or bikers – they are designed only for polluting vehicles and speeding traffic to heighten noise pollution and chaos.

15.9.4 Public Transport

Public transport covers passenger and freight movement. About 85% emissions in the transportation sector are from the surface transport alone. Investment in the public transport sector holds the key to cut down emissions. As emissions are directly proportional to the passenger-km traveled, public transport directly cuts down emissions by reducing passenger-km travel. It is estimated that public transport can cut down 37 million metric tons of emissions alone in USA. According to the American Public Transportation Association (APTA), "A single person, commuting alone by car, who switches a 20-mile round trip commute to existing public transportation, can reduce his or her annual CO₂ emissions by 4,800 pounds per year, equal to a 10% reduction in all greenhouse gases produced by a typical two-adult, two-car household. By eliminating one car and taking public transportation instead of driving, a savings of up to 30% of carbon dioxide emissions can be realized." Surface transportation emissions can be cut down to zero or near zero emissions by deploying technologies such as Electric Vehicles. Several Governments across the world are in the process of promoting Electric Vehicles to achieve zero emissions in transportation of passengers and goods.

The UK Government runs a Plug-In Van Grant of £8,000. And in Scotland, the Energy Saving Trust offers interest-free loans of up to £50,000 to purchase Edison vehicles. Companies purchasing commercial EVs can write down 100% of the capital cost against tax in the first year of ownership. Electric commercial vehicles are exempt from the annual Road Fund License Tax and van drivers are also exempt from Van Benefit Charge for the first five years of ownership. All EV registered vehicles, such as Smith, are exempt from

the London Congestion Charge, apart from a small annual registration fee. In Germany, EVs are exempt from annual vehicle registration tax for the first 5 years of ownership. The Federal government has pledged €1 billion for R&D projects, including funds to procure fleets of commercial EVs for demonstration projects. Singapore has embarked upon a scheme to procure EVs worth \$20 million. We need to look at zero emission options for the Kaziranga landscape. However, its would not be cheap going by the normal economic calculations. In the three paragraphs that follow EV options for goods, passenger and private transport has been briefly discussed.

15.9.5 Electric Truck

Goods transportation happens over long ranges with heavy transportation vehicles and in short ranges with light and medium transport vehicles in what is called the distribution trucks. Freight transport contributes significantly to GHG emissions. In USA, 95% of all heavy duty trucks are diesel powered. Beginning in 2007, all heavy duty diesel trucks sold had to meet particulate emissions levels of no more than 0.01 grams per brake horsepower hour (g/HP-hr)—a level near zero. Since 2007, US has been able to achieve till 2013, 33.5% induction levels of the new trucks which have near zero emission levels [mhlnews.com, 214]. The International Council on Clean Transportation (ICCT) commissioned CE Delft and DLR to carry out a study, which aims to investigate the potential of battery electric and fuel cell heavy - duty vehicles [Delft, 2013]. The Electric Vehicle solution driven by the concept of recharging batteries at short distances has been found to work very well for distribution trucks. Not only that the emissions are cut down to zero, but also overall efficiency doubles. Distribution trucks upto 9 MT are found to be very efficient for EV technology adoption. A 9 MT EV truck may cost somewhere around \$75000. Currently more than 1000 EV trucks are in operation as distribution trucks worldwide. In next five years the battery technologies would improve further and costs would also go down, making EV trucks a very viable option. However, in respect of long haul heavy duty trucks, the scenario does not look very bright. The on-the-road-charging infrastructure would be required to be maintained at smaller distances which makes the proposition unviable to operate. However, the newer technologies that may emerge at the end of a decade or so, would definitely bridge the gaps. It is expected that new researches in Lithium-air batteries and other ultra capacitive technologies, the zero emissions on the long haul may be achieved. Catenary wire based energy systems also would require dedicated corridors to be set up, which do not look very promising in the long haul sector.

15.9.6 Electric Bus

Trams can be technically termed as the earliest electric buses developed way back in 1915. However, technology has taken a full turn, and today electric buses with power supply lines on the top are running. Power lines could also be embedded within the surface of the road. The most interesting innovations are seem to be happening for ultra high capacity capacitors. Capacitors can hold high amount of charge for a short period. This property has been used to make Capabus which have an array of capacitors which need to be charged at short distances. This is ideal for public buses which stop after every few minutes. The current capabuses can run on a single charge upto 4.8 km. The design for higher distance, upto 32 km, is already on trial. The bus stand can be solar powered to transfer charge to the capacitors within a few minutes. As reported by <http://www.engineering.com>, a Proterra EV bus clocked 700 miles in 24 hours with a few charging stations in between. On 27th February, 2014, India's first EV bus was launched in

Bengaluru. The upfront cost of the bus was Rs. 2.70 crore against Rs. 90.00 being the cost of an AC Volvo. The swanky AC bus has capacity of 41 passengers, and runs at half the operational cost of the Volvo. The bus fair has been kept similar to that of the Volvo buses. Proterra claims \$456,000 in savings over a diesel bus of similar capacity. This translates to Rs. 2.73 crore in Indian currency, making the total cost of ownership much less than a conventional Volvo bus.



15.9.7 Electric Vehicles

Since 2010, Electric Vehicles (EV) have come of age, and are increasingly being used in private and public transport modes. All electric range (AER) has gone beyond 100 km, meaning one can drive a 100% EV vehicle for more than 100 km at a stretch without requiring to re-charge the batteries. The speeds have gone up from 30 Kmph to more than 100 Kmph. Models available are from golf cars to personal driving cars, buses, SUVs and ATVs. The two top ranking models are: one by Mitsubishi iMiEV and one by Honda.



Mitsubishi iMiEV



Honda Fit EV

The reviews of EV cars are very encouraging. Here is one review of iMiEV from *TheChargingPoint.com*'s Michael Boxwell who took out a Mitsubishi i-MiEV, with an official claimed range of up to 92 miles, to get some real-world figures: "I drove the Mitsubishi at the legal limit during a Thursday evening rush hour on the M45 and M1 motorways. Traffic

was busy, but congestion was low, allowing me to cruise at the legal limit for most of the time. Headlights were used for the entire trip and the radio and heated driver's seat were used for part of the journey. Average speed for the entire trip was 63mph [101 Km/h] with the car cruising at 70mph [112 Km/h] for the majority of the journey. Range achieved: 53.7 miles [86.42 Km]". As per the official website of Honda, the Honda Fit costs \$37,415 (2014), and has a AER of 82 to 115 Miles depending upon the road conditions. It can be fully charged within 3 hours to 15 hours depending upon the charging modalities. It can accommodate 5 passengers.

Environmental Economics of an EV:

Assuming that given the Indian road conditions, a car may not be able to give an average mileage of more than 12 km per litre, and may run upto 250000 km during its life time, and assuming a price of diesel to be Rs. 50 per litre, it is seen that the fuel cost of a vehicle during its life time comes to Rs. 10,41,600.00 at current fuel prices. The cost of the vehicles such as a Bolero (Mahindra) would be Rs.8.00 lakh. Therefore, the life cycle cost of the vehicle comes to Rs. 18,41,600.00. This would be roughly the cost of Honda Fit (if imports are made free for sake of clean environment). If we look at the environmental cost, the fuel charges alone would be Rs. 358.50 per litre as calculated earlier in the section above. Therefore, the environmental running cost of the Bolero vehicle would be Rs. 74,68,750.00, and the life cycle cost would be Rs. 82,68,750.00. During its run of 250,000 Km, the Bolero would generate CO₂ emissions of 55 tons. On the other hand, the EV cost shall be only \$37,415 for its life time (excluding repairs), and the emissions would be confined to amount of electricity used for charging of the car. That also can be made zero by using a 9.5 kW Solar PV panel for charging the car. Therefore, environmentally, the Honda Fit EV is 3.68 times cheaper than Mahindra Bolero (at \$1=Rs.60) in an environmental life cycle assessment.

Developing EV Infrastructure:

However, the Indian road conditions may prove to be a major challenge for the EV, by heavily eating into the rated AER with numerous rumble strips, speed breakers, live speed breakers (cattle, poultry and piggery on the road), pot holes and mud (during rainy season). Nevertheless, we need to develop adequate infrastructure for EV such as charging stations at regular intervals on the highways, charging stations at major public places, parking lots, hotels and residential apartments. The bus stands could be converted into charging stations with solar and wind power. There would also be requirement of repair and maintenance workshops.

Developing EV Promotion Policy:

Given the current costs of EV trucks, buses and vehicles, an effective promotion policy is required to be chalked out for achieving zero emissions in the transportation sector. Though the zero emission technologies are very well suited for Kaziranga landscape, a comprehensive plan of inducting EV fleet in the Kaziranga Tiger Reserve, as well as jeep Safari and general public passenger and freight transport within the landscape would have to be developed. A Green Road Tax may also be introduced for the visitors to Kaziranga to create funds for the cause of zero emission vehicles and associated infrastructure building and maintenance. Sketches of a policy outline have been attempted in the next chapter for this purpose.

15.9.8 Transit Oriented Development (ToD)

Kaziranga landscape is very well suited for a transit oriented development (TOD). Though Kaziranga does not have any mass rapid transport or rail transport, the tourism hubs of Kohora, Bagori, Agoratoli/ Bokakhat and Burapahar can be redesigned and modeled in such a fashion that they become the transit points for all tourists and passengers to avail public transport, commercial and market places, and also hotels and lodges. For this certain amount of zoning and relocation of some old establishments, opening of new "car free" pathways may be required. It would also require provision for paid/free zero emission shuttle services between different tourists points and transit locations. These could be operated by private operators on payment basis or by hotel owners for their guests on payment/ complementary basis.

15.9.9 Better Roads

The roads can be "green" too. The smallest interventions could be creating beautiful avenue plantations along the road, providing solar powered LED lane markers and signages, providing adequate space to pedestrians and cycles in a planned manner, widening the roads to provide more space for them (pedestrians and cycles), providing over-passes and fly-overs for wildlife to have spacious under-passes and well designed corridors, asphalt overlay LED signs controlled by sensors and similar such possibilities. The other extreme of technologies emerging are astounding and, if proved successful, may have great potential for future energy production and transform the roads altogether. One such pilot experiment has been initiated by US Highway Federal Administration involving replacing the asphalt with hexagonal thick glass covered solar panels and LEDs. An array of these panels have been used to build a parking lot as a proof of concept. Compared to \$1.00 cost of asphalt, the new technology may cost \$70.00 per sq ft, besides issues of management, maintenance and durability.



Solar Roadway Parking Lot



The Future Solar Roadway

15.10 People's Framework

The southern boundary of the Park is inhabited by about 150 villages. The livelihood of the people of these villages are mainly of agriculture based and to some extent tea plantation activities and rearing cattle. The socio-economic conditions of the majority of villages mainly inhabited by tribal and backward communities are very poor. As the existing wildlife

laws do not allow traditional access to forest based resources in the Park/ Tiger Reserve, people have to explore other areas for some activities like cattle grazing, collection of fuel wood, fishing etc. Besides, the wild animals come out of the Park/ Tiger Reserve and cause significant damage to life and property of the people resulting in man-animal conflict. Therefore to uplift the socio-economic condition of the people of the fringe villages and to maintain a good relations between the Park management and the villagers, a people friendly framework has been proposed here.

OBJECTIVES:

- To create a congenial relation between the Park management and the people, which will act as an effective barrier against attempt of poachers and miscreants.
- To improve capacity of Protected Area management to conserve resources of the Park and to achieve local co-operation in achieving Park management objectives.
- To develop effective and extensive support for eco-development.

SPECIFIC ISSUES:

- Alternative livelihood strategies.
- Improvement of living condition.
- Mitigating negative impact arising out of man animal conflict.
- Community development work.
- Non consumptive use of Protected Area through eco-tourism.
- Reduce dependence of villagers on forest resources.
- Introduce low impact housing, net zero buildings, off-the-grid housing technologies

BROAD STRATEGIES:

- Conduct participatory micro-planning and provide implementation support for
- Eco-development
- Green development
- Green growth
- Eco- Tourism
- Provide assistance for village Eco-development program which specify measurable action by villagers to strengthen conservation effort of the Park management.
- Implementation of Eco-development activities which will encourage alternative livelihood and resource use, conservation and protection of the Protected Area.
- 30% share from the income of the Tiger Reserve for eco-development.

15.10.1 Millennium Development Goals (MDG)

The United Nations (UN) Millennium Declaration was adopted at the Millennium Summit held at the UN HQ at New York City from 6th to 8th September, 2000, in which nations committed to a new global partnership to reduce extreme poverty and set up a series of time bound targets with a dead line of 2015. These are known as Millennium Development Goals (MDG). There are eight goals, 18 targets, complemented by 48 technical indicators to measure progress towards the MDGs. The eight MDGs are:

1. Eradicate extreme poverty and hunger
2. Goal to achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality

5. Improve maternal health
6. Combat HIV/ AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership for development

The Kaziranga Green Growth Framework envisages to incorporate the MDGs for implementation in the landscape.

15.10.2 Building Green and Resilient Communities

The communities around the Kaziranga Tiger Reserve are prone to several calamities and disasters such as floods, erosion, (drought), disease (heightened by lack of adequate amenities), attack from wild animals such as rhino, tiger, elephant, buffalo, wild boar etc., loss of cattle and life, damage of crops, possible ill effects of flowering of various trees such as Simul, and spread of pollens and seed dispersal which may lead allergy and sickness of poultry, cattle and humans, flying ashes from large scale burning of grasses, and vulnerability arising out of lack of adequate means of livelihood and regular income, limited seasonal income from tourism for the few stake-holders, restrictions on construction, use of fertilizers, ban on change of land use etc. to mention a few. To this we need to add vulnerabilities arising out of climate change such as flash floods, drought spells, excessive heat, change in cropping pattern, loss of productivity, loss of bio-diversity, eruption new diseases etc. Some of these are natural and arising out of geographical conditions which cannot be wished away, few others are a natural fall out of staying close to a National Park/ Tiger Reserve, while the rest arise out of the conservation strategies and cannot be wished away so easily. While migration is the only option to escape from these disasters and vulnerabilities, yet this could be only voluntary.

Risk has been defined as a product of Hazard and Vulnerability [Blaikie et al, 2004]. Vulnerabilities could be of four types namely:

1. Physical
2. Social
3. Economic (and Business)
4. Environmental

$$R = H \times V$$

Resilient communities reduce their risks and vulnerabilities towards physical and socio-economic changes and are able to bounce back to normal conditions in a short span of time. This is possible when the communities are well built, make efficient use of natural resources, have a strong socio-economic base, wise use and law abiding. Increase in the frequency of natural hazards coupled with rise in population threatens the resilience capacity of communities making them vulnerable to climate variations/ Climate change impacts. This loss of resilience may be restored through a meticulous planning and preparedness incorporating low carbon growth strategies. The low carbon strategies have already been explained in some detail in the early part of this chapter. Some of strategies and measures that are likely to bring resilience in the local communities are suggested below:

1. Sustainable Livelihood Framework (SLF)
2. Social and financial inclusion

3. Alternative livelihoods
4. Gender mainstreaming and women's empowerment
5. Man animal interface management
6. Capacity building and IEC
7. People's participation and planning

15.10.3 Sustainable Livelihood Framework

Livelihood interventions for bringing people out of poverty has been the endeavour of national and international agencies. While many such interventions have been successful, it has been observed that sustainability of such interventions remains an issue. It has been observed that communities relapse into their previous state over a period of time once the interventions are withdrawn. Thus the objective of self reliance set up by all the developmental programmes is rarely achieved. This happens because the focus is mostly on developmental issues while ignoring or giving less weightage to risks and vulnerabilities while planning for development projects. To overcome this barrier it is proposed to adopt the Sustainable Livelihood Framework (SLF). The SLF was developed by DFID and CARE based on field experiments. It is a flexible framework which can be modified and adopted based on local conditions and needs.

Livelihood Assets:

The core components of the SLF are the five livelihood assets represented through a livelihood pentagon. These are:

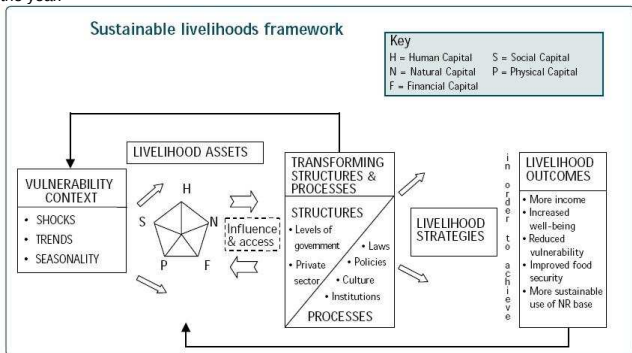
1. Natural Capital
2. Physical Capital (Built capital/ man made capital)
3. Human Capital
4. Financial Capital
5. Social Capital

The natural capital includes all natural resources such as land, water, forests, wildlife, biodiversity etc. The physical capital implies all the man made structures and infrastructure such as houses, boats, roads, bridges etc. Human capital implies all human resource, their knowledge, skills, capabilities, education, health & nutrition, attitudes etc. Banks, insurance sector, credit and loaning systems, SHGs etc. fall in the financial capital. The social capital includes social networks, customary laws, traditional practices, local institutions such as youth clubs, namghar, mahila samitis, maina parijat, sports clubs etc. which are informal institutions that help bind the society together. The ideal condition for livelihoods to be sustainable is that all the five capitals should be in balance in a given unit of development such as a village. Normally it is observed that such an ideal condition rarely exists. Thus, the crux of the successful livelihood intervention lies in the ability to diagnose the gap in the five capitals and take up measures to overcome the imbalances, and try to see that the pentagon is close to balance.

Vulnerability Context:

For sustainability of livelihoods, it is important to overlay the existing vulnerabilities that tend to throw a balanced livelihood pentagon into an imbalance. These vulnerabilities include shocks, trends and seasonality. Shocks include loss of crop due to flooding, pest attack, epidemics in the community, change in technology etc. Trends such as fluctuating

market prices, rise and fall in demand or supply affect livelihoods as externalities that may adversely impact income. Seasonality is another important factor on which livelihoods depend. Seasonality restricts certain income generating activities over different times of the year.



Transforming Structures, Processes and Policies:

The sustainability of livelihoods also gets impacted by the dynamic governance structures, policies, laws and processes. Processes also include culture and institutions (formal and informal). These changes may cause conflicts, generate new threats, or even provide new opportunities. The community should have enough internal capacity and resilience to cope with such unforeseen changes.

Livelihood Strategies and Outcomes:

The livelihood strategies need to be developed and designed keeping in mind the livelihood assets, the vulnerability context, transforming structures and process to ensure positive livelihood outcomes that provide:

1. Higher income
2. Reduce vulnerability
3. Enhance resilience
4. Provide self reliance

15.10.4 Social and Financial Inclusion

The communities living near the protected areas network often are disadvantaged due to inherent remoteness from large cities and towns, financial hubs and markets. The physical connectivity such as rail, roads and airways often are poor or non existent. The modern means of communication also do not fully touch these areas. The vulnerabilities of the communities are also higher compared to another community in another place similarly situated minus the protected area. It has also been observed that the communities in such remote areas are deprived of banking and credit facilities. It would be no surprise if people

would be found practicing barter or dependent on money lenders for credit. Most of the population is composed of either marginal farmers or daily wage earners.

The communities need to be covered with adequate social and financial security so that they may be able to bounce back to normalcy in event of a disaster such as floods, drought or in event of life threatening disease, or even attack and depredation by wild animals which could lead to serious consequences of crop damage, loss of life or loss of property. However, the issue remains that since the communities are not banking and there is no social security, their vulnerabilities are high. In order to provide financial and social inclusion the following strategies are suggested:

1. Crop Insurance
2. Cattle Insurance
3. Life Insurance
4. Property Insurance
5. Health Insurance
6. Unconditional Basic Income (UIB) Model

However, it is to be noted that financial and insurance companies are not very keen on providing services in such remote areas, and the cost of their services are higher. The Govt. has also launched several schemes such as Rashtriya Bima Surakhs Yojana (RSBY) which could be leveraged for benefit of the communities.

For the UIB model, the following is proposed:

1. The authority would create a corpus fund for the UIB.
2. The minimum corpus would be Rs. 200.00 crore
3. The UIB would be based on the concept of family as a beneficiary unit.
4. The beneficiaries of the scheme would be each of the families staying in the vicinity of the Kaziranga Tiger Reserve and they have agreed to form an EDC
5. The employees of the Kaziranga Tiger Reserve shall also be the beneficiaries of the scheme
6. Each beneficiary would get a membership card.
7. Fund would be raised from various sources including donations, charity contributions and celebrity contributions, CSR
8. Contributions to the corpus would be exempt from Income Tax.
9. Each beneficiary shall be registered, and the membership list along with certain family details would be available in public domain.
10. All donations to the corpus would be made public.
11. Each beneficiary shall maintain an exclusive bank account and shall be offered a higher rate of life insurance and medical insurance cover
12. The interest earnings of the corpus in a given year shall be divided by the number of beneficiaries equally, and the amount shall transparently be passed to the account of the beneficiary where again the fund would automatically get deposited in a wealth multiplier growth fund.
13. Any member of a beneficiary found to indulge in forestry/ wildlife crime or assisting poachers and criminals shall be barred from future memberships of the corpus fund and no benefit oriented scheme shall be made available to that family.
14. The fund partner bank shall be chosen based on transparent bidding process

15.10.5 Alternate Livelihoods

In order to enhance the family income of the communities, it is important to provide alternative livelihoods. The alternative livelihoods would help supplement the existing income from conventional agriculture and also would help reduce their dependence on natural resources. Alternative livelihoods would include:

1. Handicrafts
 1. Cane
 2. Bamboo
 3. Wood Craft
 4. Pottery
2. Weaving and tailoring units
3. Food Processing and Pickle making units
4. Agriculture and allied services:
 1. Organic farming
 2. Horticulture
 3. Floriculture
 4. Spices
 5. Bee keeping
 6. Aqua culture
5. IT based skills
 1. Mobile repair
 2. Computer and DTP
 3. Electronics equipment repair
 4. IT kiosk services
 5. Computer graphics and animation
 6. Computer Programming
 7. Hardware repairs
6. Service sector skills
 1. Security services
 2. Para medics
 3. Hospitality services
 4. BPO services
7. Special skills training
 1. Mason training
 2. Carpentry
 3. Electrical repair
 4. Driver
 5. Automobile repair
8. Soft skill training
9. Foreign languages training
10. Tourism sector skills

The alternative livelihood interventions would include linkages such as:

1. value addition and certification
2. Storage, packaging and processing
3. Branding and market linkages
4. e-Commerce
5. Cluster formation, Guilds, SHGs

6. Capital and credit availability
7. Job Melas
8. Organizing fests and melas

Attempt would be made to integrate existing schemes of NRLM, National Skills Development Council, Ministry of Small and Medium Enterprises (MSME) and the Govt. of Assam schemes of the Employment Generation Mission. Private sector participation in imparting training, NVQF/ NVEQF certification, in-house/ on the job training, industry exposure and internship and job placement would be sought. The initiative would also require S&T interventions at various stages of implementation.

15.10.6 Gender Mainstreaming and Women's Empowerment

Sustainable development calls for reduction of the gender gap in society and to bring in gender equality. Efforts and programmes in the villages to improve both the position and condition of women and to fulfill their practical as well as strategic needs should be taken up. Better health facilities for women and children, making available lady doctors/ visiting doctors/ ANMs, better education and awareness programmes for women by improving the educational infrastructure and accessibility. Skilled training programmes for women to help enhance their income, providing credit, financial inclusion, banking, savings and loan facilities and other women oriented incentives and schemes of the welfare departments should be taken up expeditiously for implementation. Strengthening of mahila samitis, creation of resource centres for imparting specialized training in computers and other skills such as tailoring, knitting, soap making, handi crafts etc which would help in enhancing their income and leading to women's empowerment.

15.11 Man Animal Interface Management

One of the biggest challenges that communities on the fringe of protected areas network have to face is the constant threat of attack / surprise encounter from wild animals. The communities find it very difficult to cope with such vulnerabilities, especially when much promised assistance from the government agencies and the Tiger Reserve authorities does not reach even several months after the family has suffered the irreparable losses. The existing systems and processes leave a lot to be desired, and help only in generating ill feeling towards the wildlife on one hand and the wildlife managers on the other. Intervention of media can worsen the situation sometimes beyond repair, and tilt the balance against the Park managers. In the stake holders meetings, this single issue has been discussed very often. The civil administration of Bokakhat has also suggested that the existing processes of compensation are very lengthy and cause unnecessary delays. Currently, in Kaziranga, immediate assistance to affected families is being provided by part assistance from the WWF.

The following suggestions are put forth in this regard:

1. The long term growth strategies in the landscape should be animal friendly for which planning is required to be done from the very beginning.
2. All the stakeholder villages could be pre-registered with the Tiger Reserve authorities and should be uniquely identifiable subsequently.
3. A help line should be made operational for the affected/ or threatened families to be able to call for help

4. The first attempt should be to avert any damage, for which the public also needs to be educated to display appropriate behaviour
5. In case of a depredation by wild animal, the assessment team (comprising of Tiger Reserve authorities, NGOs such as WWF, one Executive Magistrate) should visit the site and take snaps using still and video camera, and record the coordinates of the locations/ damage sites using GPS
6. The local Gaon Burah/ GP President / EDC President should certify the damage on the spot.
7. A ready made template of damage should be prepared with damages quantified in slabs, which should be printed on a sheet of paper, and can be filled up easily in the field.
8. Once the assessment is done (which should not be more than 24 hours in normal cases and 48 hours in case there are hurdles in communication or other emergencies), 80% of compensation fund should be transferred by the DFO (or any authorized person on his behalf) in next 24 hours.
9. A Third Party Assessment of the efficacy of the system and satisfaction level of the people should be carried out annually.

15.12 People's Participation Framework

The decision making process in the landscape would affect the communities residing therein. The landscape approach has been adopted for the long term conservation and protection of the rhinoceros in a world which is moving very fast towards unsustainable development and lopsided economic growth which generates waste and is heading towards throwing the natural balance of the ecosystems out of order. The landscape approach has the flexibility of accommodating the needs of various stakeholders, the elements of nature and wildlife and conservation requirements. However, a commonality of purpose and sense of togetherness must be achieved so that every stakeholder can understand the issues, circumstances and requirements of the other stakeholders. Some of the decisions taken in the landscape scenario may affect some or the other stakeholder adversely. In such a situation, it is important for every one to understand whether the adversely affected stakeholders has been adequately compensated for within the available means and processes. The key object in developing a people's participation framework is that there are host of issues such as livelihoods, climate change, low carbon technologies, man animal interface and the restrictions on run of the mill development and economic growth as fall out of being next to Kaziranga, which need to be resolved by a broad consensus of all concerned keeping the interest of development and conservation side by side. Such a decision making is bound to lead to conflict situations between opposing interests. An appropriate framework alone can provide the strength to be together in complex landscape like Kaziranga.

15.12.1 People's Participation Models

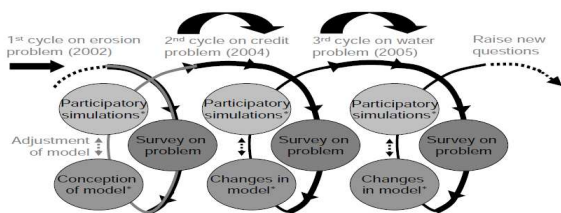
Several models of people's participation have been put forth and often quoted, noted among them being the Periyar model, Poacher Turned Protector model, Zimbabwe model, Chitwan model of eco-development. However, the situation around Kaziranga is not so simple that any model lifted from anywhere in the world can be applied here with or without modification. Most of the Indian models can straight way be rejected on simple grounds that these do not belong to rhino bearing areas, and hence have little consequence to us. The reason being that today the stakes involved in rhino poaching are so high that these

models would not be able to provide that kind of motivation. The Zimbabwe model and along with it most of the African country models would not work in India, just because the African models are based mostly on wildlife trade and hunting, both of which are banned in India. The concept of "Use it or lose it" does not work in case of wildlife in India. The Chitwan model which is based on community development and community involvement is a good model to emulate, but beyond that there are no similarities. The population around Kaziranga is multi ethnic, multi lingual and mixed. Each of the communities have different cultural values, aspirations, food habits and social institutions. The communities are also multi religious. Moreover, the anguish of the people towards the Forest Department is historical in nature and embedded in local nuances and perceptions of what is right and what is wrong. The Department shall have to walk extra miles to come any where closer to the people. The trust of the people can be won back only in course of time depending upon the sincerity and clarity of purpose and transparency shown in decision making.

15.12.2 Companion Modeling Approach

The Companion Modeling approach was developed after a series of field based experiments which led to the first draft in 2001 by a team of scientists at CIRAD. The model was revised in April, 2004. In this approach, first a model of a real world situation is conceptualized (it really does not matter how good or bad the model is), and then the model is put forth before the stakeholders for discussion and feedback. The feedback is used to refine the model further, and then the revised model is again subjected to the same process. It is a multi stakeholder modeling approach based on repetitive back and forth steps between the model and the field situation. The companion modeling approach is well suited for complexity and openness of systems because:

1. It considers as legitimate and takes into account view points which might be seen as contradictory
2. It organizes the compulsory questioning of any new element introduced into the approach
3. During each loop it confronts new external elements.



The companion modeling approach is very well suited for decision making in the Kaziranga landscape, as there are various stakeholders with conflicting interests, competing for the same resources, and commonality must be achieved at the end in the larger interest of long term protection of rhino.

15.12.4 Capacity Building and IEC

Capacity building entails enhancing people's abilities to understand, analyze and develop their capabilities towards handling different situations that arise while undertaking development activities. Orientation, awareness, training and skill development are some of the methods used to build the capacity of communities to be able to plan and implement development activities at the local level. For orientation and awareness, there is a requirement for developing IEC (Information, Education and Communication) materials such as posters, brochures, handbooks, pocket guides, audio visuals. A proper dissemination strategy for creating awareness needs to be chalked out. Some of the effective dissemination strategies in rural areas have been:

1. Street plays
2. Local theatre
3. Folk songs
4. Folk dances
5. Display at melas and market places
6. Demonstration in schools
7. Dhulias

It is important to identify the stakeholders and target groups first. Based on the target groups, different training modules need to be developed. These modules could be developed for the youth, women, school children, farmers, front line staff etc. Different areas that would require development of training modules and IEC materials are:

1. Livelihood and skill development
2. Preparation of micro plans
3. PRA methods
4. Developing and translating IEC materials
5. Use of technology and equipment
6. Science and technology interventions
7. New technology/ green technology interventions
8. Participatory Monitoring and Evaluation
9. Social Audit
10. Project planning and implementation

CHAPTER 16

16 Policy, Law, Protocols and Programme Strategies

This Chapter covers certain overarching policy, legal, protocol and programme strategies covering the various aspects of rhino habitat, anti poaching activities, implementation of Wildlife (Protection) Act, 1972. The various existing provisions of policy and law have been already discussed along with certain provisions from the rhino bearing countries in the world. Based on the discussions in the stakeholders meetings, and the material presented in Chapter 5, the policy level interventions have been suggested in this Chapter.

16.1 Proposed State Amendment to the Wildlife (Protection) Act, 1972

The Government of Assam has made laudable efforts in amending the Wildlife (Protection) Act, 1972, vide Notification no. LGL.107/2008/33 Dt. 19th October, 2010 through the Wildlife (Protection) (Assam Amendment) Act, 2009. This amendment is in respect of section 51 which lays down punishment under the various proviso of the Act. However, after several round of stakeholder meeting it was felt that fast track courts should be introduced. The experiment of the Nepal Government was also examined wherein magisterial powers have been awarded to the "Chief Warden" [equivalent of the Field Director] and territorial DFOs. Having carefully studied various aspects of the Wildlife (Protection) Act, 1972, the following premises are being put forth for two key new amendments in the Act. These amendments could be again State amendments applicable within the State of Assam.

Since 1982 till date more than 640 rhinos have been lost to the poachers. Poaching is no more a localized phenomenon in a world now well connected with communication networks, mobile and Internet. The perpetrators of the rhino poaching crime have been constantly innovating and changing their strategies compared to the rather slow process of change and adoption in the Government. The poachers took full advantage of all the loop holes and the democratic process of natural justice and slow and almost non existent conviction. Due to high international demand, they have been not only able to amass great ill gotten wealth, but also got the necessary fuel to keep their illegal industry alive with new recruits. Today the situation has reached a level that the poachers gang seemed to be getting immune to legal action, as they are able to fill the gaps created by arrests and killings of gang members, faster with new recruits. These can be stopped by adopting a two pronged strategy of keeping as many poachers as possible under arrest for as long a time as possible; and secondly by starting to investigate and confiscate the ill gotten properties. These would surely hit the poachers hard and give a very strong message in the society to keep away from rhino poaching.

In order to give shape to this two pronged strategy, amendments are proposed by way of inserting a new section 54A after section 54 under Chapter VI "Prevention and Detection of offences" of the Wildlife (Protection) Act, 1972 by conferring powers to pass sentences in certain cases to the officers not below the rank of Chief Conservator of Forests. Secondly, amendment of section 58A is proposed to include "persons suspected" to have gotten property derived from illegal hunting and trade. It is expected that these amendments shall greatly impact the current poaching scenario in the State, as the threat perception against action under law is currently very low, which would shoot up greatly once the new provisions come in force.

16.1.1 Proposed Amendment under Chapter VI

The following are the proposed amendments under Chapter VI of the Wildlife (Protection) Act, 1972:

1. A new section namely section 54A shall be inserted below section 54 as proposed below:

"54A. Power to Pass Sentences in Certain Offences- (1) The State Government may, by notification, appoint Adjudicating Officers not below the rank of a Chief Conservator of Forests to hear and dispose complaint cases of offences against this Act where the offence committed is in relation to any animal specified in Schedule I or Part II of Schedule II where the offence relates to hunting in or outside the boundary of a sanctuary or a National Park or altering the boundaries of a sanctuary or a National Park:

Provided that any punishment awarded by the Adjudicating Officers shall not exceed imprisonment for a term more than seven years or with fine which shall not be less than fifty thousand rupees, but may not exceed more than five lakh rupees or with both;

Provided further that in the case of a second or subsequent offence of the nature mentioned in this sub section, the term of imprisonment shall not be more than fourteen years and also with fine which shall not be less than seventy five thousand rupees.

(2) The State Government shall appoint at least one Adjudicating Officer for each of the zones namely Upper Assam, Northern Assam, Central Assam, Hills Areas, Barak Valley and Lower Assam specifying their headquarters and jurisdiction depending upon the origin of offence pertaining to the sanctuaries and National Parks.

(3) The Adjudicating Officers shall have the powers of the court with original jurisdiction and shall follow the same procedure as the Court of Sessions.

(4) An appeal may be filed before the High Court having jurisdiction over the place of origin of the offence within thirty days of issue of order of the Adjudicating Officer.

2. In section 51B(3), the following words shall be inserted at the end "or by an Adjudicating Officer"

16.1.2 Proposed Amendment under Chapter VIA

The following are the proposed amendments under Chapter VIA of the Wildlife (Protection) Act, 1972:

1. Under section 58A, sub section (d) to be inserted which shall read "any person who is suspected to be or believed to be involved in or has committed an offence against this Act; and against whom any of the officers referred to in section 50(1) in writing having informed the competent authority";

2. Under section 58A, sub section (e) to be inserted which shall read "any person holding or believed to be holding property derived from illegal hunting and trade in wild animals and or wildlife in contravention of the provisions of this Act";
3. Under section 58A, sub section (f) to be inserted which shall read "every associate of a person referred to in clause (d)".
4. In section 58C, sub section (1), the words "to whom this Chapter applies" shall be omitted.
5. In section 58C, sub section (2), the word "six" shall be replaced by the word "twelve".
6. In section 58C, sub section (2), the words "served a notice under section 58H by the competent authority or" shall be inserted after the words "from the date on which he was"; and the words "whichever date is earlier." shall be inserted after the words "illegal hunting and trade of wildlife and its products"; and the full stop at the end of the original sentence shall be replaced by a comma.
7. Below the section 58U, a new section 58 UA to be inserted as, "Proceeds to go to the Foundation- The proceeds, if any, arising out of sale or disposal of any property under this Chapter shall be deposited in the accounts of the respective Tiger conservation foundation duly constituted as per the provisions of this Act."

16.2 Applying Provisions of Sarai Act, 1867

Under the provisions of the Sarai Act, 1867, the following actions are proposed, to be implemented by the concerned Deputy Commissioner of the District concerned:-

1. All hotels, dhabas and lodges within the Kaziranga landscape should be registered under the Sarai Act
2. Each such registered owner shall be required to maintain a register of visitors with Photo ID proof of the residents along with details such as nationality, permanent address, profession and purpose of visit among other details
3. All the paying guest accommodations also need to be registered in a similar fashion
4. Prior to registration, land use change provisions and zonation provisions should be verified from the Kaziranga landscape Authority.
5. Eco-tourism households also to be registered.

16.3 Wildlife Crime and Prosecution

A detailed discussion on the wildlife crime and prosecution has been provided in Chapter 5. It is no denying that due to several reasons put together wildlife crime prosecution is very poor in the State, and it applied very well to Kaziranga where on an average 20-30 rhinos are being poached annually, more than 20-50 persons are getting arrested and about 5-10 poachers are getting killed during exchange of fire with forest personnel. However, there has been virtually nil prosecution since 2006. In order to remedy the issues at hand effectively, four levels of interventions are being suggested in the paragraphs below.

16.3.1 Removal of Legal Bottlenecks

There are certain legal bottlenecks which have not been taken of as yet. These must be remedied forthwith by issuing notifications by the State Government:

1. No notification of the authorized officer, being an officer not below the rank of Assistant Conservator of Forests, authorized by the State Government in this behalf

- under section 50(8) of the Wildlife (Protection) Act, 1972 to issue search warrants, to enforce attendance of witnesses, to compel the discovery and production of documents and material objects and to receive and record evidence. In absence of this, there is no locus standi of the investigating officers till date.
2. No notification under section 54 (1) to empower the Chief wildlife warden or any officer of a rank not below the rank of a Deputy Conservator of Forests, to accept from any person against whom a reasonable suspicion exists that he has committed an offence against this Act, payment of a sum of money by way of composition of the offence which such a person is suspected to have committed.
 3. No notification under section 58D of the Wildlife (Protection) Act, 1972 to authorize any officer not below the rank of Chief Conservator of Forests to perform the functions of the Competent Authority under Chapter VIA entitled "Forfeiture of property derived from illegal hunting and trade" of the Wildlife (Protection) Act, 1972
 4. No notification under section 58E of an officer not below the rank of Deputy Inspector General of Police duly authorized by the Central Government, or as the case may be, the State Government who shall on receipt of complaint from the competent authority about any person having illegally acquired property, shall proceed to take all steps necessary for tracing and identifying any property illegally acquired.
 5. Notification under 58G may be issued to appoint officers not below the rank of Conservator of Forests to perform the functions of an Administrator.
 6. No notification under section 58N whereby the State Government is required to constitute an Appellate Tribunal for Forfeited Property consisting of a Chairman and such number of other members being the officers of the State Government not below the rank of a Principal Secretary to the Government, as the State Government may think fit, to be appointed by that Government for hearing appeals against the orders made under section 58F, section 58I, sub section (1) of section 58K or section 58L.

The Chapter VIA assumes great significance in view of the huge amount of moneys involved in the illegal transactions of rhino horn trade. Procuring motorcycles, vehicles, landed property, building houses, buying flats are some of the noted activities of the poachers which must be confiscated forthwith. However, there is a bottleneck in section 58A which talks of confiscation of properties of only persons convicted of an offence punishable under the Wildlife (Protection) Act, 1972 with imprisonment for a term of three years or more. It implies that the perpetrators of heinous crime such as rhino poaching would continue to amass illegally gotten wealth, and the law enforcing machinery, despite having intelligence inputs to this effect, shall have to wait for conviction to take place and supposing that the conviction was only for two years and six months, and thus, the convict shall continue to enjoy his ill-gotten property after serving the jail term of two and half years, and meanwhile while he is serving jail term, his near and dear ones would continue enjoying that property. This itself would be a great incentive to the poachers. Since section 58J spells out clearly that in any proceedings under this Chapter [Chapter VIA of the Wildlife (Protection) Act, 1972] the burden of proving that any property specified in the notice served under section 58H is not illegally acquired property shall be on the person affected, there is no reason as to why the Competent Authority cannot initiate suo moto case under section 58H irrespective whether the person concerned is convicted or not. Secondly, if the person is convicted of a crime under the Wildlife (Protection) Act, 1972

with imprisonment for a term of three years or more, all property in his name should stand confiscated automatically, and notice should be issued to others as specified under section 58A sub section (b) and (c), for proceeding under section 58H. The section 58H should be applicable, in addition, to any suspect or any person arrested or any person accused of committing a crime punishable under the Wildlife (Protection) Act, 1972, and parallel proceedings must run under section 58E, 58F, 58I and 58K, 58L and 58M. Therefore, based on the discussion here, a State Amendment of the Wildlife (Protection) Act, 1972 has been proposed at the beginning of this Chapter.

16.3.2 Removal of Procedural and Administrative Bottlenecks

At present, the same set of officers are engaged in protection duties, crime scene investigation and prosecution. In between they have to depose before the magistrates, in different districts, for cases which they have filed in their earlier positions in previous postings. These roles need to be separated and the wildlife crime scene investigations, filing offence reports and prosecution should be segregated. The following proposal is made in this regard:

1. There is requirement of posting three dedicated ACFs who are well trained in wildlife crime scene investigations, interrogation techniques and use of psychological duress to extract information from apprehended accused. They should be posted with the office of the Field Director.
2. There should be also three DCFs attached to the Field Director to deal with issues arising out of section 50, 54, 58A to 58Y, and wildlife crime scene investigations.
3. Two conservators may be attached to the Field Director
4. On the other hand, the DFO, EAWL should be provided with three additional ACFs to deal with prosecution of cases.
5. A Public Prosecutor should be appointed for the Kaziranga Tiger Reserve exclusively.
6. The Kaziranga National Park/ Tiger Reserve authorities should be allowed to hire services of professionally competent lawyers having expertise in criminal law and wildlife law to fight every single case of wildlife crime. They may be termed as Special Public Prosecutors.
7. In all cases of violation of the provisions of the Wildlife (Protection) Act, 1972, specific complaint cases must be filed by the authorized officer in the competent court of law.
8. Only in case of seizure of arms, or encounters where a poacher is killed in cross-fire, an FIR should be lodged in the nearest Police Station. However, any progress gathered or evidence collected by a police officer may be called for the authorized officer under section 50(8)(c) to substantiate his investigations and furtherance of gathering more evidence which may be produced before the trial court.
9. In case of rhino poaching or poaching of any wildlife, information may also be made available to the local police, as often arms are involved in poaching. However, filing an information report with the police does not absolve the forest authorities of their primary responsibilities under section 50(8).
10. It may be noted that FIR is a First Information Report to be given to the nearest police station under section 154 CrPC if a cognizable offence is committed. Wildlife crime, if punishable with imprisonment of three years or more is a cognizable offence, and if a forest officer has become aware that such an offence has been committed in his jurisdiction, he as a law abiding citizen of the country and in the

larger interest of preventing further criminal activities in his jurisdiction, may file an FIR. However, there is no mention of the word FIR under the Wildlife (Protection) Act, 1972. If an action is required to be taken under this Act, he has to believe that an offence has been committed against this Act. It is clear under section 50 (1), that any forest officer or any police officer not below the rank of a sub inspector, may, if he has reasonable grounds for believing that any person has committed an offence against the Wildlife (Protection) Act, 1972 may proceed further, but a court will take cognizance of the complaint against this Act only if such a person has already been authorized under section 55 of the Act. Unless there is a specific authorization in this behalf by the State Government subject to such conditions as may be specified by that Government under section 55(c), nobody other than the Director of the Tiger Reserve [Kaziranga was notified as Tiger Reserve only in 2007], and the Chief Wildlife Warden are authorized to do so. However, the Govt. of Assam has issued a notification vide Notification No. FRW.35/87/Pt-I/60 dt. 4th March, 1994. The police officer also shall have to file a complaint case under section 55 to a trial court as per the provisions of section 200 of CrPC, 1973, without which a trial court cannot take cognizance of an offence against this Act. However, section 56 of the Act allows for application of other Acts if an accused for any act or omission which constitutes an offence against this Act or from being liable under such other law. This implies that the accused can be separately tried under the Arms Act as well by the police. Therefore, filing of an FIR at best can be an additional activity to enable the police machinery to take cognizance of the case and start investigations on his own.

11. It is to be noted that the powers under section 50(8) to issue search warrants, to enforce attendance of witnesses, to compel the discovery and production of documents and material objects and to receive and record evidence is vested only with the authorized officer, not below the rank of an Assistant Conservator of Forests duly notified by the State Government.
12. It has been observed that forest officers invariably file an FIR and virtually do nothing thereafter. However, the provisions of section 51 (1) which states that any person who contravenes any provision of this Act except Chapter VA and section 38 or any rule or order made thereunder or..., shall be guilty of an offence against this Act, and shall on conviction, be punishable with imprisonment for a term which may exceed to three years or with fine which may extend to twenty five thousand rupees or with both. Non exercise of powers under section 58(8) by an authorized officer may attract the provisions of section 51(1). Such a call may be taken under section 55 by persons specified under sub section (ab), (ac), (b) or (c) of the Wildlife (Protection) act, 1972. In event of such a situation arising, provisions of section 60 of the Wildlife (Protection) Act, 1972 may not apply, as such acts of negligence shall be deemed not to have been done in good faith.
13. It is also to be noted that the Wildlife (Protection) Act, 1972, though under Chapter VI has the title of the Chapter as "Prevention and Detection of Offences" has nothing seemingly under its garb from section 50 to 58, that is preventive in nature. The section 50(1) only talks only of "...believing that any person has committed an offence against this Act....". This actually means that while taking up cases for prosecution, support may have to be taken from the major criminal acts such as the Indian Penal Code section 120A which defines criminal conspiracy, section 172-190

- IPC defines the contempt of the lawful authority of public servants just to mention a few.
14. The Charge to be put before the trial court must be as per the provisions of section 211 and 214 of the CrPC. The Charge shall be submitted within 30 to 60 days of occurrence of the offence without fail.
 15. Case diaries have traditionally not been maintained by Forest Officers as the forest offence cases are filed as Complaint Cases under section 200 of the CrPC, 1973. However, the trial courts have been demanding case diaries of late, in absence of which getting accused on remand is proving difficult. In view of the above, it is proposed that the authorized officers shall maintain in all cases a Forest Offence Case Diary (FOCD) which shall contain all details with date wise entries of actions initiated, material evidence gathered (with serial no of tags/ identification marks etc., serially numbered photographs, serially numbered CDs/ Pen drives containing electronic evidence or video or audio footage with file names and file properties with creation and access dates etc), search warrants issued, warrants for attendance of witnesses, or call for records and material objects etc, and communication sent to other departments/ law enforcing agencies for further investigation/ collection of evidence. It should also invariably be done even if the offence is or has been compounded under section 54.
 16. Every crime scene record (not only rhino poaching alone) such as illegal fishing, entry into the Tiger Reserve or the National Park, scene of encounter, or alteration of boundary pillars or killing of wildlife must invariably contain a map of the site with nearest boundary indications and GPS coordinates along with photographs having imprint of date and time.
 17. The Kaziranga National Park/ Tiger Reserve invariably does not have visible boundary pillars on its boundary which is clearly visible from a distance. The boundary pillars not only keep the boundary intact, but also act as legal instrument in proving that the accused entered the area willfully ignoring the clearly visible boundary pillars with intentions to commit an offence punishable under the Wildlife (Protection) Act, 1972. Therefore, boundary pillar fixation with embedded solar LED for night time identification must be fixed as a short term measure all around the Tiger reserve/ National Park. The boundary pillar should not be less than 1mX1m at the base and of 1m in height in pyramidal shape with tip being not less than 0.30mX0.30m. It should be embedded with solar LED for flashing at night on all sides and on the top.
 18. Regular training on wildlife crime investigation and prosecution should be conducted for all concerned wildlife staff and officers.
 19. Orientation of the Magistrates and trial courts should also be conducted at least twice in a year so that the judges can appreciate the nuances of wildlife crime and understand the gravity of the damages inflicted by criminals against the environment and forests.
 20. There is no database of suspected or noted criminals. In absence of such a system it becomes difficult to proceed in any case of poaching. Therefore, the following additional recommendations are being made for creating a comprehensive database of suspected rhino poachers, accomplices etc, which shall apply to apprehended persons in poaching related cases whether involved in rhino poaching crime or not:

1. Photograph of the person from front, back and sides, including face blow ups on four sides to be taken
 2. His physical body characteristics such as color of hair, color of the pupil of the eye, height, weight, overall built profile, chest (normal and expanded), length of hands, length of legs to be recorded
 3. Any feature such as extra fingers/ toes, missing fingers/ toes, body deformity, visible cut marks on the body, birth marks to be noted and photographed.
 4. 10 finger prints to be scanned using a finger print scanner as well as manual method by applying ink
 5. Foot size and contour to be recorded by taking plaster cast foot print
 6. DNA profiling of the person to be done
 7. Facial recognition parameters of the person to be captured using facial recognition software
 8. All this to be stored electronically and physically in secure manner and catalogued for easy retrieval.
 9. In event of a crime, the data obtained from the crime scene would be matched with the data available, and a guess list of possible accused involved in the poaching should be prepared and circulated to all concerned for further investigation and arrest.
21. Every Range Office should have one or more cells and interrogation rooms which should be fully secure and away from any public view.

16.3.3 Wildlife Crime Scene Investigation Methodology

The current wildlife crime scene investigation methodology is very rudimentary and helps only the cause of the poachers. The wildlife crime scene investigation modernization has been discussed separately in the next paragraph. Here the procedural aspects alone have been suggested:

1. The crime scene, or Place of Occurrence (PO) when first detected, especially in case of poaching, must be left undisturbed. The team spotting it, must return back carefully the way they entered ensuring that no further damage is caused to the crime scene.
2. Once at safe distance, an assessment should immediately be made whether the poachers are still around, scooted or any major visible object they left behind (which may be helpful in tracking the culprits using the dog squad). Accordingly urgent message shall be passed for pressing the dog squad, if workable, and the wildlife crime investigation officer to be present on the scene in shortest possible time. Exact location of the crime scene with GPS coordinates should be passed on immediately.
3. Until the next team arrives, the patrol team should guard the crime scene.
4. Immediately the concerned wildlife crime investigation officer (which the Field Director/ Chief Wildlife Warden may so designate), an officer not below the rank of Assistant Conservator of Forests, assisted by two or more trained junior wildlife crime investigation officers (not below the rank of Forester I), should be contacted to arrive at the crime scene and start investigations. Till the wildlife crime investigation officer (WCIO) and his team does not arrive on the spot, the local patrol team should ensure that no one tampers with the crime scene.
5. The WCIO and his team shall arrive on scene take photographs of the crime scene from at least four directions (if terrain permits).

6. The WCIO must ensure that he has with him all necessary materials, tools and equipment and requisite forms and paper etc. as per the checklist approved by the Field Director.
7. If the scene has potential for dog squad based tracking. First preference should be given to the dog squad team. The team should be carefully led to the crime scene and necessary objects required for the dog to follow scent should be allowed to be picked up.
8. Thereafter, he shall proceed to cordon off an area not less than 20m around the kill.
9. He shall use flags/ improvised flags to mark points of interest and record their details in his diary. Each such flag shall be preferably numbered, or numbered cards can be placed below the flags.
10. All evidence shall be systematically collected and kept in designated containers/ packets, each of which shall be tagged and numbered.
11. Each crime scene shall be assigned a unique number for Kaziranga as a whole, and a sketch map of the crime scene shall be prepared.
12. Each label shall additionally contain the unique crime scene number, date and time and code of the WCIO.
13. The GPS reading of the centre of the crime scene to be recorded.
14. Measurements of the various relevant distances should be recorded
15. Measurement of the killed animal should be taken (say body length, shoulder to leg length, length and width of the skull mouth to neck and top and bottom etc., length of the ears etc.)
16. All measurements must be taken on horizontal plane and not along any surface contour.
17. Inspect the carcass and look for wounds, cut marks and bullet injuries
18. Use HHMD and DSMD to detect bullets
19. DNA sample of the dead rhino should be taken as per RhoDIS guidelines
20. For all visible bullet wounds, direction of bullet entry may be indicated by inserting flags in the visible wounds with easy hands.
21. Collection of human DNA, finger-prints, hair or other body parts/ saliva from objects such as used water bottle should be carried out after careful examination.
22. Lifting of foot prints using denture plaster should be carried out, if footprints are available on the crime scene.
23. The crime scene should be photographed finally from at least four directions if possible
24. There are possibilities that in across fire one or more poachers may get killed near or in the vicinity of the rhino killed. In such a situation, the WCIO shall note the relevant facts, but shall not touch any material objects such as bags etc. found on the spot. The nearest Police shall be informed accordingly to arrive at the scene.
25. Once the WCIO is satisfied that there is no more clue available without further damaging the crime scene, he shall call for the postmortem of the animal killed including necessity of turning around the animal for further examination.
26. No persons other than forest/ police or other investigating officers duly authorized under the Wildlife (Protection) Act, 1972 shall be allowed entry to the crime scene.
27. A video footage of the final crime scene prior to postmortem may be released to the media by the Range Officer of the concerned range where the crime has occurred.

Dog Squad Protocol:

The following basic principles must be observed in a crime scene:

1. Whoever happens to spot the crime scene must not damage the crime scene any further, and should not even go near any object.
2. Until the dog squad arrives, no object should be touched.
3. All effort should be made to ensure that the dog squad arrives at the earliest possible time.
4. The dog squad must be accompanied by at least one to two sections of alert and fit and well armed AFPF and or Armed Police Battalion such as Assam battalion. The young members of the Battalion are found to be most suited to accompany the dog squad.
5. The AFPF jawans accompanying the dog squad must use BP jackets and helmets. The same would also apply to the armed police jawans.
6. The team must carry equipment such as one or two thermal scanners/ binoculars
7. The local police must be kept ready in advance to accompany along with sufficient force in case the track is likely to lead to any civil/village areas
8. Once the dog squad team departs, investigations should be continued at the crime scene.
9. No unauthorized persons to accompany the dog squad during the operation.

Postmortem Protocol:

The following postmortem protocol is suggested for Kaziranga Tiger Reserve:

1. The Field Veterinary Officer (FVO) or any other such officer authorized by the Field Director/ DFO, EAWL alone shall carry the postmortem of wild animals in and around Kaziranga Tiger Reserve
2. The FVO shall ascertain whether the Place of Occurrence is a wildlife crime scene or not. If it is a crime scene, he shall first ensure that the WCIO has completed his investigations and given clearance for postmortem
3. The FVO shall make his own notes of the physical condition of the carcass and record measurements, and take his own photographs of the carcass or close of any body part or may cause turning of the carcass for further investigation.
4. He shall record all the physical description of the animal and take appropriate measurements.
5. For every wild animal physical measurements to be recorded by the FVO and the WCIO shall be on preprinted art paper of sufficient thickness having the necessary outline sketch of the animal and some of its body parts. Each such sheet shall be serially numbered
6. For animals killed using bullets, every effort should be made to recover the bullet(s) causing the fatal wound(s), if required, by using DSMD.
7. Samples of viscera/ fluid should be collected to study if, otherwise, the animal was suffering from any infection or if it was acting as a carrier of any specific germs.
8. Every attempt should be made to ascertain the actual cause of death.
9. All samples should be analyzed in the facility to be created for this purpose at Kaziranga. Only if all tests fail, sample may be sent to labs having better facilities.
10. The FVO shall submit his report in two parts. The first report shall be submitted within 24/48 hours. The second report with detailed observations may be submitted with all documentary evidence and laboratory reports as soon as all the reports are received.

11. If there is a observable trend within a species or within an geographical area, the FVO shall make further investigations and submit a separate detailed report to the DFO/ Field Director expressing his views and suggestions.

Post Gun Shot Protocol:

A lot of firing incidents keep happening within the Kaziranga Tiger Reserve, some fired in self defense against wild animals, some fired in self defense against poachers, some accidentally fired and some fired by miscreants either to poach a rhino or to ward off an approaching animal too close to them or even accidental fire. With the existing network system, it takes anything from a few minutes to several hours to establish the source the gun shot. In the past there has been a practice of replying to the gun shots of poachers by all those camps that heard the gun shot originally. Though it proved initially very effective, it had done more harm than good in the long run. It added to the confusion and direction of the original shot, and allowed sufficient time for the poachers to decamp with the horn. In view of the above, the following strategy is being followed and requires rigorous implementation:

1. No one to fire on hearing a gun shot
2. To establish the gun shot origins on wireless by asking the nearest camps if they fired/ heard the sound.
3. If fired by any field staff, he is required to report immediately. However, often it may not happen due to the field situations or lack of communication. This introduces an element of delay and uncertainty. However, he has to report at the next best available opportunity.
4. If established to be an enemy shot, all the neighbouring camps to surround the area, and close all possible escape routes, and lay siege/ ambush until further orders.
5. All concerned to take positions at vulnerable points. The operation may continue for several hours and days.
6. One or two (even three) big teams are then sent as search parties to flush out miscreants/ apprehend them.
7. Fire exchange may take place. All teams prepared and ready to fire.
8. The search parties may or may not find any carcass. The focus is solely on locating the poachers

Currently this strategy is difficult to put in full action due to lack of proper equipment and technologies. The poachers have an advantage as they can keep watch from vantage points and be still in hiding. As modernization of the forces happens, this strategy would yield good results. Already using this strategy, highest number of poachers have been killed during this year, compared to any other year before.

16.3.4 Modernizing Wildlife Crime Scene Investigations

Currently the crime scene investigation is very poor and lacks technology. It is based on mostly visual observations and random guesses. Some of the new introductions of technology include use of HHMD, DSMD since January, 2014. The only other innovative introduction is the Dog Squad which became a part of the Kaziranga arsenal in January, 2014. The following suggestions are being made for modernizing wildlife crime scene investigations:

1. A checklist of the investigation toolkit to be approved by the Field Director based on the available technologies, preparedness and training imparted to the field staff.
2. The checklist to be revised from time to time to improve it and make it more effective.
3. All the concerned staff to be trained on the toolkit.
4. The following equipment must be part of the kit as of now:
 1. HHMD
 2. DSMD
 3. Digital SLR camera 35mm with 25-75 mm zoom lens
 4. Digital Video Camera
 5. GPS
 6. 100-150 m of Crime Scene tape/ special nylon rope with tags
 7. 30 m retractable Steel tape
 8. 3 m retractable steel tape
 9. Laser Range Finder
 10. Lithium Ion Battery Pack
 11. Scissors (Big and small)/ Tweezers / Pliers/ Scalpel
 12. Magnetic Compass
 13. Binoculars
 14. Numbered cards (1-30)
 15. Ruler/ Pencil/ Eraser/ Sharpener
 16. Maps of the area
 17. Animal measurement printed sheets
 18. Magnifying Glass
 19. Hand Gloves
 20. Self sealing Polythene bags of different sizes
 21. Dental Plaster (15 kg)
 22. Spoons
 23. Transparent tape (narrow/ wide) [preferably KNP pre-printed]
 24. Iron Flag sticks (20 in number)
 25. "DO NOT DISTURB" sign
 26. Sticky pre-printed labels with barcodes
5. In the next revision of this checklist, the following target items would be captured:
 1. Human finger prints
 2. Human hair and other human tissues
 3. Human finger prints from the body of the animal
6. Once the RhoDIS system is introduced, the above kit would be further modified to capture samples for rhino DNA profiling
7. Another kit for the postmortem would also be introduced

16.3.5 Implementing RhoDIS

The Rhino DNA Index System (RhoDIS) has been developed over a period of almost nine starting from the year 2000 by the Veterinary Genetics Laboratory (VGL) at the Faculty of Veterinary Science of the University of Pretoria. The project finally matured in 2009 providing a method to obtain an individual DNA profile from any part of the rhino horn so that it can be linked at any point of time to the animal that it was taken from. The method has been successfully tested to detect many horn components in small quantities and finally bring the criminals involved to the court of law for successful prosecution. Already

several convictions have already happened based on RhoDIS system. More than 1700 rhinoceros forensic cases have been received by the VGL since June, 2010. The RhoDIS maintains a clean database of all rhino DNA profiles which is based on the CODIS system of human DNA profiles maintained by the FBI. The advantage is that the DNA profile of the poached rhino can be collected during the first wildlife crime scene investigations itself. The samples are sent to VGL for DNA profiling and indexing. Whenever a rhino horn or any other object having some parts of rhino horn are caught by the investigators, the DNA profile of that object is also done. Thereafter, the new profile is matched in the database for possible matches of any record of a poached rhino. On successful matching, it is established that this rhino horn came from that specific rhino that was poached, or the object contains parts of the horn which ultimately came from that particular rhino. RhoDIS is able to establish direct link between the horn and the poaching incident.

A team of experts on RhoDIS namely Rodrick H Potter and Cindy Harper came to Guwahati ad Kaziranga on 26th to 29th May, 2014, and gave training to the wildlife staff on wildlife crime scene investigations and the use of RhoDIS. The following is suggested in respect of RhoDIS:

1. A Genetic Analysis laboratory should be officially recognized for carrying out RhoDIS related works.
2. The Staff of the laboratory should be well trained in RhoDIS
3. The WCCB or the NTCA should maintain the Indian RhoDIS database
4. The Indian RhoDIS database should also be made available to other law enforcing agencies in the World. However, all security precautions should be taken while allowing others to connect. No untrusted connection should be allowed.
5. The NIC can host the RhoDIS database in a very secure environment, and should ensure that the system is beyond the reach of hackers
6. The Govt. of Assam may set up a Genetics lab or use one in PPP mode.
7. In all wildlife poaching cases, DNA sample collection from the crime scene must be made mandatory, once the genetics lab is certified by VGL.
8. DNA profiling test must be conducted for all rhino horns caught/ confiscated

16.3.6 Inter Agency Coordination

It is to be clearly understood by all that rhino poaching is an organized crime involving national and international gangs who work in close coordination with each other. It has components of arms smuggling, money laundering, cross border smuggling, terrorism and international illegal wildlife trade. The rhino trade, as revealed in some interrogations of poachers arrested, is multilayered and translational. It is depicted graphically below:-



The diagram is explained in more details in the Table below:

Level	Key Role	Activities	Area of Operation	Remarks
1	Poaching	Field Guide, Shooting, Hacking, Accomplices to cross river or spot a stray rhino	Park.	Shooters mostly come from Nagaland, Manipur, Arunachal Pradesh
2	Organizing	Organize shooters, arms, escort weapons	Outside the Park, but within 15-20 km radius	Organizers themselves may not enter the Park, and send his key man to lead the team. The shooting arms are kept separately
3	1 st Level trade	Pick up the horn for smuggling	Small towns	Routing happens through private taxi, bus or train
4	2 nd Level trade	Pick up the horn for final destinations	Possibly Dimapur, Itanagar, Imphal	
5	3 rd Level	Horn moved out of country	Trans-border	

[It needs to be mentioned that in some cases, local hunters who are expert shooters such as Karbi / NDFB Militants (also possibly some local persons working in various armed forces may be taking the risk of becoming shooters as the earnings are handsome and attractive)]

Therefore, it is clear from the Table above that people from the neighbouring states are involved in not only trade but also in shooting/ poaching of the animals. Several poachers shot dead inside the Park during encounters have been found to be unidentified Naga/ Paite/ Kuki / Arunachali tribesmen. They are engaged by the local organizers who on one hand either already have illegal/ smuggled weapons or hire weapons from militants by way of rentals on daily basis or buy weapons in markets such as Dimapur. The arms are handed over to the shooters at the time of the operation only when the team is inside the Park. Once the rhino horn is removed, it is kept with the leader of the team only. The leader is either himself the organizer or a confidant of the organizer.

Most of the activities take place outside the Park boundaries in civil areas. The most important observation is that if about 15 km area around the Park is sanitized of illegal arms, poaching would drop down to almost nil. However, in a state which is infested with so many active militant groups and many surrendered groups who have been allowed to retain their weapons with them, nothing much can be expected in this direction. The Police, the para military forces, the armed forces also have to perform their duties and contribute their full might in controlling illegal arms movement around the Kaziranga Tiger

Reserve. Should the forest personnel somewhere be blamed for their failure to protect the rhinos, more than equal share should also be passed onto Police, Para Military Forces and the Army along with other law enforcing agencies for their failure and failure of their intelligence network to prevent the elements, that contribute more than 80% of the time, energy and space towards organizing a poaching event, from culminating into killing of a rhino. If the challenges faced by these agencies in the civil areas is very tough and unsurmountable and beyond control, then the hurdles inside the Park/ Tiger Reserve are many orders higher in magnitude than the challenges outside.

Therefore, there must be mutual admiration for the challenges faced by all law enforcing agencies, including forest personnel, and a concerted effort must be made by all concerned without mounting any blame games or showing each other's deficiencies. The constitution of the Anti Rhino Poaching Task Force (ARPTF) under the Additional Director general of Police (STF) is a laudable effort in this direction. It is for the first time that full scale coordination has started happening between the Forest and Police. It is also welcome that the intelligence and the Special Branch of the Assam Police has started to share intelligence inputs with the Park/ Tiger Reserve authorities. The result is that so far this year nine poachers have been killed, many arrested, and at least five poachers received fatal bullet injuries (and might have died elsewhere, for which there are no confirmed reports, but only intelligence inputs). However, this is also not enough. The joint actions of Police and Forest have only been able to touch the level 1 and 2. The levels 3 and 4 still remain untouched. Unless these levels are touched, and damage is inflicted and the chain broken, poaching would continue to be a difficult task to control as there are more people willing to risk their lives (in the form of new recruits in the game).

In the light of the above discussion, the following suggestions are put forth for effective crack down on the rhino poachers and criminals involved in the illegal rhino horn trade:

1. The cooperation between the Police and Forest must continue for which a permanent institutional arrangement should be made
2. The ARPTF should be strengthened with infrastructure and capacities.
3. The ARPTF personnel should be provided with high value insurance cover and incentives.
4. A system of awards should be introduced for the ARPTF personnel for carrying out excellent anti poaching activities.
5. The process of engagement of the CBI, which handles cases only on recommendation of the State Govt. and the process seems to be long, ineffective and introduces delay in the system, needs to be overhauled. Such systems only delay the start of investigations and help the criminals who get sufficient time to obliterate all evidences and act clean, making investigations long drawn and futile. Therefore, the following is suggested in respect of CBI:
 1. The CBI must be given the mandate to pick up all cases of rhino poaching automatically and suo moto in whichever case the rhino horn could not be recovered within two days of poaching, unless there is confirmed intelligence inputs that the horn still could not come out of the Kaziranga Tiger Reserve.
 2. The mandate of CBI should be shifted to markets and levels 3 and 4, rather than confining to level 1 and 2. The level 1 and 2 should be and large be left to local Forest and Police personnel, unless the intelligence inputs say that the accused are absconding to territories beyond the jurisdiction of the local forces.

3. The CBI should adequately equip itself for rhino poaching and must develop an independent manpower, infrastructure and capacities within a short period of time. Today rhino crime is one such crime where instant exchange of moneys are happening and the horn is being used as liquid cash of Rs. Seventy lakhs and above.
4. The CBI should be able to attack the markets, modus operandi, money exchanges and bring the level 3 and 4 culprits to the book.
6. The WCCB is another organization of the Govt. of India which has a key role to play in curbing rhino poaching. However, WCCB is currently not in a position to do much. The following is suggested in respect of WCCB:
 1. The WCCB must set up a full fledged (and this should be one of their biggest establishment) office at Guwahati with branches at Dimapur, Imphal and Itanagar.
 2. The WCCB must equip itself fully with requisite infrastructure, manpower and capacities to play the role of CBI in wildlife crime.
 3. The WCCB should also run a wildlife forensics and ballistic expertise laboratories geared to handle wildlife cases exclusively. Such facilities should be either set up at Kaziranga or Guwahati within a time bound manner
 4. The WCCB must have a team of top notch investigators who can use latest tools to crack down on criminals. These investigators must assist the field officers in conducting their inquiries especially in capturing finger prints and other clues to reach the criminals and assist in their prosecution.
7. The WCCB and CBI must join hands with each other in all wildlife crime investigations.
8. These two agencies must coordinate with Interpol to reach at levels 5 criminals across the Indian borders.
9. These agencies must also maintain close links with similar wildlife crime/ crime investigating agencies such as in Nepal, Myanmar, Vietnam, Cambodia, China, Taiwan, Australia, South Africa etc.
10. All criminals outside the borders of Assam must be brought to the trial courts in Assam that have taken up the rhino poaching cases.
11. CBI along with Army intelligence and local police must curb the illegal arms menace which is threatening the survival of rhinos. They must somehow crack down on the illegal arms market.
12. The WCCB must also act as coordinating agency and rightly interface with CBI, the Army, CISF, GRP, Customs and the Enforcement Directorate.

16.3.7 Protocol and Training for Enforcement Agencies

There are a variety of law enforcement agencies especially customs, CISF and GRP who guard the border points, airports and railway stations respectively. These are all central government agencies who get frequent transfers. The Govt of India has a norm of not keeping personnel in the North East India for more than two years in general. In such a situation, it is important to continue sensitizing the agencies of the Govt of India about rhino horn trade, and the ways in which they can help the local authorities in apprehending culprits. Therefore it is proposed that a protocol be developed for checking/ identifying/ detecting rhino horn in X-ray machines and baggage scanners. All the staff should be

regularly trained using replica. Baggage scanner systems should be deployed in all the important railway stations of the NER.

16.3.8 Access to Mobile Subscribers' Data

The poachers have been found to use mobile phone very often to keep in contact with their accomplices and often carry mobile phones to the scene of crime. They have been found to contact their support groups outside as they enter and leave the National Park. Access to mobile subscribers' data, call records, location etc. are very vital to conduct successful investigation and bring the poachers to book. The mobile service providers refuse to part with the data on the pretext that forest officers are not authorized to get any data in respect of mobile subscribers. Therefore, as a matter of policy, the forest officers should be allowed access to all mobile data as is permissible for the other intelligence branches of the Police.

16.4 Research and Development

The research and development component of the management of the Kaziranga Tiger Reserve is rather weak and unsatisfactory. As there is requirement to overhaul the research wing and develop linkages with research institutions across the world, develop lab to land schemes for local communities and provide scientific inputs into the management practices, the following strategies are proposed:-

1. A dedicated Research Fund to be created under the Authority
2. Grants to local universities and colleges (within the landscape or landscape districts)
3. Some of the suggested research areas could be:
 1. In situ data collection and archival for habitat etc.
 2. Research on GOH Rhino population dynamics, Inter-calving periods, activity and behaviour studies
 3. Genetic study of Rhino and other species
 4. Interspecies interactions and space utilization
 5. Climate Change and its impact on Kaziranga
 6. Technologies for anti poaching
 7. Proof of Concept for IT systems, databases and analysis
4. There would be an internal research team with dedicated field staff
5. There would be a research laboratory for all basic air, water, waste analysis. This can be set up in PPP mode with Private, Govt or Semi Govt agencies
6. There would be a dedicated team for animal behaviour studies
7. There would be a networking and partnership with local research laboratories such that RFRI, NEIST, AAU, NESAC, NEHU, NERIWALM, GSI, BSI etc.
8. The gap areas of research pertaining to Kaziranga need to be identified
9. A dedicated cell on Climate Change would be set up
10. The local communities would be involved in climate change related studies

16.5 Institutional Mechanisms in Kaziranga

The details of the various institutional mechanisms, instruments and committees have been provided in Chapter 5. An attempt has been made to bring uniformity of goal and purpose in the following paragraphs by proposing an overarching legislation to constitute the Kaziranga Landscape Conservation and Development Authority.

16.5.1 Kaziranga Landscape Conservation and Development Authority

The Government of Assam shall bring an appropriate legislation in the name and style of The Kaziranga Landscape Conservation and Development Act (or any other name that the Govt. may deem fit) based on the framework of the authority, its constitution, powers and functions etc. as suggested in Chapter 13 of this Report. The Act shall also incorporate the clauses mentioned in the following paragraphs in order to provide a holistic framework of governance for effective management of the landscape. The Authority shall be immediately constituted on promulgation of the Act with provisions of funding and powers of expenditure as envisaged in this Report. The Authority shall be given adequate financial and administrative freedom to carry forward its mandate within the overall framework laid down under this Report.

16.5.2 KLCDA Policy Framework

The Kaziranga Landscape Conservation and Development Authority shall work on the basis of a set of well defined policies and programme guidelines within the overall green growth framework described in Chapter 15. The following policy guidelines may be framed and adopted on constitution of the Authority:-

1. Kaziranga Landscape Land Sale and Change of Land Use Policy
2. Kaziranga Landscape Zonation
 1. Land Use Zonation
 2. Building Height Regulation
 3. Animal Corridor Zonation
 4. Eco-Sensitive Zone Management
 5. No Development Zone Management
 6. Tourism Zone Management
3. Kaziranga Landscape Tourism Policy (as outlined in the Tourism section of this Chapter)
4. Kaziranga Green Growth Policy Guidelines.
 1. Climate Sustainable Agriculture.
 2. Low Impact Housing
 3. Renewable Energy Use
 4. Unconditional Basic Income
 5. Model Village Guidelines
 6. Water Use and Recycle including Rain Water Harvesting
 7. Waste Recycle and Management
 8. Green Transportation and Roadways
5. Kaziranga Landscape Health and Education Guidelines
6. Kaziranga Landscape Livelihoods and Skill Development Guidelines
7. Kaziranga Landscape EDC and Micro-plans Guidelines
8. Kaziranga Landscape Public and Stakeholders Engagement Framework
9. Kaziranga Landscape Project Management, Evaluation and Monitoring Guidelines
10. Kaziranga Landscape Tendering and Procurement Policy
11. Kaziranga Landscape Finance, Budget, Expenditure, Accounting and Audit Policy
12. Kaziranga Landscape HR Policy
13. Kaziranga Landscape Grant of Loan, Assistance and Grants-in-Aid Policy
14. Kaziranga Landscape PPP and Green Gap Funding Policy

All the Policy and Guidelines shall be framed keeping in view the broad principles laid in this Report and recommendations made thereof. All policy formulations shall pass through a stakeholders consultative process, Internet based opinion and email based expert groups, including making of small expert groups/ committees or outsourcing to external agencies/ professional bodies of national and international repute. Wherever required, the clear indication of expected deliverables, outputs, outcomes, evaluation parameters, social audit methodologies, third party audits or public hearing procedures must be spelt out. Each Policy and Guidelines shall be suitably versioned, and each version to be archived. The Policies and Guidelines.

Wherever required, the enforcement components should be clearly indicated and transparently laid out. If required, appropriate Rules should be framed under the Act under which the Authority shall be constituted (say Kaziranga Landscape Conservation and Development Authority Act).

There would be certain components of policy that would require implementation of Proof of Concept (PoC), technology demonstration, pilot studies or even vendor driven PoC and technology demonstrations. Once the technologies are found suitable for local adoption and well accepted or requisite changes made based on field trials, then alone such components should be undertaken for adoption in the landscape.

16.5.3 Kaziranga National Park and Tiger Reserve Management

All areas of the Kaziranga National Park and the Kaziranga Tiger Reserve and the surrounding Eco-Sensitive Zones and Corridors shall be managed as per the Tiger Conservation Plan of the Kaziranga Tiger Reserve. Additionally, the following provisions shall apply:-

1. All the funds that accrue to the Kaziranga Tiger Conservation Foundation shall continue to be kept and managed under the Foundation as per the requirements and mechanism proposed under the NTCA guidelines.
2. The Foundation may seek additional funds, if required, as interest free loan from the Authority to be returned within a period not exceeding three years.
3. All other income generated shall be part of the income of the Authority
4. The Authority shall be authorized to carry out investment/ execute works within the Kaziranga National Park / Kaziranga Tiger Reserve within the overall ambit of this Report and the Tiger Conservation Plan of KTR.
5. The Authority shall be authorized to implement schemes/ projects/ activities through the EDCs, and park its funds with the EDCs. However, the EDCs shall have to open separate bank accounts as per requirements of the Authority.
6. The Office of the Director, Kaziranga National Park and the office of the Field Director, Kaziranga Tiger Reserve shall continue to function as a single unit.
7. The Office of the CEO, KLCDCA shall be nucleated from the Director, KNP office and shall be developed into a full fledged establishment of which Director, KNP/ Field Director, KTR shall become one management unit of the landscape.

16.5.4 Management of Areas outside the KTR

The areas of the Kaziranga landscape falling outside the Kaziranga National Park and Kaziranga Tiger Reserve shall be administered under the overall policy framework of the Authority as follows:

1. Areas under the jurisdiction of the Eastern Assam Wildlife Division by the DFO, EAWL, Bokakhat in consultation with the SDO (Civil), Bokakhat and SDO (Civil), Kaliabor wherever required
2. Areas under the jurisdiction of Golaghat Division by the DFO, Golaghat in consultation with Deputy Commissioner, Golaghat wherever required
3. Areas under the jurisdiction of Jorhat Division by the DFO, Jorhat in consultation with Deputy Commissioner, Jorhat wherever required
4. Areas under the jurisdiction of Nagaon Division by the DFO, Nagaon in consultation with Deputy Commissioner, Nagaon, wherever required
5. Areas under the jurisdiction of Sonitpur East and West Divisions by the DFO, Sonitpur East and West in consultation with Deputy Commissioner, Sonitpur wherever required, including corridors along the river tributaries of the Brahmaputra on the north bank touching the Kaziranga National Park/ Tiger Reserve
6. Areas under the jurisdiction of Laokhowa and Burachapori Wildlife Sanctuaries and their Eco-Sensitive Zones and Corridors by the DFO, Nagaon Wildlife Division in consultation with Deputy Commissioner, Nagaon and Sonitpur wherever required
7. Areas under the jurisdiction of Orang National Park, its Eco-Sensitive Zone and Corridors by the DFO, Mangaldoi Wildlife Division, Mangaldoi in consultation with Deputy Commissioner, Darrang wherever required.
8. Areas under the jurisdiction of Karbi Anglong East Division by the DFO, Karbi Anglong East in consultation with the Principal Secretary, KAADC and the Deputy Commissioner, Karbi Anglong wherever required, or any other authority constituted in future to manage the whole/ part of the landscape falling within the jurisdiction of the Karbi Anglong Autonomous District Council.
9. The Authority shall provide adequate infrastructure, manpower and capacity building assistance to these offices to enable them to undertake the additional works of the landscape. The assistance shall be proportional to the area of the landscape being managed with due weightage on the wild animal population/ movement and human population within that portion of the landscape.

16.5.5 Tiger Conservation Plan

The Tiger Conservation Plan shall be prepared keeping consonance with this Report. The following provisions are proposed to be applied in this regard:-

1. This Report shall be a part and parcel of the Tiger Conservation Plan of the Kaziranga Tiger Reserve.
2. This Report shall be also part of the Tiger Conservation Plans/ Management Plans of Orang National Park, and the Laokhowa and Burachapori Wildlife Sanctuaries, to the extent of the provisions of the recommendations, and the jurisdiction of the Kaziranga Landscape Conservation and Development Authority and its policies and programmes.
3. In event of creation of one or more Tiger Reserve or a National Park or a Wildlife Sanctuary in the part or whole of the watershed of the landscape as described in Chapter 13 of this Report, falling in the Karbi Anglong District, the provisions of the this Report shall apply to the whole of the area(s) so notified and its resultant Eco-Sensitive Zone. This Report shall be also part of the Tiger Conservation Plans/ Management Plans of the area(s) so notified. The jurisdiction of the Kaziranga Landscape Conservation and Development Authority shall be deemed to be over

the entire area(s) so notified and its policies and programmes shall equally apply thereto.

16.5.6 Kaziranga Biodiversity Conservation and Development Committee

The Committee shall stand dissolved after the constitution of the Kaziranga Landscape Conservation and Development Authority.

16.5.7 Local Advisory Committee

The Local Advisory Committee for the Kaziranga Tiger Reserve has been constituted as per the National Tiger Conservation Authority (Normative Standards for Tourism Activities and Project Tiger) Guidelines., 2012 issued under Section 38-O of the Wildlife (Protection) Act, 1972, Part B "Guidelines for Tourism in and around Tiger Reserves" Clause 2.1.9. The Committee shall continue to function as envisaged under Clause 2.1.9 and 2.1.11. The Committee shall also act as the Local Stakeholders Committee in respect of all development activities to be carried out in the landscape. Additional members to be included in the Committee are proposed to be:

1. Representative of PWD (NH) and Buildings
2. Representative of Power Department
3. Representative of AEDA (Assam Energy Development Agency)
4. Representative of Agriculture Department
5. Representative of PN&RD Department
6. Representative of Mission Director, NLRM
7. Representative of Health Department
8. Representative of Education Department

The Committee shall advise the Authority for all developmental works to be undertaken in the landscape, keeping in mind the low carbon and green growth and development strategies. The Committee shall have within its power to set up sub committees or any expert committees.

16.6 Rhino Protocols

Successful management of a flagship species like rhino would require Standard Operating Procedures (SOP) and established protocols which would need to be evolved and made better in future based on scientific inputs and learnings. However, there is a lot to be done in this regard. The management of the Kaziranga National Park/ Tiger Reserve has a great responsibility to develop these protocols, as Kaziranga alone houses the largest populations of rhinos in the South Asia. Nevertheless, it is to be noted that there is no umbrella program in the Ministry of Environment and Forests, Govt. of India, like the national Tiger Conservation Authority (NTCA), which can take the administrative responsibility of ensuring that all such required protocols are not only developed, but also are followed to the core. In absence of such a mechanism, the Forest department, Govt. of Assam has taken the lead role in setting up several committee to develop SOP and Protocols for Rhinos, noted among which are:

1. SOP for Rescue of Stray Rhinos
2. Translocation of Rhino

Some additional protocols and SOPs are being suggested here with specific requirements of Kaziranga. These are discussed below:

Rhino Horn Stockpile Protocol:

The past statistics shows that at least 35 rhinos die naturally in Kaziranga. The number could even touch 100 or more depending upon certain circumstances such as floods. The rhino horn is collected in almost every case of natural death, except if the horn does not get washed away in floods accidentally. Normally, the horn is collected by the field staff, the same is numbered sequentially in the concerned Range where its gets treated and then weighed. From there, it is then sent to the Central Strong Room, where its weighed again and numbered with a unique serial and then sealed and stored. A good number of horns, say when 5-60 in number, are together sealed in iron trunk and sent to treasury for safe keeping.

The proposed protocol is described here:

1. The rhino horn is to be collected by the concerned Range Officer or his authorized officer having jurisdiction over the area where the horn has been found.
2. The horn is to be brought under security to the concerned Range Office.
3. The horn shall be boiled in plain water till the nasal bone flesh gets detached from the horn.
4. The horn is then dipped in water or any other suitable liquid and its volume is recorded by displacement of the liquid. Atleast three readings required.
5. The horn is air dried for two days in a room with 25° C temperature and low humidity.
6. Weight of the horn is recorded in an electronic balance which is calibrated.
7. Density of the horn is calculated
8. The Range Horn Serial No is put on it along with a barcode generated by the Range Office. It is pasted on the horn which includes weight of the horn and its volume
9. The horn is transported under security to the Central Strong Room.
10. At the Central Strong Room, the horn is physically examined for
 1. Physical condition of the horn
 2. Whether broken?
 3. Any cut marks?
 4. Any other physical mark on the horn?
11. The horn is photographed against a white matt finish non reflecting background from six directions, by keeping the horn as if the rhino were to face you, namely 0°,90°,180°,270°, Top and Bottom
12. Outline of the base of the horn is recorded, and the dimensions of the bounding rectangle are noted.
13. The height of the horn from the base to the tip is recorded by keeping the horn vertically up against a scale.
14. Denture plaster cast of the base is made.
15. A new barcode is generated with the Govt. of India Serial No and other characteristics measured as above. The barcode is labeled on all the photographs (physical print/ digital print), the plaster cast, the base diagram with bounding rectangles.
16. A microchip is inserted little above the base of the horn.
17. The base underneath is drilled as per RhODIS Protocol and sent for DNA Indexing to a certified lab.
18. The horn is labeled with the new barcode

19. Data entry made of all the calculations, records, photographs, plaster casts
20. The horn taken to the physical safe area and stored there
21. On collection of sufficient numbers, the horns shall be recorded out "OUT" transit, entered into the system, sealed in a box, a transit challan shall be generated from the system.
22. The box shall be removed after sealing. The keys of the lock to be sealed and kept in the safe with a serial number.
23. All these operations shall be under mounted CCTV
24. The box shall be deposited under security cover to the treasury.
25. The storage room shall be physically and electronically secured with a Tier IV Data Centre like construction (for fire etc.) and security parameters and a fire proof vault room door.
26. Crime exhibits shall not be deposited in the treasury.
27. Quarterly returns of the horn stock along with IN-OUT balance to be submitted to the Govt.

16.7 Tourism

Tourism in Kaziranga Tiger Reserve should be a responsible, informed and sustainable travel to the conservation area, where minimum or no damage is caused due to any kind of pollution (noise pollution, air pollution or water pollution), or waste generation (plastic bottles, polythene bags, biscuits/ chips packets, edible items), or carbon emissions. The following strategies are proposed for tourism, which shall be developed into a full fledged Kaziranga Tiger Reserve Tourism Plan based on the following considerations:

Ticketing and Booking:

Starting from the tourist season of 2014-15, effort shall be made to:

1. Provide online booking of Elephant Seats
2. Minimum elephant seats to be declared range wise at the beginning of the season
3. Additional minimum elephant seats may be declared at least 3 days prior to the actual date of safari.
4. Balance seats, if any, to be booked on the spot, previous evening
5. A fixed quota in the elephant seats may be kept for State guests/ dignitaries/ Departmental visitors
6. 65% of the jeep safari quota to be booked online
7. 10% departmental quota may be reserved
8. Online Payment gateway to be provided
9. Payment through Card (Credit/ Debit etc.) to be enabled at the counters
10. All visitors to fill up mandatory form with photograph

Entry and Exit:

All entries of visitors to the Kaziranga Tiger Reserve to be recorded by dedicated 24X7 CCTV cameras, ANPR systems. The entry and exit time of each vehicle to be recorded at the gate electronically. The following checks shall be applied at the entry point:

1. To check if driver/ visitors are in inebriated condition
2. Driver/ visitors in inebriated condition not to be allowed
3. Identity check
4. In time recording
5. Out time recording

6. Check for any plastic bottles/ eatables
7. Warning for not littering the Park
8. Check for Arms and Ammunition using DFMD/ HHMD/ frisking / X-Ray
9. Entry/ Exit regulation systems to be placed for comfort of visitors
10. Emissions from vehicles shall be checked and recorded.
11. Depending upon maturity of the system, each visitor (above 10 years of age) may be given an Identity card valid for a day/week/month/ season depending upon the requirement

Public Conveniences:

The following public conveniences may be provided at the entry/ exit/ intermediate halt points:

1. Parking of private vehicles
2. Parking fee to be charged
3. Gents/ ladies/ Children toilets
4. Dust bins for waste disposal
5. First Aid
6. Mobile Charging Points

Jeep Safari Regulation:

The following steps for regulation of jeep safari within the Kaziranga Tiger Reserve are proposed:

1. The registration of vehicles to be continued.
2. All vehicles must be of uniform color and make (except any Electric Vehicle that may be introduced by the KTR management)
3. All vehicles must bear Assam Govt registration number only
4. The Driver must have valid driving license and Identity Proof
5. Each vehicle must have valid pollution and emission certificate from APCB
6. The vehicle must be roadworthy
7. Each vehicle shall be fitted with a Vehicle Tracking System

Carrying Capacity:

Based on the carrying capacity to be worked out separately in the Tourism Plan, the following restrictions shall apply:

1. Not more than 216 vehicles per day (all ranges put together) shall be allowed.
2. During peak season additional vehicles upto 300 may be allowed to cope with the rush. However, a Congestion fee of Rs. 100.00 per vehicle may be charged during peak season when number exceeds 216.
3. Minimum distance between two vehicles shall be 100-150 meters
4. Equal number of vehicles should be directed in each range (subject that one group, if not very big, gets accommodated in one range, with a maximum of 4-5 vehicles)
5. Big groups may be split in two or more ranges
6. Jeep safari entry timings shall be 7.30 AM to 10.30 Am and 1.30 PM to 3.30 PM.
7. Early/ late entries may be allowed for accommodating rush

Entry Fee and Other Fees:

It is felt that certain entry fee and rates must be revised for entry into Kaziranga. This would not only keep the rush under control, but also generate more revenues for the Tiger

Reserve. It is also observed that the Indian rates are very low and the rates for foreigners are very high. There is a strong reason to rationalize this as well. The following revised levies and taxes are proposed:

1. Entry fee for Indian visitor Rs. 250.00 and for foreigner Rs. 500.00 per entry
2. Road tax to be at Rs. 300 per vehicle per entry
3. Elephant fee and professional fee kept as it is
4. Non professional camera charges may be levied as below for Indian as well as foreigner visitor:
 1. Still Camera for all Rs. 200.00
 2. Movie camera for all Rs. 800.00
 3. Video Camera for all Rs. 800.00
5. Additional Green Fee to be introduced per person Rs. 25.00 for all
6. Additional Green Fee to be introduced per vehicle Rs. 100.00 for all

Green Fee and Its Regulation:

Green Fee is proposed to be introduced for raising resources for implementation of low carbon strategies for the Kaziranga Tiger Reserve. The following proposal is made in this regard:

1. Till such a time that there are no zero emission vehicles, all visitors shall be required to pay Green Fee.
2. Supposing a EV Safari is introduced, then the following measure may be adopted:
 1. The Operator of the EV Safari shall charge the same rates as other vehicles from passengers
 2. The savings on the Fuel shall be the extra earning incentive for the operators
 3. There shall be no Green Fee on EV Safari. Therefore, the visitors would benefit.
 4. The EV Safari shall be booked 100% online, except vacancies if any may be locally filled.
3. The EV Safari may be run in PPP mode.
4. Attempt shall be to phase out all fossil fuel based safari vehicles over a period of 10 years.
5. Provision/ Infrastructure for charging of EV shall be made at Entry/Exit points and at halting points on the tourist circuit. Charging points shall also be maintained along the NH37. These shall be on payment basis. All charging stations shall be zero emission based systems operating on Solar/ Wind/ Mechanical power

Hotels and Lodges:

As per the National Tiger Conservation Authority (Normative Standards for Tourism Activities and Project Tiger) Guidelines., 2012 issued under Section 38-O of the Wildlife (Protection) Act, 1972, Part B "Guidelines for Tourism in and around Tiger Reserves" Clause 2.1.6, a Conservation Fee is required to be levied on all tourism facilities, except home stays upto 6 bed facilities. The Conservation Fee may range between Rs. 500 to Rs. 3000 per room per month. The facilities need to be classified in various categories starting from home stay to high end. In view of the above guidelines, the following action plan is proposed:

1. All tourist infrastructure to be registered with the Field Director, Kaziranga Tiger Reserve with the following terms and conditions:-
 1. Registration under Sarai Act
 2. Land Ownership documents

3. Land use change NOC from Agriculture to Commercial by the Filed Director prior to start of business / registration under the Sarai Act
 4. Details of beds/ rooms along with associated facilities
 5. Star category/ Heritage category awarded by the Govt. of India, Ministry of Tourism, if any
 6. Total Power consumption (peak/ normal/ lean season), rated power, captive power, Renewable Sources of Energy
 7. Waste Disposal and Recycle infrastructure
 8. Water source and associated infrastructure
 9. Rain Water harvesting infrastructure
 10. Black Water/ Gray water treatment/ recycle
 11. Sewerage system/ disposal of waste
 12. Scale map of the property with GPS based longitude and latitude of the corners of the property
2. All such infrastructure / registered properties shall be classified on two parameters namely Carbon Emission and Guest Comfort
 3. The Guest Comfort classification and charges proposed are:
 1. Home Stay normal: No Charges upto 6 beds. Beyond 6 beds must move to category 2 below
 2. Home Stay certified (upto 12 beds): Rs. 25 per bed per day
 3. Lodge (Only stay): Rs. 50 per bed per day
 4. Dining Only Dhaba/ Restaurant: Rs. 1.00 per Rs. 100.00 transaction. Cash dispenser to be installed
 5. Hotel (Stay plus dining): Rs. 100 per bed per day
 6. Luxury Hotel: Rs. 250 per bed per day
 7. The above rates shall be based on occupancy only
 8. Each registered property shall have to install CCTV in its public/ common premises/ corridors
 4. The Carbon Emission classification shall apply for categories 3 to 6 mentioned above in the following manner:
 1. The Carbon classification shall be based on the principle that least carbon emission property shall get the highest rating and least of the Green Levies to be imposed on the property.
 2. Platinum shall be the highest category, and the owner shall pay Rs. 50 per bed per day during tourist season, and Rs. 25.00 per bed per day during off season. In addition, the owner shall pay Rs. 2000 per month flat for inspection and other charges
 3. Gold shall be the second highest category, and the owner shall pay Rs. 75 per bed per day during tourist season, and Rs. 38.00 per bed per day during off season. In addition, the owner shall pay Rs. 2500 per month flat for inspection and other charges.
 4. Silver shall be the third highest category, and the owner shall pay Rs. 100 per bed per day during tourist season, and Rs. 50.00 per bed per day during off season. In addition, the owner shall pay Rs. 3000 per month flat for inspection and other charges
 5. Bronze be the second lowest category, and the owner shall pay Rs. 150 per bed per day during tourist season, and Rs. 75.00 per bed per day during off season.

In addition, the owner shall pay Rs. 4000 per month flat for inspection and other charges

6. Lead shall be the lowest category, and the owner shall pay Rs. 250 per bed per day during tourist season, and Rs. 125.00 per bed per day during off season. In addition, the owner shall pay Rs. 5000 per month flat for inspection and other charges
7. The per bed charges shall be on occupancy basis.
8. The properties can invest in green infrastructure and move up the ladder after getting a new certification at any point of time
9. All the parameters of classifications and marking system shall be made online and available in public domain, and should be such that each property can do its own assessment itself
5. However, every registered property including home stay shall have to maintain/ provide the minimum green facilities such as solar/ wind power, LED lighting, waste disposal system, rain water harvesting.

16.8 Training, Capacity Building and Manpower Support

There would be additional requirement of trained manpower from various other domains such as computers, IT, electronics, mechanical engineering, civil engineering, project managers, system analysts and other domain experts. It is proposed to hire professionals on contract at levels from L0 to L4, L1 being the lowest in hierarchy and L4 being the highest. From project management, capacity building, training, change management point of view, the levels would be somewhat as below:

1. L4 Principal Consultant (capable of independently heading a project)
2. L3 Senior Consultant (can assist PS, and lead domain specific teams)
3. L2 Consultant (domain expert with at least 3-5 years field experience)
4. L1 Junior Programmers/ technicians/ diploma holders
5. L0 Skilled manpower/ data entry operators

The salaries of the above personnel could be driven by market and incentive and output based, rather than fixed or flat. However, depending upon the level and experience, the salaries could fluctuate from as low as Rs. 5000 per month to Rs. 1.50 per month.

16.9 Raising of Additional AFPF Battalions

As the rhino population from Kaziranga would have to be translocated to other protected areas of Assam, security and strong protection measures would become vital in deciding the future course of action. Currently, there are hardly any spare capacities in the existing two battalions, as Kaziranga has been holding onto the AFPF without tightly. As a result other PAs and forest areas are suffering due to lack of adequate manpower to guard the resources and forest property. The situation is likely to worsen in course of time, as the rhinos start spreading out. The habitats outside Kaziranga would also become very important in about five years time from now. If adequate protection measures are not taken, all the rhinos would become target of the bullets of poachers, thereby advancing the clock on rhino. If the rhinos have to be protected with zeal outside Kaziranga, process of raising four more AFPF battalions should be started. The third battalion is already in the pipeline with HQ at Samaguri. That leaves us with three more battalions to be planned and raised in the next three years so that we have adequate trained and dwell armed manpower

ready to defend the territory of the rhinoceros elsewhere in Assam. It is suggested that of the three battalions that need to be planned, one should be planned between Sibsagar and Tinsukia, as Dibru Saikhowa and Pani Dihing are potential rhino habitat expansion candidates. Similarly, another battalion should be planned in lower Assam so that Manas can be fully secured. Once the Kaziranga landscape is secured, rhinos would start staying near the north bank areas on a more permanent basis, and chances of their straying further north would increase. Further, the corridors of Kaziranga landscape that would also fall on the north bank along most of the river systems joining the Brahmaputra from the north that would be recognized as corridors, would need constant protection, as the population densities are very high there. In view of this one battalion should be planned on the north bank side, say near Biswanath.

16.10 Assam Rhino Range Expansion Project (ARREP)

As already stated in Chapter 6, the excess rhinos from Kaziranga need to be translocated to new secure sites annually. The removals that can safely happen from Kaziranga is estimated to be 25-35 rhinos per year. It has been seen that there have been some good experiments in the African countries for expanding range and securing the future of the black rhino. A similar initiative is required in Assam as well.

Current Status of Rhinos in Assam:

The current status of rhinos in Assam PA wise is given below:

Sl. No.	Name of PA	Year of Census	Rhino Population
1	Kaziranga National Park	2013	2329
2	Rajiv Gandhi Orang National Park	2012	100
3	Pobitora Wildlife Sanctuary	2012	93
4	Manas Tiger Reserve	2014	31
	TOTAL		2553

16.10.1 Black Rhino Expansion Project

The Black Rhino Range Expansion Project started in South Africa in 2003 to create new populations of black rhino. Prior to 1960, the estimated population of black rhinos was 65000 across Africa. However due to poaching, only 2000 rhinos were left by the end of 1990s. After introduction of the BRREP, eight new black rhino populations have been created in South Africa, residing in KwaZulu-Natal and Limpopo spread over a territory of about 1600 sq km. So far about 130 black rhino have been translocated. More than 40 calves have been born on the new project sites. Of course poaching continues to be menace. So far 3 rhinos have been poached from these secure sites.

16.10.2 IRV 2020

The Indian Rhino Vision (IRV) 2020 is a joint program of the Assam Forest Department, World Wide Fund for Nature (WWF) and International Rhino Foundation (IRF) formulated by the "Task Force for Translocation of Rhinos within Assam" in November 2005. The

IRV2020 is a multi-partner program where government departments are working together with the international organizations, local NGO's and the communities. The program has been formulated by the "Task Force for Translocation of Rhinos within Assam" constituted by the Government of Assam vide notification No. FRW.24 / 2005 / 15 dated 30th June, 2005 incorporating conservationists and officials from the government as well as non-governmental sector. The aim was to work for the long-term conservation of the rhinos in the state through enhanced protection, habitat management and range expansion and the vision set was "To have a rhino population of 3000 in the wild in Assam in spread over seven of its protected area by the year 2020". The plan was to secure the existing rhino population in Kaziranga NP, Pobitora WLS and Rajib Gandhi Orang National Park and to re-introduce rhino's in the potential habitat's identified viz. Manas NP, Dibru Saikhowa WLS, Laokhowa - Bura Chapori WLS with a viable population of rhino through wild to wild translocations from Kaziranga NP and Pobitora WLS.

To assess the feasibility, specialized teams for Security and Habitats were formed and field studies undertaken in the identified potential areas. From the reports received, the Task Force decided to select Manas NP as the first site to re-introduce the rhinos after necessary corrective measures were undertaken. These pro-active efforts for the conservation of the rhinos in Assam received acceptance globally and necessary support both financial and technical were made available by International Organizations and Donors as well as the Government of Assam and the Bodoland Territorial Council for the implementation of the program. The security group of the Task Force made multiple assessments and presented the findings to the Task Force. On learning about the satisfactory progress of works, a decision was taken to move four rhinos to Manas starting in 2008 after obtaining necessary permissions from the Government of India. Plans were made to translocate twenty rhinos to Manas as the founder population from Pobitora WLS and Kaziranga NP. After all necessary preparations, as a part of the training phase, two male rhinos were released in Manas NP on 12th April 2008 transported by truck from Pobitora escorted by a special team. The rhinos were radio collared and were monitored on a daily basis to understand their ranging and social behavior. The reports indicated that the rhinos had adapted well and the habitat was quite favorable. Thereafter, 16 more rhinos were translocated to Manas in batches, two rhinos were released in December 2010, four in January 2011, two in January 2012, four in February 2012 and four more in March 2012. Till date eighteen rhinos have been released in Manas in batches. All these have been wild to wild translocations under IRV2020. The translocated rhinos were monitored regularly using radio telemetry as well as by standard traditional methods.

The ranging of rhinos were regularly monitored by dedicated teams for the first time in the wildlife history of Assam. It also generated a lot of documentation regarding the post-release behavior and ranging of the rhinos. The data generated by the field teams were fed into a GIS platform with the support of the WWF team and mapped for better understanding and arriving at management decisions. Manas also housed five rhinos which were under rehabilitation and thus, there were now thirty-one rhinos in the Park. Eleven calves were recorded to have been born in Manas after the translocation and three of these from the rehabilitated females, which is a reliable indicator that the rhinos have adapted and settled well in Manas.

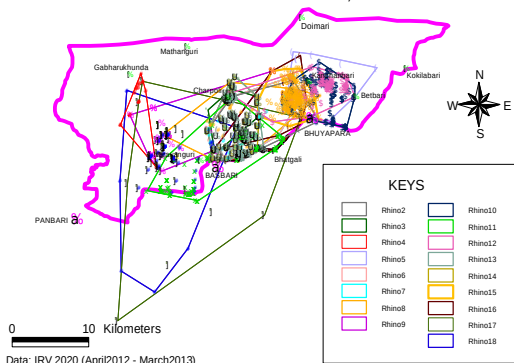
However since late 2011, three years after the first two rhinos were translocated to the

Park, the first incident of poaching took place. Since then till date, a total of seven rhinos have been poached in Manas raising serious questions about the security situation. A lot of efforts have been initiated during the last one year that included implementation of Law Enforcement Monitoring (SMART) to improve the security situation and after re-assessing the situation the translocation of the two remaining rhinos of the first planned batch of twenty rhinos have been put on hold by the Rhino Task Force. It has been decided to re-assess the situation from time to time in terms of the prevailing security situation for planning any further translocations to the park under IRV2020.

After the success of translocation trials in Manas, the Task Force identified the Laokhowa-Burachapori complex in Nagaon district of Assam to re-introduce rhinos in the area. Rhinos existed in these wildlife sanctuaries till recent past which were wiped out due to social unrest in that area. The habitat team has already given the green signal for the rhinos and the security team has given the suggestions to improve the security scenario to support the rhinos. Works are in progress and necessary funds are being provided from WWF, IRF, USFWS and Government sources. The Government of India has already provided the permission for the translocation of ten rhinos as the first batch and it is expected that the first round of translocation to the complex from Kaziranga NP can be conducted by early 2015.

RANGING PATTERNS OF THE RELEASED RHINOS

MANAS NATIONAL PARK, ASSAM



The key learnings from the programme are:

1. Security of the habitat is of utmost priority, as even a single rhino lost in a new struggling population would mean that the population would continue to be threatened even in the long run.
2. Non availability of the drugs necessary for chemical immobilization within India is a

serious limitation to the programme of translocation. The procurement process is very difficult and time consuming as clearances / licenses / NOC's are necessary for the import from various Government departments / agencies. The drugs is classified as Narcotics and is governed by the Narcotic Drugs and Psychotropic Substances Rules, 1985.

3. There is no dedicated team working on IRV2020. Nor is there any overarching enabling mechanism other than the task force.
4. The fund flow is highly irregular, and a program like IRV2020 cannot be sustained with erratic fund flows.

16.10.3 Aim of the Project

As can be seen that there is lot to learn from the IRV2020. The Assam Rhino Range Expansion Project must be institutionally very strong, as rhinos matter for the people of Assam, and a dedicated team is required to be put in place along with an enabling overarching mechanism.

Therefore, the Assam Rhino Range Expansion Project shall be a Mission Mode Project. The aims of the project would be:

1. To reintroduce rhinos back to its traditional habitats in Assam
2. To extend the rhino habitat so that an ecological carrying capacity of 6000 rhino population can be sustained
3. To initiate habitat improvement programmes in all the rhino bearing areas as well as potential rhino bearing areas
4. To secure all rhino bearing habitats
5. To foster international cooperation and research on the Greater One Horned Rhino

16.10.4 Status of IRV2020 in ARREP

IRV2020 is proposed to become a sub programme under the ARREP. All the funding available for IRV2020 shall be available for achieving the future targets, as the key aim of the both the schemes is the same- i.e. long term survival of the rhinoceros. In fact, the fund gap in IRV2020 would be met from AREEP; and the scheme would provide for adequate manpower support to IRV2020.

16.10.5 Institutional Mechanism of ARREP

Since ARREP would be a mission mode programme, and habitat extension is the focus area, the following proposals in this regard are made:

1. There would be an Apex Committee headed by the Chief Secretary, Assam comprising of the following members:
 1. Chief Secretary, Chairman
 2. Addl CS, Revenue, Member
 3. Addl CS, Finance, Member
 4. Principal Secretary, Forest & Env. Member
 5. Principal Secretary, P&D, Member
 6. PCCF & HoFF, Member
 7. PCCF (Wildlife), Member secretary
 8. Addl PCCF (Biodiversity), Member

9. CCF/CF of concerned wildlife areas/ PAN, Members
10. Deputy Commissioners of concerned districts, Members
11. Representatives of NGOs, Members
2. The existing IRV2020 Task Force may double for the Executive Council of the ARREP
3. The ARREP shall be housed in the office of the PCCF(WL) with a dedicated PMU headed by a L4 resource and two L3, 4 nos of L2 and 6 nos of L1 resource. About 10 nos of L0 resource could also be hired for continuous field work and data gathering
4. There shall be a separate account for the ARREP to receive funds from the KLCD

16.10.6 Plans and Activities

The ARREP can adopt the plan and activities of IRV2020. The additional areas to be covered would include:

1. Assessment of carrying capacity of existing rhino bearing areas
2. Scout possible extensions areas, and design strategies for their security
3. Plan research and development for the GOH rhino
4. Engage with the communities in the vicinity of the rhino bearing areas for EDC and eco-development intervention
5. Continuously assess the security situation around the existing rhino bearing areas and organize funding for the gap areas.
6. Carry out capacity building and training of the field staff and provide schemes for their motivation.

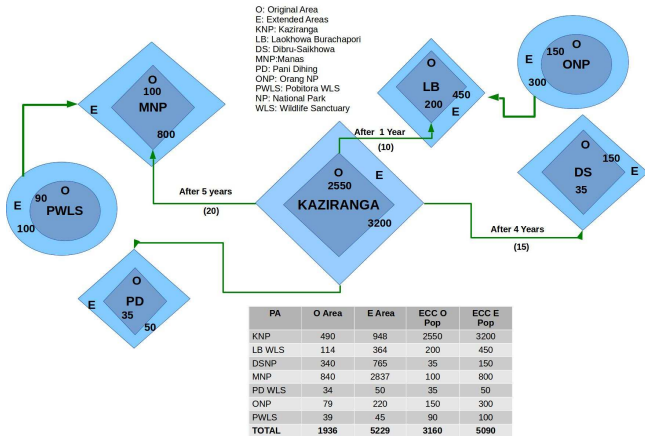
16.10.7 Areas to be covered

The following PA would be covered first:

1. Manas Tiger Reserve
2. Burachapori WLS
3. Laokhowa WLS
4. Dibru Saikhowa Biosphere Reserve
5. Pani Dihing WLS
6. Orang National Park
7. Pabitora WLS
8. Buffer areas of the Tiger Reserves

16.10.8 The ECC of the Habitats and Challenges in Rhino Bearing Areas

The target set forth should be to create an Ecological carrying capacity of 5000 rhino populations in Assam. This seems to be a good target, as it is not likely to be reached before 2070, assuming that we reach a population size of 3000 by 2020. This gives us a good time to identify the habitats, clear them of any encroachments, and secure them. However, there are several challenges. These have been discussed PA wise below:-



Manas Tiger Reserve:

The Manas National Park has an area of 500 sq km, and the Manas Tiger Reserve has a notified core area of 840 sq km including the barnadi WLS. Of these, only limited area is suitable for rhino. Manas alone may not support more than 100 rhinos. However, the buffer area of Manas constitutes of areas such as the Manas RF (on the west of the Sukhanjan river) having a total area of 619.03 sq km. Of this, the western part is almost all forest villages and encroachments. Next to the Manas RF lies an area of about 350 sq km, for which already a proposal has been moved to convert it into a National Park. This part of the Manas RF is a very vast expanse of grasslands with a few woodlands scattered here and there. This is an excellent habitat for rhino, and probably can grow to be the next Kaziranga, if given protection. This habitat to my mind could be the next dream habitat of the rhino. The undersigned had surveyed most of this area during 1998-99 for working plans, as Working Plan Officer, Upper Assam Circle, Jorhat. One of the first targets should be to notify the area as national Park and secure it just like Kaziranga. This could be the home for about 800 rhinos in the future.

Bura Chapori Laokhuwa WLS:

The twin sanctuaries are currently part of the Kaziranga Tiger Reserve, and a brief description about them can be found in the Part I Chapter 3. **it must be mentioned here that in 1983 during the period of Assam agitation, 35 rhinos (the last of the surviving species in these parts) were poached over a period of three days.** [the undersigned tried to unearth the recorded proof of the above, but was not successful, as the records, being old appears to be out of life]. Now the area is bereft of any rhino. The area appears to have an ECC of 200 rhinos as of now. Though the Burachapori is getting ready to receive its first rhinos from Kaziranga sometime in 2015, what is more important from the ARREP point of view is to work from now for a secure and extended habitat. Right from under the Kaliabhomora bridge to Singri hills, there is land along the Brahmaputra river measuring 248 sq km which can be acquired in two parts of 140 sq km and 108 sq km. The DFO Nagaon Wildlife Division has already initiated correspondence in this regard with the Deputy Commissioner, Sonitpur. There could be human populations residing in the char areas, which needs to be taken into account. Incidentally, there is also a Kuchmara RF having an area of 21.55 sq km, adjacent to Burachapori on the west. This RF was constituted in 1978. During the Assam agitation in the eighties, the area got encroached. Part of this RF is eroded, and a fishery mahal is currently operating there. There are about 1200 families settled in this RF. About 14 sq km of the RF is encroached. We may have to initiate eviction drive to clear the RF, and use it as extended habitat for the rhino. The new areas would enable the ECC of this twin sanctuaries to be raised to 450. This entire area has been proposed under the Kaziranga Landscape.

Orang National Park:

Orang National Park is an excellent rhino habitat , but only confined to 79 sq km. The park currently houses about 100 rhinos. The ECC could be about 150 as of now, since Orang is an excellent productive habitat. There is a potential to include more areas starting from the west of the proposed additions to Burachapori-Laokhowa WLS, right upto the western part of the Park. This could potentially provide an additional area of 140 sq km, which is substantial. The ECC of the Park could then possibly go upto 300. The DFO Mangaldoi Wildlife division should move a proposal of addition forthwith to the concerned Deputy Commissioner. Orang along with the extended area has been proposed to be in the Kaziranga Landscape. The rhino census figures for Rajiv Gandhi Orang National Park are given below for record:-

Sl No.	Year	Count
1	2006	68
2	2009	64
3	2012	100

Pobitora WLS:

The Pobitora wildlife sanctuary is currently the smallest rhino bearing area in Assam with a very high density of animal population. It has notified area of about 39 sq km and there are about 90 rhinos as of now. Pobitora seems to be at its peak of the Ecological Carrying Capacity. However, it is to be noted that there is an area of 1100 ha (11 sq km) which still is not in possession of the sanctuary, and local people are continuing to raise agricultural crops in that parcel of land. Therefore, the effective area of Pobitora is only 28 sq km and the rhino density is actually higher than officially thought. The Assam Survey, it appears, recently conducted a survey of the land, and it is expected that this parcel may be handed over to the sanctuary in near future, much to the relief of the rhino. There are also private areas where rhinos stray regularly. If possible, the chances of buying about additional 5-10 sq km of land should be explored.

SI No.	Year	Count
1	1987	54
2	1993	56
3	1995	68
4	1999	74
5	2004	79
6	2006	81
7	2009	84
8	2012	93

Dibru Saikhowa NP:

The Dibru-Saikhowa National Park has an area of 340 sq km, and is surrounded by ten mighty rivers on all the sides. Currently there are no rhinos. The area, however is suitable for the rhinos, and as such is already on the radar of the IRV2020. However, due to immense biotic interference of human and cattle population, the Park may not be in a position to support more than 35 rhinos. There are two villages namely Laika and Dadhia were two forest villages set up in 1955. There were 1553 families in 2005. The population has grown up now and considerable encroachments also have occurred. There are more than 10000 cattle population. It appears that villagers are also now interested to move out, but there does not seem to be any appropriate place available. If the population is moved out, and the area allowed to rejuvenate, it would be in a position to support about 150 rhinos. Therefore, this area also needs a long term planning and administrative interference to find another good home for the Rhinos.

Panidihing WLS:

The Panidihing WLS is about 34 sq km area. This earlier was supposed to be a rhino bearing area. The site is ecologically highly disturbed and surrounded by villages all around. It has been carved out of the original Panidhing RF, of which only 21.39 sq km is left. There is also a forest village, and most of the RF area remains encroached. There are about 1500 families residing inside the RF. Unless a strategy is adopted to bring the villages out side, security of the rhinos would be questionable. Considerable attention needs to be paid to this area in order to reintroduce rhinos here.

Kaziranga National Park:

As of now about 490 sq km is the actual habitat of the rhino, of which about 84 sq km is already lost to the river Brahmaputra. Therefore, the effective area is about 406 sq km. On acquiring all the proposed additions, and additional forest areas in the adjoining hills, the total area of Kaziranga would be about 948 sq km. Beyond this, considerable effort would be required to increase the area any further. If we take the entire area of the Karbi Anglong and adjoining watersheds, and protect it fully, there would be a gain of 750 sq km of additional area for Kaziranga. However, effective use of this area would largely depend upon, besides excellent protection strategies, the treatment that we give to the NH37 and the way we restore and retrofit the corridors.

The fate of the rhinos in Assam would largely depend upon whether, we, the people of Assam, rise to the occasion and do every bit that we can do to restore and secure the home range of the rhinos.

CHAPTER 17

17 Time Budget

The overall time perspective for implementation of the proposals has been kept at 10 years starting from the 3rd Quarter of 2014-15 to the 4th Quarter of 2024-25. Further, the proposals put forth from Chapter 11 to 16 have been classified as Short Term (ST), Medium Term (MT), Long Term (LT), and some intermediate time frames. The short term would mean a maximum period of one and half years. The short term measures should be complete by the end of 2015-16. Medium Term initiatives are expected to be completed by the end of the fifth year i.e. 2019-20. The Long Term initiatives would be expected to be over by 2024-25. However, some initiatives may not exactly fit into the classification given above, especially habitat related activities which need to be carried out annually. These have been termed Annual Ongoing (AO). There are certain measures which need to be implemented in next 6 months. These have been termed as Immediate (IM)

In terms of Time of Start, some activities would start right away in 2014-15, others would take time of project preparation of about a year and half. These proposals would have project preparation phase slotted in the short term, while the project actually may start in medium term. In certain other cases, if the short term phase ends, the roll out may start in the medium phase. Certain issues are matter of policy implementation, which is required to be done either in short term, medium term or long term. Therefore, the timelines have been coded as below:

Code	Full Form	Time Period
IM	Immediate	From 1 st September, 2014 to 31 st March, 2015
IS	Immediate to Short Term (Time Spill Over)	From 1 st September, 2014 to 31 st March, 2016
ST	Short Term	From 1 st September, 2014 to 31 st March, 2016
SM	Short Term to Medium Term	From 1 st April, 2015 to 31 st March, 2020
SL	Short term to Long Term	From 1 st April, 2015 to 31 st March, 2025
MT	Medium Term	From 1 st April, 2016 to 31 st March, 2020
ML	Medium Term to Long Term	From 1 st April, 2016 to 31 st March, 2025
LT	Long Term	From 1 st April, 2020 to 31 st March, 2025

17.1 Immediate Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
	11.3	1	Taking over 2 nd to 6 th Additions to KNP	IM
	11.4	1	Detailed Corridor Survey and Mapping	IM
	11.5	6	Evictions	IM
12. Upscaling Anti Poaching Infrastructure				
	12.2.1	1	SMART GUARD Pilot	IM
	12.2.2	3	SMART Communication Pilot	IM
	12.2.3	5	Electronic Eye	IM
		8	Pilot Perimeter Security in Burapahar Range	IM
13 Kaziranga Landscape Conservation & Development Authority				
		1	Enactment of the Kaziranga Landscape Conservation & Development Authority	IM
		2	Formation of the Kaziranga Landscape Conservation & Development Authority	IM
14 Management Strategies				
	14.1.1	1	Fill current vacancies	IM
		2	Replace old and infirm staff	IM
		3	Fill vacancies in AFPF	IM
		4	Local Community Volunteers	IM
	14.2.1	8	Additional Responsibilities to R HQ and Beats (1-6,8)	IM
	14.2.2	10	Additional Incentives (1-4, 6,7, 9,10)	IM
		14	Equipping floating camps and boats with equipment	IM
	14.2.5	16	Dog Squad	IM
16 Policy, Law, Protocols and Programme Strategies				
	16.3.1	3	Removal of Legal Bottlenecks	IM
	16.3.2	4	Removal of Procedural Bottlenecks (1-16)	IM
	16.3.3	6	Wildlife Crime Scene Investigation Methodology (1-18, 20, 23-27)	IM
		8	Dog Squad Protocol	IM
		9	Postmortem Protocol	IM
		10	Post Gun Shot Protocol	IM
	16.3.4	11	Modernizing Wildlife Crime Scene Investigation (1-4,7)	IM

	16.5.5	19	Tiger Conservation Plan (1)	IM
	16.5.6	21	Kaziranga Biodiversity Conservation and Development Committee	IM

17.1.1 Immediate to Short Term

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
		2	Habitat Extension Programmes (HEP)- Forest Land	IS
12. Upscaling Anti Poaching Infrastructure				
	12.3	16	Solar Power	IS
16 Policy, Law, Protocols and Programme Strategies				
	16.2	2	Applying provisions of the Sarai Act, 1867	IS
	16.5.7	22	Local Advisory Committee	IS
	16.7	24	Tourism	IS

17.2 Short Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
	11.1.3	1	Experimental Bank Line Erosion Control Measures at Debeswari bank line	ST
		2	Revised FREMAA proposal for Kaziranga – Its formulation and approval	ST
		4	Brahmaputra Bankline Migration study for Kaziranga	ST
		5	Creating Habitat Management Infrastructure- ATV/ Tractors/ Excavaors/ Dumpers	ST
		3	HEP – Procurement of Government Land	ST
	11.4.2	5	Other Corridors Survey and Delineation	ST
	11.7	9	Informed Management	ST
12. Upscaling Anti Poaching Infrastructure				
		2	SMART GUARD Roll Out	ST
		4	SMART Communication Roll Out	ST
	12.2.7	10	UAV	ST

		11	Quad Copters/ Aerostat	ST
		12	Vehicle Mounted Surveillance	ST
12.2.8		13	AWS-WQ Monitoring	ST
		14	GIS	ST
		15	IT	ST
13 Kaziranga Landscape Conservation & Development Authority				
		3	Office, Manpower and Funds	ST
14 Management Strategies				
		5	Raise the Sanctioned Strength of EAWL Division	ST
14.1.2		6	Reorganization of EAWL Division	ST
14.2		7	Realignment of Anti Poaching Camps	ST
		9	Additional Responsibilities to R HQ and Beats (7,9)	ST
		11	Additional Incentives (5, 8-10)	ST
14.2.3		12	Family Welfare measures	ST
14.4		18	Veterinary Hospital	ST
		19	Hospital at Kohora	ST
		20	Central Strong Room	ST
		21	Kaziranga Mini Data Center	ST
		22	Model Range Offices	ST
		24	Upgradation of KCCC	ST
		27	Pilkhana	ST
		29	Upgradation of CWRC	ST
		30	Upgradation of 2 nd AFPP HQ	ST
		31	VC System	ST
		32	Satellite Based Monitoring	ST
15 Kaziranga Landscape Green Growth Framework				
15.7.2		4	Organic certification	ST
15.8.8		11	Rain Water Harvesting	ST
16 Policy, Law, Protocols and Programme Strategies				
16.1		1	State Amendment to the Wildlife (Protection) Act, 1972	ST
		5	Removal of Procedural Bottlenecks (17-21)	ST
		12	Modernizing Wildlife Crime Scene Investigation (5)	ST
16.3.6		15	Inter Agency Coordination	ST
16.3.7		16	Protocol and Training for Enforcement Agencies	ST

	16.5.4	18	Management of Landscape Areas outside KTR	ST
	16.6	23	Rhino Horn Stockpile Protocol	ST
	16.8	25	Training and Capacity Building Policy	ST

17.2.1 Short Term to Medium Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
12. Upscaling Anti Poaching Infrastructure				
	12.2.4	6	R&D in Anti Poaching & Surveillance	SM
	12.2.6	7	Perimeter Security	SM
		9	Ground Surveillance Radars	SM
	12.4	17	Tazer and Other Equipment	SM
13 Kaziranga Landscape Conservation & Development Authority				
		4	Policy Formulations	SM
14 Management Strategies				
		15	Permanent watch towers in the River Brahmaputra	SM
	14.3	17	Roads and Bridges	SM
		25	IMAX Theatre & 3D Films	SM
		28	Staff Quarters	SM
15 Kaziranga Landscape Green Growth Framework				
	15.9.2	13	Safe Walkways	SM
	15.9.3	14	Safe Cycling	SM
	15.9.6	16	Electric Bus	SM
	15.9.7	17	Electric Vehicle	SM
	15.10	20	Peoples Framework	SM
	15.10.1	21	Building Green and Resilient Communities	SM
	15.10.4	23	Microplans and Capacity Building	SM
16 Policy, Law, Protocols and Programme Strategies				
		7	Wildlife Crime Scene Investigation Methodology (19, 21,22)	SM
		13	Modernizing Wildlife Crime Scene Investigation (6)	SM
	16.3.5	14	Implementing RhoDIS	SM
		20	Tiger Conservation Plan (2-3)	SM
	16.9	26	Raising of Additional AAFP Battalions	SM

17.2.2 Short Term to Long Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
		5	HEP – Procurement of Tea Garden Land	SL
		6	HEP – Procurement of Private Land	SL
14 Management Strategies				
		33	Extension of Management Practices	SL
15 Kaziranga Landscape Green Growth Framework				
	15.6	1	Renewable Energy	SL
	15.7.1	3	Organic Agriculture	SL
	15.8	5	Low Impact Buildings	SL
	15.8.2 / 3	6	Building Certification	SL
	15.8.4	7	Net Zero Building	SL
	15.8.5	8	Off-the-grid Buildings	SL
	15.8.6	9	Model Villages	SL
16 Policy, Law, Protocols and Programme Strategies				
	16.4	17	Research & Development	SL
	16.8	25	Assam Rhino Range Expansion Project	SL

17.3 Medium Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
		3	Revised FREMAA proposal for Kaziranga – Its implementation	MT
		2	Policy for ban of use of chemical pesticides and insecticides	MT
		6	Forestry Logging Equipment	MT
		8	Setting up of mechanical workshop	MT
		2	NH37 Overpasses on Corridors	MT
13 Kaziranga Landscape Conservation & Development Authority				

		5	Functioning of the Kaziranga Landscape Conservation & Development Authority	MT
14 Management Strategies				
		23	Central Interpretation Centre	MT
		26	Staff Grooming cum Recreation Centre	MT
15 Kaziranga Landscape Green Growth Framework				
	15.8.9	12	Waste Management	MT

17.3.1 Medium Term to Long Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
		7	Securing the entire bankline on the south bank	ML
		4	HEP – Procurement of Community Land	ML
	11.6	8	New Corridors	ML
15 Kaziranga Landscape Green Growth Framework				
	15.7	2	Climate Smart Agriculture	ML
	15.8.7	10	Grey Water	ML
	15.9.5	15	Electric Truck	ML
	15.9.8	18	Transit Oriented Development	ML
	15.9.9	19	Better Roads	ML

17.4 Long Term Measures

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
		6	Dredging and Chapori Reclamation within 500 of Bankline	LT
	11.2	1	To create No Activity Zone of 500 m	LT
		7	Fire Fighting Equipment	LT

17.5 All Measures at a Glance

Sl. No	Broad Category of Intervention	ID	Proposal	Time Frame
11 Habitat Strategies				
	11.1.3	1	Experimental Bank Line Erosion Control Measures at Debeswari bank line	ST
		2	Revised FREMAA proposal for Kaziranga – Its formulation and approval	ST
		3	Revised FREMAA proposal for Kaziranga – Its implementation	MT
		4	Brahmaputra Bankline Migration study for Kaziranga	ST
		5	Brahmaputra river profiling and acoustic survey	AO
		6	Dredging and Chapori Reclamation within 500 of Bankline	LT
		7	Securing the entire bankline on the south bank	ML
	11.2	1	To create No Activity Zone of 500 m	LT
		2	Policy for ban of use of chemical pesticides and insecticides	MT
		3	Invasive Weed Control Programme (Annual Areas of Operation)	AO
		4	Other Habitat Improvement Programmes (OHIP)	AO
		5	Creating Habitat Management Infrastructure- ATV/ Tractors/ Excavaors/ Dumpers	ST
		6	Forestry Logging Equipment	MT
		7	Fire Fighting Equipment	LT
		8	Setting up of mechanical workshop	MT
	11.3	1	Taking over 2 nd to 6 th Additions to KNP	IM
		2	Habitat Extension Programmes (HEP)- Forest Land	IS
		3	HEP – Procurement of Government Land	ST
		4	HEP – Procurement of Community Land	ML
		5	HEP – Procurement of Tea Garden Land	SL
		6	HEP – Procurement of Private Land	SL
	11.4	1	Detailed Corridor Survey and Mapping	IM
		2	NH37 Overpasses on Corridors	MT
		3	NH37 as Highland for animals	ML

	4	Corridor Retrofitting	ML
11.4.2	5	Other Corridors Survey and Delineation	ST
11.5	6	Evictions	IM
	7	Compensation to People	IS
11.6	8	New Corridors	ML
11.7	9	Informed Management	ST
12. Upscaling Anti Poaching Infrastructure			
12.2.1	1	SMART GUARD Pilot	IM
	2	SMART GUARD Roll Out	ST
12.2.2	3	SMART Communication Pilot	IM
	4	SMART Communication Roll Out	ST
12.2.3	5	Electronic Eye	IM
12.2.4	6	R&D in Anti Poaching & Surveillance	SM
12.2.6	7	Perimeter Security	SM
	8	Pilot Perimeter Security in Burapahar Range	IM
	9	Ground Surveillance Radars	SM
12.2.7	10	UAV	ST
	11	Quad Copters/ Aerostat	ST
	12	Vehicle Mounted Surveillance	ST
12.2.8	13	AWS-WQ Monitoring	ST
	14	GIS	ST
	15	IT	ST
12.3	16	Solar Power	IS
12.4	17	Tazer and Other Equipment	SM
13 Kaziranga Landscape Conservation & Development Authority			
	1	Enactment of the Kaziranga Landscape Conservation & Development Authority	IM
	2	Formation of the Kaziranga Landscape Conservation & Development Authority	IM
	3	Office, Manpower and Funds	ST
	4	Policy Formulations	SM
	5	Functioning of the Kaziranga Landscape Conservation & Development Authority	MT
14 Management Strategies			
14.1.1	1	Fill current vacancies	IM

	2	Replace old and infirm staff	IM
	3	Fill vacancies in AFPF	IM
	4	Local Community Volunteers	IM
	5	Raise the Sanctioned Strength of EAWL Division	ST
14.1.2	6	Reorganization of EAWL Division	ST
14.2	7	Realignment of Anti Poaching Camps	ST
14.2.1	8	Additional Responsibilities to R HQ and Beats (1-6,8)	IM
	9	Additional Responsibilities to R HQ and Beats (7,9)	ST
14.2.2	10	Additional Incentives (1-4, 6,7, 9,10)	IM
	11	Additional Incentives (5, 8-10)	ST
	12	Staff Training and Capacity Building	AO
	13	Floods and Disaster Management	AO
14.2.3	12	Family Welfare measures	ST
14.2.4	13	Brahmaputra River mapping after floods along with items of work 2 to 5	AO
	14	Equipping floating camps and boats with equipment	IM
	15	Permanent watch towers in the River Brahmaputra	SM
14.2.5	16	Dog Squad	IM
14.3	17	Roads and Bridges	SM
14.4	18	Veterinary Hospital	ST
	19	Hospital at Kohora	ST
	20	Central Strong Room	ST
	21	Kaziranga Mini Data Center	ST
	22	Model Range Offices	ST
	23	Central Interpretation Centre	MT
	24	Upgradation of KCCC	ST
	25	IMAX Theatre & 3D Films	SM
	26	Staff Grooming cum Recreation Centre	MT
	27	Pilkhana	ST
	28	Staff Quarters	SM
	29	Upgradation of CWRC	ST
	30	Upgradation of 2 nd AFPF HQ	ST
	31	VC System	ST
	32	Satellite Based Monitoring	ST
	33	Extension of Management Practices	SL

15 Kaziranga Landscape Green Growth Framework			
15.6	1	Renewable Energy	SL
15.7	2	Climate Smart Agriculture	ML
15.7.1	3	Organic Agriculture	SL
15.7.2	4	Organic certification	ST
15.8	5	Low Impact Buildings	SL
15.8.2 / 3	6	Building Certification	SL
15.8.4	7	Net Zero Building	SL
15.8.5	8	Off-the-grid Buildings	SL
15.8.6	9	Model Villages	SL
15.8.7	10	Grey Water	ML
15.8.8	11	Rain Water Harvesting	ST
15.8.9	12	Waste Management	MT
15.9.2	13	Safe Walkways	SM
15.9.3	14	Safe Cycling	SM
15.9.5	15	Electric Truck	ML
15.9.6	16	Electric Bus	SM
15.9.7	17	Electric Vehicle	SM
15.9.8	18	Transit Oriented Development	ML
15.9.9	19	Better Roads	ML
15.10	20	Peoples Framework	SM
15.10.1	21	Building Green and Resilient Communities	SM
15.10.2	22	Man Animal Interface Management	AO
15.10.4	23	Microplans and Capacity Building	SM
16 Policy, Law, Protocols and Programme Strategies			
16.1	1	State Amendment to the Wildlife (Protection) Act, 1972	ST
16.2	2	Applying provisions of the Sarai Act, 1867	IS
16.3.1	3	Removal of Legal Bottlenecks	IM
16.3.2	4	Removal of Procedural Bottlenecks (1-16)	IM
	5	Removal of Procedural Bottlenecks (17-21)	ST
16.3.3	6	Wildlife Crime Scene Investigation Methodology (1-18, 20, 23-27)	IM
	7	Wildlife Crime Scene Investigation Methodology (19, 21,22)	SM
	8	Dog Squad Protocol	IM

		9	Postmortem Protocol	IM
		10	Post Gun Shot Protocol	IM
16.3.4		11	Modernizing Wildlife Crime Scene Investigation (1-4,7)	IM
		12	Modernizing Wildlife Crime Scene Investigation (5)	ST
		13	Modernizing Wildlife Crime Scene Investigation (6)	SM
16.3.5		14	Implementing RhoDIS	SM
16.3.6		15	Inter Agency Coordination	ST
16.3.7		16	Protocol and Training for Enforcement Agencies	ST
16.4		17	Research & Development	SL
16.5.4		18	Management of Landscape Areas outside KTR	ST
16.5.5		19	Tiger Conservation Plan (1)	IM
		20	Tiger Conservation Plan (2-3)	SM
16.5.6		21	Kaziranga Biodiversity Conservation and Development Committee	IM
16.5.7		22	Local Advisory Committee	IS
16.6		23	Rhino Horn Stockpile Protocol	ST
16.7		24	Tourism	IS
16.8		25	Training and Capacity Building Policy	ST
16.9		26	Raising of Additional AFPF Battalions	SM
16.8		25	Assam Rhino Range Expansion Project	SL

CHAPTER 18

18 Budget and Finance

An attempt has been made based on the suggested measures listed in the previous Chapter, to arrive at budgetary cost estimates of the various items of work. These costs at many places are tentative and a Detailed Project Report (DPR) would have to be prepared for most of the strategies suggested. For example a DPR has already been prepared and submitted to ONGC for the SMART GUARD Pilot. Another DPR for SMART Communication is underway for submission to Oil India Ltd. Both the proposals are meant for CSR funding from the corporate houses. This Chapter also outlines briefly the sources of fund that may be tapped for implementation of the programmes and strategies. Additionally, an indication of possible revenue sources for the KTCF and the Authority have been also indicated.

18.1 Budget Estimates

All the figures in Crore Rupees and costed for a period of 10 (ten) years:

SI No	Programmes and Strategies	Core Project Funding	Gov/ GoA Project Funding	Non Plan Support	State Plan Support	Total
1	Erosion Control	20.00	2250.00			2,270.00
2	Habitat Improvement Programme	70.00			5.00	75.00
3	Habitat Extension Programme	200.00			50.00	250.00
4	NH37 & Corridors	250.00	2000.00			2,250.00
4A	Gohpur-Numaligarh 4 Lane Bridge and Connectivity		2750.00			
4B	Kaliabor to Gohpur 4 Lane with another bridge on the river near Kaliabhomora		4388.45			
5	Informed Management System	15.00				15.00
6	Anti Poaching Equipment	280.00			15.00	295.00
7	Anti Poaching Infrastructure & Maintenance	365.00			30.00	395.00
8	Capacity Building of Staff	30.00			5.00	35.00
9	Reorganization			150.00		150.00
10	Staff and Family Welfare	140.00			15.00	155.00
11	Key Support	170.00			10.00	180.00

	Infrastructure					
12	Kaziranga Landscape Conservation & Development Authority	80.00		25.00	10.00	115.00
13	Green Growth Strategies	1500.00	10.00			1,510.00
14	Support to Local Communities for Resilience	350.00	80.00		0.50	430.50
15	Research & Development	50.00			5.00	55.00
16	Technical & Project Manpower Support	35.00				35.00
17	Assam Rhino Range Expansion Programme	250.00			50.00	300.00
18	Policy Implementation	90.00		10.00		100.00
19	Third Party Audit	10.00				10.00
	Total	3,905.00	11,478.45	185.00	195.50	8,625.50
	Programme Implementation	195.25				195.25
	Grand Total	4,100.25	11,478.45	185.00	195.50	8,820.75

18.2 Funding Sources

The cost estimates have four different types of funding sources, namely:

1. Core Project Fund (CPF)
2. Govt. of India or Govt. of Assam Project Funding
3. Non Plan support from the Govt. of Assam
4. State Plan support including Project Tiger Funding

18.2.1 Core Project Fund (CPF)

This is the core of the programme and strategies, which are designed to be funded through a Core Project Fund. The cost of the protection measures for the rhino, welfare of the Staff, infrastructure development, local communities development etc. has been all bundled together in the Core project Fund. In case the the Govt. of India or the Govt. of Assam do not provide funds wholly or partly, the entire amount or part thereof (any balance left after receipt of any grant of the Govt. of India or the Govt. of Assam), is meant to be met entirely from the Corporate Social Responsibility (CSR) fund of the Central Govt. PSUs. The Core Project Fund required for a period of 10 years is about Rs. 4100.00 crore, which translates to Rs. 410.00 crore per year. If 15-20 PSUs come forward in the public cause to fund about Rs. 20-25 crore per year, the entire CPF can be met easily without any difficulties. The Govt. of India may request the PSUs to come forward and partner with Kaziranga in the cause of protection of the rhino in a long term CSR partnership. Some of the suggested PSUs are:

1. ONGC 2. Oil India Ltd. 3. NRL Ltd. 4. IOC Ltd. 5. GAIL Ltd. 6. HP Ltd.
7. NTPC 8. PGCIL 9. NHPC 10. Coal India 11. SAIL 12. BHEL

For the UIB Corpus Fund (UCF), an amount of Rs. 200.00 crore has already been built into the CPF. Additional fund for the corpus would be raised through private sector CSR and donations. The target is to raise the UCF money to more than Rs. 500.00 crore.

18.2.2 Project Funding

This funds have been targeted from already ongoing programmes of the Govt. of India or the Govt. of Assam. The key projects in this regard are listed below:

1. FREMAA for Erosion Control (Rs. 137 Crore)
2. Water Resources Department's schemes for Bank Erosion control (Rs. 2250.00 cr)
3. NHAI for the fly overs on the NH37 between Jakhlabandha and Bokakhat (Rs. 2000.00 cr)
4. NHAI for Gohpur Numaligarh 4 lane Bridge and road connectivity (Rs. 2750.00 cr)
5. NHAI for rest of the 4 Lane from Kaliabor to Gohpur (Rs. 4388.45 cr)
6. Contributions from organic farming promotion projects (Rs. 10.00 cr)
7. NRLM support for communities
8. NRHM support for communities
9. National Skill Development Council support for skills development
10. Employment Generation Mission of the Govt. of Assam

[Sl. 7 to 10, put together Rs. 80.00 crores]

18.2.3 Non Plan Support

The non plan support is for salary and other allowances, office expenses etc. for the additional sanctioned strength of staff at the Eastern Assam Wildlife Division as well as the Field Director and the office of the CEO of the Kaziranga Landscape Conservation and Development Authority. The total additional non plan support envisaged from the Govt. of Assam comes to Rs. 18.50 crore per year.

18.2.4 State Plan Support

The State Plan support is mostly as per the APO approved by the Govt. of India under the Project Tiger scheme. This has been brought on record mainly to ensure that there no duplicity in expenditure, and the funds are well spent. However, certain additional fund has also been sought for which annually, the Department has to make budget provision. These are in the spirit of contribution of the Govt. as matching grants for the CSR fundings required for the CPF. This would also keep the focus of the Govt on the projects all the time. The additional funding sought annually is as below:

Sl. No.	Programmes and Strategies	Amount (in Cores Rupees)
1.	Habitat Extension programme (HEP)	5.00
2.	Anti Poaching Equipment	1.50
3.	Anti Poaching Infrastructure and Maintenance (50% additional assistance sought)	1.50
4.	Capacity Building of Staff	0.50

5.	Key support Infrastructure	1.00
6.	Kaziranga landscape Conservation and Development Authority	1.00
7.	Research and Development	0.50
8.	Assam Rhino Range Expansion Programme	5.00
	TOTAL	16.00

Therefore, additional requirement of the State Plan fund is Rs. 16.00 crores per annum.

18.3 Revenues and Income

This Report has also proposals for raising certain entry fee for visitors in the Park/ Tiger Reserve. Additionally, new levies such as Conservation Fee, Congestion Fee, Green Levy etc. have also been brought. These are in consonance with the guidelines issued by the NTCA for tourism management.

The conservation fee alone would bring additional revenues to the tune of Rs. One crore or more to the Kaziranga Tiger Conservation Foundation. Similarly, the green levies would bestow about Rs. 50.00 annually to the Authority. The rise in the entry fee would lead to an additional income of about Rs. 1.50 crore in the next tourist season for the Foundation.

30% of all the income would be spent on the Eco Development Committees.

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**GOVERNMENT OF ASSAM
KAZIRANGA NATIONAL PARK**

**DETAILED REPORT
ON
ISSUES AND POSSIBLE SOLUTIONS
FOR
LONG TERM PROTECTION
OF
THE GREATER ONE HORNED
RHINOCEROS
IN
KAZIRANGA NATIONAL PARK
PURSUANT TO THE ORDER OF
THE HON'BLE GAUHATI HIGH COURT**

PART III



GREEN WARRIORS OF KAZIRANGA

Name	Contribution	Year
<i>B. Fuller</i>	Chief Commissioner, Assam, who suggested establishing an asylum for rhinos	1902
<i>J. C. Arbutnot</i>	The pioneer who expressed concern on declining animal population in Kaziranga	1902
<i>Major Gurdon</i>	He surveyed the area for the proposed Reserved Forest of Kaziranga and prepared the trace map of the area	1903
<i>Balaram Hazarika</i>	Also known Nigona Shikari. He was the guide mahout during the visit of Lady Curzon, and it was him who motivated her to stop the sahibs from killing rhinos. His grandson, Sri Bapiram Hazarika was honoured along with Nicholas Moszley, 3rd Baron of Ravensdale during the Kaziranga Centenary Celebrations in 2005	1905
<i>Lady Curzon</i>	Whose maiden visit to Kaziranga and legendary love for wildlife helped the birth of Kaziranga conservation saga	1905
<i>H Carter</i>	Conservator of Forests, Eastern Assam. Banned hunting etc.	1908
<i>Major A. Playfair</i>	Forest Settlement Officer & DC, Sibsagar	1913
<i>W. F. L. Totton</i>	Conservator of Forests, Eastern Assam. Declared the Kaziranga RF as Game Sanctuary	1916
<i>Mahi Chandra Miri</i>	Got into the Imperial Forest Service in 1929. 1st Indian IFS officer in Kaziranga, and joined Kaziranga as Extra Assistant Conservator of Forests in 1934 at Bagori	1934
<i>A. J. W. Milroy</i>	He opened the Kaziranga Game Sanctuary for visitors	1938
<i>E. P. Gee</i>	He put the Kaziranga on the world map, and was one of the first to enter Kaziranga as a visitor, and pressed for rhino census.	1939
<i>Rustom Phirozsha</i>	First to take aerial photography of Kaziranga	1949
<i>P. D. Stracey</i>	Ordered the Game Sanctuary to be named as Kaziranga Wildlife Sanctuary	1950
<i>Padmasfiri Dr. Robin Banerjee</i>	His movie called "Kaziranga" was of international acclaim, which was also the first movie on Kaziranga	1961
<i>J. Juan Spillet</i>	He conducted the 1st animal census	1966
<i>P. Barua</i>	Chief Conservator of Forests. Initiated the process of declaring Kaziranga as a National Park	1968

INCUMBENCY LIST OF DIRECTOR, KAZIRANGA NATIONAL PARK

Sl No	Name of Officers	Designation / Charge	Period of posting	
			From	To
1	Mr P. N. Lahon	IFS	28-07-1984	07-07-1987
2	Mr. S. Doley	IFS	08-07-1987	21-01-1992
3	Mr. B. S. Bonal	IFS	22-01-1992	01-12-1992
		(Acting)		
4	Mr. S. K. Sen	IFS	02-12-1992	10-07-1996
5	Mr. B. S. Bonal	IFS	10-07-1996	04-08-2000
6	Mr. D. M. Singh	IFS	05-08-2000	01-12-2001
7	Mr. N. K. Vasu	IFS	01-12-2001	01-06-2006
8	Mr. U. Bora	IFS	01-06-2006	06-07-2006
		(Acting)		
9	Mr. D. M. Singh	IFS	06-07-2006	02-03-2007
10	Mr. S. N. Buragohain	IFS	02-03-2007	30-04-2010
11	Mr. Surajit Dutta	IFS	30-04-2010	29-03-2012
	Mr. Surajit Dutta	IFS	30-03-2012	31-03-2012
		C.C.F.		
12	Mr. S. K. Bora	IFS	31-03-2012	29-09-2012
13	Mr. N. K. Vasu	IFS	29-09-2012	16-12-2013
		C.C.F.		
14	Mr. M. K. Yadava	IFS	16-12-2013	10-02-2014
		C.C.F.		
15	Mr. N. K. Vasu	IFS	10-02-2014	10-02-2014
		C.C.F.		
16	Mr. M. K. Yadava	IFS	10-02-2014	
		C.C.F.		

**INCUMBENCY LIST OF DIVISIONAL FOREST OFFICERS OF EASTERN ASSAM
WILDLIFE DIVISION, BOKAKHAT**

Sl No	Name of Officers	Designation	Period of posting	
			From	To
1	Mr L.C. Das	AFS	23-11-1966	08-07-1968
2	Mr N.C. Chakraborty	IFS	09-07-1968	06-03-1969
3	Mr S. Debroy	IFS	07-03-1969	12-05-1971
4	Mr P.N. Lahon	AFS	12-05-1971	28-02-1972
5	Mr H.C. Chakraborty	IFS	29-02-1972	20-03-1972
6	Mr P.N. Lahon	AFS	20-03-1972	25-12-1975
7	Mr K.C. Pator	AFS	26-12-1975	17-08-1977
8	Mr A.C. Gohain	W.L. Warden	18-08-1977	16-11-1977
9	Mr K.C. Pator	AFS	17-11-1977	06-06-1978
10	Mr P.D. Neog	AFS	07-06-1978	07-08-1978
11	Mr B.N. Pathak	AFS	08-08-1978	07-03-1979
12	Mr M.K. Sinha	AFS	07-03-1979	21-08-1980
13	Mr S.N. Buragohain	AFS	22-07-1980	09-01-1981
14	Mr D.G. Baruah	AFS	10-01-1981	04-05-1981
15	Mr L.D. Adhikari	AFS	05-05-1981	11-06-1981
16	Mr D.G. Baruah	AFS	12-06-1981	08-01-1984

17	Mr P.N. Lahan	IFS	09-01-1984	27-07-1984
18	Mr P.N. Lahan (Director, KNP)	IFS	28-07-1984	26-09-1985
19	Mr K.K. Gohain	IFS	27-09-1985	30-12-1985
20	Mr P.N. Lahan	IFS	30-12-1985	11-04-1986
21	Mr M.M. Sarma	IFS	12-04-1986	15-12-1986
22	Mr R.N. Sonowal	AFS	16-12-1986	31-05-1989
23	Mr S. Ahmed	AFS	31-05-1989	30-03-1990
24	Mr B.S. Bonal	IFS	30-03-1990	27-09-1993
25	Mr C.R. Bhobora	AFS	27-09-1993	08-03-1996
26	Mr A. Dey, (ACF)	AFS	08-03-1996	11-03-1996
27	Dr. R.D.S. Tanwar	IFS	11-03-1996	02-01-1998
28	Mr P.S. Das	IFS	02-01-1998	14-09-2001
29	Mr A.C. Das	AFS	14-09-2001	13-08-2003
30	Mr R.K. Das	AFS	13-08-2003	15-09-2004
31	Mr Utpal Bora	IFS	15-09-2004	01-08-2007
32	Mr Bankim Sarma	AFS	01-08-2007	07-05-2008
33	Mr D.D. Gogoi	AFS	07-05-2008	11-02-2013
34	Mr S. K. Seal Sarma	AFS	11-02-2013	11-07-2014
35	Mr S. K. Seal Sarma	IFS	11-07-2014	

Name of Officers in Charge of Kaziranga Range, Kohora

SL No	Name	Designation	From	To
1	Babu H.K. Dastidhar	Deputy Ranger	01-04-1949	26-10-1949
2	Sri G.C. Thakuria	Forest Ranger	26-10-1949	19-11-1951
3	R.C. Das	Forest Ranger	19-11-1951	09-09-1956
4	B.C. Baruah	Deputy Ranger	09-09-1956	25-09-1956
5	R.C. Das	Forest Ranger	25-09-1956	29-10-1956
6	R.C. Das	ACF	30-10-1956	09-07-1957
7	S.P. Choudhury	Forest Ranger	09-07-1957	08-07-1959
8	P. C. Kalita	Forest Ranger	08-07-1959	27-02-1961
9	H. C. Changkakati	ACF	27-02-1961	17-05-1961
10	K.N. Gogoi	Forest Ranger	17-05-1961	31-07-1962
11	M.N. Adhikari	Forest Ranger	31-07-1962	10-11-1964
12	C.L. Chakraborty	Forest Ranger	10-11-1964	13-03-1968
13	R.N. Sonowal	Forest Ranger	13-03-1968	13-05-1981
14	R.N. Sonowal	ACF	14-05-1981	31-10-1981
15	G. Saikia	Forest Ranger	31-10-1981	09-11-1990
16	K.K. Medhi	Forest Ranger	09-11-1990	09-06-1993
17	D.D. Gogoi	ACF	09-06-1993	14-07-1995
18	A.Dey	ACF	14-07-1995	18-08-1995
19	B.N. Talukdar	DDR	18-08-1995	28-12-1996
20	D.D. Boro	Forest Ranger	28-12-1996	14-10-2009
21	K.K. Deori	Forest Ranger	14-10-2009	30-10-2009
22	A.Rahman	Forest Ranger	30-10-2009	27-08-2012
23	L.C. Gogoi	Forest Ranger (AFS)	27-08-2012	04-03-2013
24	M. Tamuly	Forest Ranger (AFS)	04-03-2013	

Name of Officers in Charge of Western Range, Baguri

SL No	Name	Designation	From	To
1	Sri Thaneswar Das	Forest Ranger	29-07-1980	04-12-1980
2	Sri Gautam Saikia	Forest Ranger	04-12-1980	25-02-1982
3	Sri Horendra Nath Kalita	Forest Ranger	25-02-1982	01-11-1983
4	Sri Narayan Ch Sarmah	Forest Ranger	01-11-1983	28-06-1989
5	Sri Dharanidhar Boro	Forest Ranger	28-06-1989	16-08-1989
6	Sri Narayan Ch. Sharma	Forest Ranger	16-08-1989	04-10-1990
7	Sri Mahat Ch. Talukdar	Forest Ranger	04-10-1990	27-01-1993
8	Sri Pankaj Sarma	Forest Ranger	27-01-1993	20-10-1997
9	Sri Ranjit Kr. Dutta	Forest Ranger	20-10-1997	19-06-1998
10	Sri Jiten Bora	Forest Ranger	19-06-1998	25-01-2000
11	Sri Bidyot Borthakur	Forest Ranger	25-01-2000	09-10-2000
12	Sri Mukul Tamuly	Forest Ranger	09-10-2000	14-06-2005
13	Sri Dharanidhar Boro	AFS	14-06-2005	16-08-2005
14	Sri Mojuj Kr. Das	AFS	16-08-2005	13-12-2005
15	Sri Pallab Kr. Deka	AFS	13-12-2005	20-08-2008
16	Sri Deben Kalita	AFS	20-08-2008	30-07-2012
17	Sri Kushal Kuwar Deka	AFS	30-07-2012	04-03-2013
18	Sri Pradipta Baruah	ACF	04-03-2013	Till Date

Name of Officers in Charge of Eastern Range, Agorotoli

SL No	Name	Designation	From	To
1	Sri A.C. Kalita	Forest Ranger	20-11-1980	30-11-1981
2	Sri K.N. Mahanta	Forest Ranger	30-11-1981	13-12-1982
3	Sri T. Ahmed	Forest Ranger	13-12-1982	03-11-1986
4	Sri S.K. Basumatary	Forest Ranger	03-11-1986	21-11-1989
5	Sri M.C. Talukdar	Forest Ranger	21-11-1989	04-10-1990
6	Sri D. D. Boro	Forest Ranger	04-10-1990	07-01-1997
7	Sri L.N. Baruah	ACF	07-01-1997	22-12-1997

8	Sri M. Tamuly	Forest Ranger	22-12-1997	09-10-2000
9	Sri Salim Ahmed	Forest Ranger	09-10-2000	27-04-2005
10	Sri P. Baruah	Forest Ranger	27-04-2005	13-12-2006
11	Sri D. Baruah	Forest Ranger	13-12-2006	12-03-2007
12	Sri Tralukya Bhuyan	Forest Ranger	12-03-2007	05-11-2009
13	Sri K.K. Deori	Forest Ranger	05-11-2009	16-08-2012
14	Sri D. Baishya	Forest Ranger	16-08-2012	04-03-2013
15	Sri Salim Ahmed	Forest Ranger	04-03-2013	

Name of Officers in Charge of Burapahar Range, Ghorakati

SL No	Name	Designation	From	To
1	Sri Ranjit Konwar	Forest Ranger	27-12-1990	14-06-1993
2	Sri Pankaj Sarma	Forest Ranger	14-06-1993	01-07-1993
3	Sri Ranjit Konwar	Forest Ranger	01-07-1993	09-07-1993
4	Sri Sailen Das	Forest Ranger	09-07-1993	06-06-1997
5	Sri F. Ali	Forest Ranger	06-06-1997	31-03-1999
6	Sri Kamal Kr. Medhi	Forest Ranger	31-03-1999	06-07-1999
7	Sri Utpal Bora, IFS	ACF	06-07-1999	23-10-1999
8	Sri Kamal Kr. Medhi	Forest Ranger	23-10-1999	28-05-2002
9	Sri Mukul Tamuly	Forest Ranger	28-05-2002	06-07-2002
10	Sri J. R. Barma	Forest Ranger	06-07-2002	27-11-2002
11	Ms. Sonali Gosh, IFS	ACF	27-11-2002	07-04-2003
12	Sri Mukul Tamuli	Forest Ranger	07-04-2003	22-10-2003
13	Sri Unis Salim	Forest Ranger	22-10-2003	05-03-2007
14	Sri I. Mazid	Forest Ranger	05-03-2007	03-02-2013
15	Sri J. R. Bordoloi	Forest Ranger	03-02-2013	

Name of Officers in Charge of Northern Range, Biswanathghat

SL No	Name	Designation	From	To
1	Sri Hemanta Bhuyan,	Forest Ranger	04-08-2009	30-06-2010
2	Sri Bhadra Kakoty	Forest Ranger	30-06-2010	01-02-2011
3	Sri Basanta Kakoty	Forest Ranger	01-02-2011	31-08-2013
4	Sri J. R. Das	Forest Ranger	31-08-2013	12-06-2014
5	Sri Puspadhar Borgohain	Forest Ranger	12-06-2014	

**List of Deceased and Injured Staff On Duty
(We Salute You!)**

SL No	Date	Name of the Staff	Designation	Cause of Death/Injured
1	26-02-1968	Late Boluram Dutta	Forest Guard (Fgd.)	Killed by poacher
2	28-03-1975	Sri Katiram Das	Forest Guard (Fgd.)	Injured by Wild Elephant
3	31-03-1975	Sri Indreswar Bora	Forest Guard (Fgd.)	Injured by Rhino
4	10-03-1983	Sri Pranab Pal	Forest Guard (Fgd.)	Injured by Rhino
5	28-03-1985	Late Motiram Baruah	Forest Guard (Fgd.)	Killed by poacher
6	03-11-1986	Md. Ajad Hazarika	Forest Guard (Fgd.)	Injured by Wild Buffalo
7	29-10-1989	Sri Jaygeswar Hazarika	Forest Guard (Fgd.)	Injured by Rhino
8	11-02-1990	Sri Babul Mura	Grass Cutter	Injured by Rhino
9	29-12-1990	Md. Nasiruddin Ahmed	Forest Guard (Fgd.)	Injured by Tiger
10	29-01-1992	Sri Budha Dutta	Forest Guard (Fgd.)	Injured by Wild Buffalo
11	14-04-1992	Sri Amar Sing Deka	Forest Guard (Fgd.)	Injured by Wild Buffalo
12	29-08-1992	Sri Thaneswar Sarma	Forest Guard (Fgd.)	Injured by Wild Buffalo
13	03-11-1992	Late Dharma Kt. Kalita	Forest Guard (Fgd.)	Killed by Rhino
14	14-03-1993	Sri Lila Kt. Saikia	Game Watcher	Injured by Rhino
15	19-10-1993	Sri Anil Das	Forest Guard (Fgd.)	Injured by Bear
16	27-12-1993	Sri Apurba Deka	Forest Guard (Fgd.)	Injured by Rhino
17	17-09-1994	Sri Ajit Boro	CL	Injured in encounter
18	08-10-1994	Sri Amal Das	ML Driver	Injured by Rhino
19	05-12-1994	Sri Hem. Kt. Gogoi	CL	Injured by Tiger
20	01-02-1995	Sri Nigrū Karmakar	Grass Cutter	Injured by Rhino

21	08-01-1996	Sri Rajat Baruah	Forest Guard (Fgd.)	Injured by Buffalo
22	07-09-1996	Sri Dharmeswar Dutta	CL	Injured by Rhino
23	11-11-1996	Sri Ajit Saikia	Forest Guard (Fgd.)	Injured in encounter
24	27-05-1997	Sri Bhadreswar Gogoi	Mahut	Injured by Wild Elephant
25	03-12-1997	Sri Rajen Bora	Forest Guard (Fgd.)	Inured by Rhino
26	20-06-1998	Late Deben Chasa	Forest Guard (Fgd.)	Drowned in water
27	02-01-1999	Sri Arun Rava	Grass Cutter	Injured by Elephant
28	14-07-1999	Sri Mohan Karmakar	CL	Injured by Rhino
29	12-11-1999	Sri Hemo Boro	Grass Cutter	Injured by Rhino
30	15-03-2000	Late Niren Saikia	Forest Guard (Fgd.)	Killed by Rhino
31	06-10-2000	Sri Ratul Bora	CL	Injured by Wild Buffalo
32	07-03-2001	Sri Dandidhar Sonowal	Fr-I	Injured by Rhino
33	11-11-2001	Late Pradip Dutta	Forest Guard (Fgd.)	Drowned in water
34	02-12-2001	Sri Digen Bhoumik	Forest Guard (Fgd.)	Injured by Rhino
35	21-02-2002	Sri Ranjit Bora		Injured by Rhino
36	07-03-2002	Md. Abidur Rahman	Forest Guard (Fgd.)	Injured by Rhino
37	18-06-2002	Sri Lambudhar Chaoukham	Forest Guard (Fgd.)	Injured by Wild Buffalo
38	20-06-2002	Sri Lakhi Ghatowal	Grass Cutter	Injured by Wild Buffalo
39	28-02-2003-	Sri Kishore Kurmi	Forest Guard (Fgd.)	Injured by Rhino
40	10-04-2003	Sri Siba Saikia	Grass Cutter	Injured by Elephant
41	10-04-2003	Sri Purna Kt. Neog	Forest Guard (Fgd.)	Injured by Deptt. Bullet
42	10-04-2003	Sri Praneswar Swargiari	Forest Guard (Fgd.)	Injured by Rhino
43	10-04-2003	Sri Gonesh Bora	Forest Guard (Fgd.)	Injured by Rhino

44	27-07-2003	Sri Padma Kt. Das	Boat Man	Injured by Rhino
45	08-09-2003	Sri Pash Bhatta	Boat Man	Injured by Wild Buffalo
46	13-02-2004	Sri Horen Bora	Forest Guard (Fgd.)	Injured by Bear
47	13-03-2004	Sri Paban Sarma	Forest Guard (Fgd.)	Injured by Wild Buffalo
48		Sri Satyban Pegu	CL	Injured by Tiger
49	31-12-2004	Sri Deben Bordoloi	Game Watcher	Injured by Rhino
50		Late Gopal Bori	Forest Guard (Fgd.)	Fell down from elephant back while on duty and sustained injury and succumbed to death
51	12-01-2005	Sri Sashi Saikia	Forest Guard (Fgd.)	Injured by Rhino
52	04-02-2005	Late Babul Barua	CL	Killed by Deptt. Elephant 'Ramu'
53	14-08-2005	Late Rajen Hazarika	Forest Guard (Fgd.)	Drowned in water
54	02-01-2006	Sri Nripen Hazarika	Forest Guard (Fgd.)	Injured by Rhino
55	14-02-2006	Sri Naba Kr. Neog	Fr-I	Injured by Wild Buffalo
56	25-02-2006	Sri Khagen Phukan	Forest Guard (Fgd.)	Injured by Rhino
57	02-05-2006	Late Kanbap Dutta	Driver	Died on road accident while on duty
58	27-07-2006	Sri Manik Yein	AFPF	sustained injuries in an encounter
59	29-09-2006	Late Prabhat Saikia	Tourist Guard	Killed by Elephant
60	02-01-2007	Sri Suresh Das	Game Watcher	Injured by Rhino
61	29-09-2007	Sri Putul Bora	Forest Guard (Fgd.)	Injured by Rhino
62	18-01-2008	Sri Jurman Nath	Fr-II	Injured by Rhino
63	07-02-2008	Sri Jadu Gogoi	Game Watcher	Injured by Rhino
64	08-02-2008	Md. Rajul Ali	Home-Guard	Injured in road accident while on duty
65	16-06-2008	Sri Padum Sarma	Fr-I	Fell down form elephant back while on duty and sustained injury

66	19-06-2008	Sri Ratul Mahanta	Game Watcher	Fell down from elephant back while faced with Rhino and sustained injury
67	26-07-2008	Sri Purna Ch. Saikia	Forest Guard (Fgd.)	Fell down from elephant back while faced with Rhino and sustained injury
68	20-09-2008	Sri Ruhini Dutta	Game Watcher	Fell down from elephant back while combing operation
69	19-11-2008	Late Ranjit Medhi	Home Guard	Killed by Rhino
70	22-12-2008	Sri Indrswar Bora	Forest Guard (Fgd.)	Injured by Wild Buffalo
71	26-12-2008	Sri Sadagar Singh	Driver	Knocked down by the vehicle on NH-37
72	03-01-2009	Sri Mukuta Gogoi	Fr-II	Injured by Rhino and died on 23-06-09
73	03-02-2009	Sri Dipak Bordoloi	Forest Guard (Fgd.)	Fell down from the camp
74	23-02-2009	Sri Chandra Dhar Deka	Tourist Guard	Injured by Rhino
75	25-02-2009	Sri Phulen Kakoti	Forest Guard (Fgd.)	Injured by Rhino
76	02-03-2009	Sri Tankeswar Gogoi	Forest Guard (Fgd.)	Injured by Rhino
77	07-03-2009	Late Atul Bora	Forest Guard (Fgd.)	Killed by Rhino
78	09-03-2009	Sri Amiya Lal Gohain	Forest Guard (Fgd.)	Injured by Wild Buffalo
79	31-03-2009	Sri Bijoy Chetry	Forest Guard (Fgd.)	Injured by Rhino
80	01-04-2009	Sri Birbahadur Chetry	Boat Man	Injured by Wild Buffalo
81	21-06-2009	Sri Uttam Rai	Home Guard	Injured by Elephant
82	22-06-2009	Md. Allauddin Siddiq	Home Guard	Fell down form elephant back
83	26-06-2009	Sri Rangbon Loying	Home Guard	Injured by Rhino
84	18.10.2009	Dilip Bora	OP	Expired in Road accident on NH-37
85	14.04.2010	Sibian Hemrom	Fgd	Drowned in water inside the Park
86	09-06-2010	Mohendra Karmakar	Mahout	Drowned water inside the Park
87	05-11-2010	Bhupen Paul	Boaman	Expired in Road accident on NH-37

88	05-11-2010	Bimal Saikia	Home Guard	Expired in Road accident on NH-37
89	23-01-2011	Bharat Gogoi	Boatman	Killed by Wild Buffalo inside the Park
90	06-02-2011	Nitul Dutta	Home Guard	Killed by rhino inside the Park
91	20-02-2011	Karuna Kanta Das	Forest Guard	Expired in Road accident on NH-37
92	03-03-2011	Rabin Nath	Game Watcher	Injured by rhino inside the Park
93	07-04-2011	Bharat Ch Das	Forester-II	Killed by rhino inside the Park
94	12-12-2011	Bakul Nath	Boatman	Killed by wild elephant inside the Park
95	03-01-2012	Purna Barman	Forest Guard	Injured by rhino inside the Park
96	09-01-2012	Suchandra Mahanta	AFFP Constable	Killed by wild buffalo inside the Park
97	09-02-2012	Prem Kr Pradhan	Forest Guard	Injured by wild elephant inside the Park
98	28-02-2012	Bhagirathi Mahantee	Forest Guard	Injured by tiger outside the Park
99	09-03-2012	Braja Kr Saikia	Game Watcher	Injured by rhino inside the Park
100	06-03-2012	Ganesh Tarafdar	Chowkidar	Injured by rhino inside the Park
101	18-03-2012	Jogeswar Baruah	Boatman	Injured by rhino inside the Park
102	29-06-2012	Durjoy Bawri	Mahout	Drowned in water inside the Park
103	15-08-2012	Bhaba Hazarika	Forester-II	Injured by rhino inside the Park
104	09-04-2013	Kalyangiri Adhikari	Forest Guard	Killed by wild buffalo inside the Park
105	10-12-2013	Biren Dutta	Forest Guard	Heart Fail inside the Park
106	08-04-2014	Nilamoni Bora	Forest Guard	Expired in road accident on NH-37

Present Position of Departmental Elephant under Kaziranga Range, Kohora

Sl No	Name of Elephant	Bandh	Sex	Date of Birth	Date of Porcument	Microchip Number
1	Saraswati	Mirika	F	1965	23-06-1965	961 00 10000 06290
2	Mohanmala	Kumura	F	1951	17-05-1970	961 00 10000 05911
3	Padmini	Kumura	F	1973	15-05-1978	961 00 10000 05155
4	Kartik	Kumura	T	1981	25-01-1981	961 00 10000 03308
5	Rudra	Kumura	M	1981	25-04-1981	Nil
6	Rukmini	Kumura	F	1970	13-06-1982	961 00 10000 05381
7	Malati	Mirika	F	1992	24-12-1992	961 00 10000 03711
8	Konwar	Kumura	M	1986	04-07-1994	961 00 10000 03225
9	Konwari	Kumura	F	1981	04-07-1994	961 00 10000 05739
10	Phulandevi	Kumura	F	1974	10-11-1994	961 00 10000 03972
11	Phulmai	Kumura	F	1992	27-03-1997	961 00 10000 05487
12	Rahul	Kumura	M	1997	02-12-1997	961 00 10000 03543
13	Prithiraj	Kumura	T	1998	14-11-1998	Nil
14	Nunaimala	Mirika	F	1988	10-02-1999	961 00 10000 05625
15	Pradumnya	Kumura	M	1999	28-04-1999	961 00 10000 04649
16	Lakhimai (Seized)	Mirika	F			Nil
17	Moromi (Seized)	Kumura	F			Nil
18	Airawat	Kumura	T	2001	27-10-2001	Nil
19	Pawan	Kumura	T	2001	15-12-2001	Nil
20	Joydev	Kumura	T	2003	14-11-2003	Nil
21	Biswajit	Kumura	T	2004	19-09-2004	Nil
22	Kazi	Kumura	F	2005	02-02-2005	Nil
23	Borosha	Kumura	F	2005	23-07-2005	Nil
24	Rakhi	Kumura	F	2008	12-11-2008	Nil
25	Mohan Prasad	Kumura	M	2009	22-12-2009	Nil
26	Rosy	Kumura	F	2013	12-03-2013	Nil
27	Purnima	Kumura	F	2012	28-12-2012	Nil
28	Karna	Kumura	M	2013	04-05-2013	Nil
29	Joy	Kumura	M	2014	09-01-2014	Nil
30	Brishnu	Kumura	M			Nil
31	Chandra Archariya	Kumura	M	2008	16-08-2008	Nil

LIST OF DEPARTMENTAL ELEPHANTS UNDER WESTERN RANGE, BAGORI

Sl. No.	Name of elephants	Bund	Sex	Date of Birth	Date of Procurement	Microchip No.
1	Krishna	Kumura	Female	1972		961 00 1000003189
2	Rohimola	Mirika	Female	1980		961 00 1000003235
3	Lakhimi	Kumura	Female	1991		961 00 1000005811
4	Ganesh Prasad	Nichla	Male (Tusker)	1992		961 00 1000003215
5	Rupa	Mirika	Female	-		961 00 1000004853
6	Junaki	Nichla	Female	-		This elephant was missing from Burapahar Range and captured at Bimoli Camp under Western, Range, Bagori.
7	Deepa	Kumura	Female	26.10.2003		Microchip has not been done
8	Padumi	Kumura	Female	25.06.2004		-do-
9	Bhadoi	Kumura	Female	15.09.2004		-do-
10	Biswajit	Kumura	Male (calf)	16.09.2011		-do-
11	Lakhimala	Kumura	Female (calf)	05.10.2012		-do-

LIST OF DEPARTMENTAL ELEPHANTS UNDER EASTERN RANGE, AGORATOLI

Sl. No.	Name of elephants	Bund	Sex	Date of Birth	Date of Procurement	Microchip No.
1	Bhadoi	Mirika	F	1985	05.09.1985	961 00 1000004156
2	Phaguni	Kumora	F	1986	24.02.1992	961 00 1000003257
3	Jaymala	Mirika	F	1960	31.03.1993	961 00 1000003348
4	Samrat	Kumora	M	1988	22.07.1994	961 00 1000003745
5	Sukracharya	Mirika	M	1996	11.10.1996	961 00 1000001410
6	Rongmon	Mirika	M	-	03.09.2011	961 00 1000006225 (Seized)
7	Mohan	Mirika	M	-	08.12.2011	Microchip not available. Seized from Jorhat Divn.
8	Droncharya	Mirika	M	2008	04.11.2008	Microchip not done
9	Kripacharya	Kumora	M	2008	18.11.2008	-do-
10	Madhuri	-	F	2013	24.02.2013	-do-
11	Borosha	-	F	2013	25.04.2013	-do-

**YEAR WISE STATEMENT OF ANIMAL MORTALITY ON NH. 37 UNDER EAWL DIVISION, BOKAKHAT
2010**

SL NO	DATE	DAY	NIGHT	ANIMAL SPECIES	RANGE	PLACE OF OCCURRENCE	ON CORRIDOR		OFF CORRIDOR	
							Day	Night	Day	Night
1	14/1/2010	0	1	Hog deer	BPR	Near Range Head quarter	0	1	0	0
2	28/1/2010	1	0	Macaque	BKT	Near Factory of Methoni Tea estate	1	0	0	0
3	28/1/2010	1	0	Capped Lengur	BKT	Near Panbari camp	1	0	0	0
4	30/6/2010	0	1	Hog deer	WR	Near Harmoti camp	0	1	0	0
5	07/01/2010	1	0	Hog deer (Injured)	WR	Near Tunikati	1	0	0	0
6	07/06/2010	0	1	Hog deer	WR	Near Kanchanjuri camp	0	1	0	0
7	07/09/2010	0	1	Hog deer	KR	Near Haldhibari camp	0	1	0	0
8	07/10/2010	0	1	Hog deer	WR	Near Ragini Hotel	0	0	0	1
9	13/7/2010	1	0	Macaque	BKT	Near Salkathoni	1	0	0	0
10	13/7/2010	1	0	Hog deer	KR	Near Kenyamora bridge	1	0	0	0
11	17/7/2010	1	0	Wild Elephant	BPR	Near Tetulguri	0	0	1	0
12	20/7/2010	1	0	Hog deer	BPR	Near Chiang pahar	0	0	1	0
13	13/9/2010	0	1	Hog deer	BPR	Near Neherubasti	0	0	0	1
14	14/9/2010	1	0	Hog deer	WR	Near 1 No.Harmoti	1	0	0	0
15	24/9/2010	0	1	Hog deer	KR	East of Haldhibari camp	0	1	0	0
16	24/9/2010	1	0	Hog deer	WR	Near Burapahar Waiting shed	0	0	1	0
17	27/9/2010	0	1	Hog deer	BPR	Near Sadhubheth	0	0	0	1
18	29/9/2010	0	1	Hog deer	WR	Near Maloni Camp	0	1	0	0
19	29/9/2010	1	0	Hog deer	KR	Near Haldhibari camp	1	0	0	0
20	10/01/2010	0	1	Porcupine	KR	East of Haldhibari BO	0	1	0	0
21	15/10/2010	0	1	Wild boar	WR	Near Kanchanjuri gate	0	1	0	0
22	28/11/2010	1	0	Macaque	BKT	Near Bokakhat Boys' School	0	0	1	0
23	10/12/2010	1	0	Capped Lengur	BKT	At Bogorjuri	0	0	1	0
24	20/12/2010	0	1	Hog deer	WR	Near Nahardanga	0	0	0	1
	Total	12	12				7	8	5	4

2011

SL NO	DATE	DAY	NIGHT	ANIMAL SPECIES	RANGE	PLACE OF OCCURRENCE	ON CORRIDOR		OFF CORRIDOR	
							Day	Night	Day	Night
25	22/2/2011	0	1	Barking Deer	KR	Near Durgapur Siva Mandir	0	0	0	1
26	23/4/2011	1	0	Capped Lengur	KR	Near Haldhibari camp	1	0	0	0
27	19/5/2011	0	1	Hog deer	BPR	Near Sarali camp	0	1	0	0
28	20/7/2011	0	1	Hog deer	WR	West of Kanchanjuri camp	0	1	0	0
29	26/7/2011	1	0	Wild boar	BKT	Near Salkathoni	1	0	0	0
30	22/8/2011	1	0	Hog deer	WR	Near Bagori oil pump	0	0	1	0
31	09/08/2011	1	0	Hog deer	WR	Near Nahardanga	0	0	1	0
32	09/08/2011	1	0	Hog deer	WR	Near Harmoti camp	1	0	0	0
33	17/10/2011	0	1	Hog deer	BPR	Near Buraphar Range Head Quarter	0	1	0	0
34	12/09/2011	0	1	Hog deer	BPR	Near Samdanga	0	0	0	1
	Total	5	5				3	3	2	2

SL NO	DATE	DAY	NIGHT	ANIMAL SPECIES	RANGE	PLACE OF OCCURRENCE	ON CORRIDOR		OFF CORRIDOR	
							Day	Night	Day	Night
35	20/1/2012	0	1	Capped Lengur	BKT	Near Methoni Tea-Estate	0	1	0	0
36	15/4/2012	0	1	Python	KR	Near Haldhibari B.O.	0	1	0	0
37	19/5/2012	0	1	Hog deer	WR	Near Baghmari village	0	0	0	1
38	06/06/2012	0	1	Hog deer	WR	Near Maloni Camp	0	1	0	0
39	06/12/2012	0	1	Hog deer	BPR	Near Amguri	0	0	0	1
40	27/6/2012	1	0	Hog deer	WR	Near Kanchanjuri	1	0	0	0
41	27/6/2012	1	0	Hog deer	WR	Near Harmoti camp	1	0	0	0
42	27/6/2012	0	1	Hog deer	WR	Near Bagori oil pump	0	0	0	1
43	27/6/2012	1	0	Hog deer	WR	Near Bagori oil pump	0	0	1	0
44	27/6/2012	0	1	Hog deer	WR	Near Forest colony	0	0	0	1
45	27/6/2012	0	1	Hog deer	WR	In front of PWD IB	0	0	0	1
46	27/6/2012	0	1	Hog deer	BKT	Near Salkathoni	0	1	0	0
47	28/6/2012	0	1	Hog deer	WR	Duar Bagori Bridge	0	0	0	1
48	28/6/2012	0	1	Hog deer	WR	Duar Bagori Bridge	0	0	0	1
49	28/6/2012	0	1	Hog deer	WR	East of Deopani Bridge	0	0	0	1
50	28/6/2012	0	1	Hog deer	WR	Near Baghmari village	0	0	0	1
51	29/6/2012	1	0	Wild Boar	WR	Near Kali Mondir	0	0	1	0
52	29/6/2012	1	0	Hog deer	WR	Near Kuthori LP School	0	0	1	0
53	29/6/2012	1	0	Hog deer	KR	Near Methoni Tea-Estate	1	0	0	0
54	21/7/2012	0	1	Hog deer	BPR	Near Chiang pahar	0	0	0	1
55	24/7/2012	0	1	Hog deer	KR	Near Rangajan Tea- Estate	0	0	0	1
56	29/7/2012	1	0	Hog deer	WR	Near Harmoti	1	0	0	0
57	08/04/2012	0	1	Hog deer	WR	West of Harmoti camp	0	1	0	0
58	19/8/2012	0	1	Hog deer	KR	East of NRL Oil Pump	0	0	0	1
59	19/8/2012	0	1	Hog deer	KR	East of NRL Oil Pump	0	0	0	1
60	23/8/2012	0	1	Hog deer	KR	Near Lalita Hotel	0	0	0	1
61	09/01/2012	1	0	Hog deer	WR	Near Harmoti camp	1	0	0	0
62	09/10/2012	1	0	Hog deer	KR	Near Laldhasna	1	0	0	0
63	09/10/2012	1	0	Hog deer	KR	Near Laldhasna	1	0	0	0
64	24/9/2012	0	1	Hog deer	BKT	Near Methoni Tea-Estate	0	1	0	0
65	25/9/2012	0	1	Swamp deer (Injured)	BKT	Near Panbari	0	1	0	0
66	10/03/2012	0	1	Hog deer	BPR	Near Amguri	0	0	0	1
67	11/06/2012	0	1	Hog deer	WR	Near Nursery	0	0	0	1
68	11/08/2012	1	0	Hog deer	BKT	Near Salkathoni	1	0	0	0
69	22/11/2012	0	1	Hog deer	WR	Near Dusuti camp	0	1	0	0
70	28/11/2012	0	1	Porcupine	KR	Near Geleki gaon	0	0	0	1
71	12/10/2012	1	0	Hog deer	WR	East of Range Head Quarter	0	0	1	0
72	15/12/2012	0	1	Barking Deer	KR	Near Hatkhuli Tea-Estate	0	0	0	1
	Total	12	26				8	8	4	18

2013

SL NO	DATE	DAY	NIGHT	ANIMAL SPECIES	RANGE	PLACE OF OCCURANCE	ON CORRIDOR		OFF CORRIDOR	
							Day	Night	Day	Night
73	16/1/2013	0	1	Leopard	KR	West of Chepena kubua Namghar	0	0	0	1
74	02/11/2013	1	0	Hog deer	BKT	Near Pura dolong	1	0	0	0
75	04/08/2013	0	1	Hog deer	BPR	Between Ghorakati and Rhino land Park	0	1	0	0
76	05/07/2013	1	0	Capped Lengur	WR	Near Maloni Camp	1	0	0	0
77	18/5/2013	0	1	Hoolock gibbon	WR	Near Nahardanga	0	0	0	1
78	17/6/2013	0	1	Hog deer	WR	Near Maloni Camp	0	1	0	0
79	23/6/2013	0	1	Jungle cat	WR	East of Duarbagori Police Out post	0	0	0	1
80	29/6/2013	0	1	Hog deer	KR	Near Bogorijuri gaon	0	0	0	1
81	07/11/2013	1	0	Hog deer	BPR	Near Amguri	0	0	1	0
82	07/12/2013	0	1	Hog deer	WR	Near Harmoti turning	0	1	0	0
83	08/07/2013	0	1	Hog deer	WR	Near Maloni Camp	0	1	0	0
84	29/8/2013	0	1	Hog deer	WR	Near Harmoti	0	1	0	0
85	09/07/2013	1	0	Hog deer	KR	West of East Haldhibari camp	1	0	0	0
86	09/08/2013	1	0	Hog deer	WR	Near Harmoti camp	1	0	0	0
87	09/10/2013	0	1	Hog deer	BPR	Near GL Resort	0	0	0	1
88	09/12/2013	0	1	Hog deer	WR	Near Harmoti camp	0	1	0	0
89	14/9/2013	0	1	Hog deer	WR	Near Harmoti turning	0	1	0	0
90	15/9/2013	0	1	Hog deer	KR	West of Haldhibari	0	1	0	0
91	19/9/2013	0	1	Hog deer	KR	Near Rangajan Tea-estate	0	0	0	1
92	23/9/2013	0	1	Hog deer	KR	Near Kohora Chariali	0	0	0	1
93	25/9/2013	0	1	Hog deer	WR	Near Nahardanga	0	0	0	1
94	27/9/2013	1	0	Hog deer	WR	East of Range Head Quarter	0	0	1	0
95	10/03/2013	0	1	Hog deer	KR	Near Rangajan Tea- Estate	0	0	0	1
96	21/10/2013	0	1	Turtle	BR	West of Rhino land Park	0	1	0	0
97	11/05/2013	0	1	Wild Boar	KR	Near Bogorijuri gaon	0	0	0	1
98	11/12/2013	1	0	Capped Lengur	KR	Near Laldhasna	1	0	0	0
	Total	7	19				5	9	2	10

List of Anti Poaching Camps in Kaziranga National Park

Sl No	Name of the Camp	Sl. No	Name of the Camp	Sl No	Name of the Camp	Sl. No	Name of the Camp
A. Central Range, Kohora				C. Eastern Range, Agaratoli			
1	Mihimukh	27	Naobhangi	1	Dhoba	19	Natunbeel
2	Benga	28	Solmara tongi	2	Mohkhuti	20	Tinibeel
3	Goroimari	29	Thungru	3	Dhanbari	21	Pahumari
4	Bordoloni	30	Kholkholi	4	Balijan	22	Duramari
5	Laudubi	31	Kaziranga Beat	5	Turturoni	23	Sohola
6	Teteliguri	32	Lengtajan	6	Mohpora	24	Sohola tongi
7	Jamuguri	33	Baghmari	7	Maklung	25	Mowamari
8	Dusuti	34	Tilaidubi	8	Rongamotta	26	Nolani
9	Tajeng	35	Tazeng	9	Anhotguri	27	Tamulipathar
10	Bhengrai	36	Bherbheri	10	Rajamari	28	Siga
11	Holalpath	37	Naromora	11	Soba	29	Siga tongi
12	Baruntika	38	Bheroni	12	Balipukhuri	30	Sukani
13	Solmora	39	Mikirjan	13	Debeswari	31	Arikati
14	Borbeel	40	Naharkathoni	14	Erasuti	32	Dimow
15	Bokabeel	41	Bejbejia	15	Hatichora	33	Cobra
16	Hldibari East	42	Korne	16	Dighali	34	Kartika chapori
17	Haldibari	43	Alubari	17	Sebe tapu	35	Samrat floating
18	Sildubi	44	Bokpora	18	Sapekhati		
19	Paharline	45	Kerasing	D. Burapahar Range, Gorakati			
20	Arimora	46	Buloni	1	Tunikati	12	Maite
21	Hanuman	47	Naste	2	Lohorani 2	13	Baneswar
22	Gobrai	48	Monatongi	3	Janta	14	Rangalu
23	Kartika	49	Kartika Floating	4	Phulaguri	15	Panjuri
24	Ajogor	50	Bhinhdia	5	Chirang	16	Kathalchang
25	Dheklatoli	51	Kathonibari	6	Borhola	17	Makbul
26	Methonmari			7	Borghop	18	Baneswar Mandir
B Western Range Bagori				8	Difalu	19	Hatibalu
1	Harmoti	20	Bandarkhal	9	Bahubeel	20	Sundari
2	Bhaisamari	21	Gotonga	10	Amguri	21	Sorali
3	Murphuloni	22	Nalamukh	11	Chanak		
4	Gerakati	23	Kawaimari	E. Northern Range, Biswanath			
5	Bahubeel	24	Tunikati	1	Panpur	12	Kohuwa
6	Borbeel	25	Amkathoni	2	Tewaripal	13	Sildubi
7	Baghmari	26	Difaloomukh beat	3	Bogoriant temp.	14	Balidubi temp.
8	Deopani	27	Bornoloni	4	Lahorijan	15	Gomeri
9	Ajarkathoni	28	Kathpora	5	Gaitapu	16	Keteng
10	Daflong	29	Chitalmari	6	New Keteng temp.	17	Bhawani
11	Dusuti	30	Pachim Bimoli	7	Hhadong	18	Murkhowa
12	Kanchanjuri	31	Rutikhowa	8	Lohorani 2	19	Kingfisher floating
13	Bherbheri	32	Bimoli	9	Tigris floating	20	Unicorn floating
14	Borakata	33	Rajapukhuri	10	Luit floating	21	Hawk Float
15	Malani	34	Gendamari	11	Biswanath camp		
16	Hatidandi	35	Rowmari	F. Bokakhat HQ Beat			
17	Burapahar Beat	36	Donga	1	Panbari	5	Bhokte
18	Bhalukajan	37	Kantaghat	2	Modarjuri	6	Moriahola
19	Mahabahu Floating	38	HQ camp	3	Gabharu	7	Sisubari
				4	Gongasiloni floating	8	Bokakhat Beat

ABSTRACT OF THE ANTI POACHING CAMPS:

Range	No of Camps
Central Range	51
Western Range	38
Eastern Range	35
Burapahar Range	21
Northern Range	21
Bokakhat HQ Beat	8
TOTAL	174

Includes 9 Floating Camps highlighted in Yellow in the Table

Total Existing Towers: 13 as mentioned below:

ER Sohola, Debeswari No. 1 & 2 = 3
KR Mihimukh, Kathopra, Dafalong, Borbeel, Karsing = 5
WR Donga, Selsoni, Bahubeel = 3
BR Difalu, Sagalibeel = 2

Opinion/ Response from the Stakeholders, Experts, NGOs and Individuals

<p>Richard Emslie, Scientific Officer, AfRSG, IUCN</p>	<p>As one of the "Friends of Kaziranga" I was most interested to read your background paper on Kaziranga. It is such a special place and I have been fortunate to visit it on three occasions.</p> <p>I have gone through your document and added my comments.</p> <p>You highlight a really serious issue of human settlement and disturbance rapidly encroaching onto the park boundaries that threaten to limit or stop movement to higher ground during floods. I really like the suggestion to try to create such a corridor by buying up and rehabilitating the tea gardens. That seems to be a really good idea and one that needs to be acted upon soon before it is too late. This question ultimately will probably be of far greater importance than whether or not to dehorn.</p> <p>I will look through the links you sent me, but for now I wanted to send you some comments and some background information.</p> <p>I know that dehorning is one of the key issues the court is looking at. You may find the study on dehorning of interest. Raoul du Toit in particular has the most data from years of opportunistic dehorning of some animals in the Zimbabwe lowveld. He found that despite slight mortality risks on balance the dehorned rhinos survived a little better than the horned ones and dehorning didn't stop the rhino cows breeding really well. Zimbabwe's experience is however that dehorning on its own will not work. Poachers will still poach if there is inadequate protection and they think they can get away with it. However if there is also decent protection then you have effectively sifted the cost benefit away from the poachers disincentivising them as they will get less horn and less money for taking the same amount of risk.</p> <p>See also Raoul and Natasha's short popular article (although they were baffled why the editor put in a picture of one of your GOH rhino !).</p> <p>The AfRSG doesn't have an official position on dehorning but it is generally accepted that under certain circumstances dehorning can be</p>
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part of an anti-poaching strategy. If you say have a smaller private population in a vulnerable location you might seriously consider dehorning all your rhinos and this may encourage potential poachers to go elsewhere where they can get more kgs of horn for their efforts/risk. A bit like someone putting in a good house alarm security system. It transfers the problem somewhere else. Dehorning in NW Namibia certainly appeared (from intelligence reports) to put off potential rhino poachers at the time of Namibia's independence. However it is not really a cost effective or practical option for very large populations.

From a translocation perspective rhinos here are often routinely dehorned or at least horn tipped before translocation and this is in the IUCN Rhio Translocation Guidelines. If you want me to send you a digital copy of these please ask.

Someone may bring up a controversial paper by Joel Berger when he was in Namibia. However it has been roundly criticised and was based on a tiny sample size. In discussing dehorning of GOH rhino and the furore about Berger's paper, Raoul (in an e-mail to Christy Williams) wrote.. "I honestly think that there is not much point in digging into the controversy that arose over Berger's work in Namibia because there are some key points that override issues of his tiny sample size and other data analysis problems that arose in his papers:

- 1.) For black rhinos, the fuss raised by Berger was to do with defence against predators. But he never explained that a.) that the greatest predator risk to black rhino calves is when they were left hidden by their mothers while the cows went to water, which in Namibia can take a while – what difference does it make then if the cow is dehorned or not? b.) a cow without horns can still easily thump predators like hyenas to death with horn stubs – I have even seen a dehorned rhino kill another rhino. c.) does a hyena (or even a lion) size up a rhino's horn size before deciding to tackle its calf if she is there to defend it? What learned behaviour or evolutionary response could achieve that calibrated predator response?
- 2.) Your Indian rhinos have small horns. They use

their tusches for fighting and presumably also for defence. Very different situation to African rhinos. What predators are of concern, in any case? Tigers? Will a small reduction in size of horns that are already quite small make any difference to tigers?

So it is a different ballgame in India/Nepal and to my mind the question of dehorning relates more to 1.) the poacher response, and 2.) the risk of immobilization in swamps, rather than anything else such as the kind of noise that Berger made.

I've enclosed a brief paper on dehorning black rhinos (no idea why the editor used an Indian rhino to illustrate it!), but must stress that this is a different context to yours.

Not sure if this helps, but don't get side-tracked by irrelevant issues when making a decision on dehorning Asian rhinos!

Regards

Raoul"

From memory I think Joel Berger's study was based on a tiny sample size (3?). Even then I seem to recall (but am not 100% certain) the late Blythe Loutit telling me there was some problem with Berger misidentifying a rhino with the result that a rhino calf he deemed to have died actually survived. I do clearly remember, that at the time Berger's work, it was heavily criticised by many experienced African rhino conservationists who paid very little attention to it. However it was used by others who sought to oppose what they saw as "invasive" procedures.

Raoul has dehorned lots of rhinos in Zimbabwe and if the horns were so valuable and essential to the rhinos (as suggested by Berger) then one could expect the reproductive performance and survival rates of dehorned rhinos to be much worse than horned rhino and that has not been the case in the Lowveld. As Raoul and Natasha Anderson have shown, many dehorned rhinos in the Lowveld in Zimbabwe have bred and survived very well. Black rhinos can use horns to break branches, but clearly dehorning has not been a major problem. See

<http://scienceline.org/2013/12/caught-in-the-crosshairs/> and see Raoul and Natasha Anderson's recent article.

<http://www.rhinosourcecenter.com/index.php?s=1&act=pdfviewer&id=1366424627&folder=136>

which contains a key summary table below showing the better overall survival rate of dehorned compared to horned rhino in Buby 2007-12.

As for the impact dehorning would have had on rhinos in Manas. Probably would depend upon the level of protection afforded to the rhinos. Zimbabwe experience shows that without adequate law enforcement dehorned rhinos also get poached. One option may be to concentrate dehorning in a few hot areas. You could set up an adaptive management experiment and do it in some areas but not others and measure what happened.

You also need to bear in mind that horn grows back so you will need to prime decision-makers of the need to dehorn periodically if you want to continue using dehorning as part of a deterrent to poachers in Manas. Also GOH carries much less horn and there is only one horn. You need to leave quite a bit behind when dehorning to avoid damaging the germinal layer and so dehorning would in percentage terms not reduce the amount of horn (in % terms) that dehorning in Africa reduces.

As for the impact dehorning would have had on rhinos in Manas. Probably would depend upon the level of protection afforded to the rhinos. Zimbabwe experience shows that without adequate law enforcement dehorned rhinos also get poached. I don't know the details of Manas but it may be something else such as change of leadership at the top that may make much more of a difference.

You also need to bear in mind that horn grows back so you will need to prime decision-makers of the need to dehorn periodically if you want to continue using dehorning as part of a deterrent to poachers in Manas. You always have to leave a bit of horn behind to make sure you don't cut into the germinal layer. If you do this the horn is likely to never grow back properly and may cause discomfort to the rhino. However if done properly by skilled and experienced rhino vets this is not a damaging procedure to the rhinos.

Ultimately what matters is does dehorning improve the survival chance of the dehorned rhinos as Raoul found was the case. If I was a rhino I would rather be darted every few years and have some of my horn cut off if it reduced my chance of being killed by a poacher. Similarly it is better to take Polio vaccine than get Polio.

Might also be worthwhile for you to come and discuss and see other models for park expansion. There are multiple ways to skin a cat and you don't necessarily want to foreclose your options in order the achieve a goal of park expansion. The AfrSG Chair Mike Knight has been involved with a lot of park expansion as a major part of his work for SANParks and it may be worth your while to chat to him about it and possibly even come and have look .

Also I realise you have limits on what can and can't be done in your NP's but one must weigh up the negatives and positives of using herbicides that breakdown quickly and don't have long residual effects but which may help you deal with really bad invasive aliens that can significantly and very negatively impact on rhino habitat.

Finally - poisoning horn. Apart from the moral aspects - it has been sold as treatment in S.Africa. It has not been cheap and as can be seen from Sam Ferreira et al's Pachyderm paper this treatment didn't work as the dye couldn't penetrate into the horn. Seems that poisoning horns has been more of a money making exercise by those promoting it. Something to steer well clear of.

I like your paper's focus on improving the quality and treatment and training of your field rangers. Just as in Africa I am sure a big part of any solution will be not to forget the basics and get them right.

I am currently en route to Omaha in the US where I am afraid I will be in a conference on the first (when I think you are having your international session). However on the first my conference registration only starts at 3pm Omaha time and I could be available before say 2.30pm. I have just looked it up and the time in Omaha is 10 hrs 30 mins behind the time in Guwahati. Thus I may be able to take part in

	<p>discussions via video or Skype link given the time difference if you wanted this. Please let me know if this may be of interest. 4am in Omaha will be 2.30pm your time in Guwahati.</p> <p>Anyway hope the comments and documents help you in your deliberations. Please give a shout if there is something you would like to do before my conference starts and I will see what I can do. I will be travelling for much of the next day and be out of comms. However when I get to Omaha on the afternoon of the 30th I will try to look at e-mail.</p> <p>Best wishes</p> <p>Richard</p>
<p>Richard Emslie, Scientific Officer, AfRSG, IUCN</p>	<p>THIS IS A KEY ISSUE THAT NEEDS TO BE ADDRESSED NOW BEFORE IT IS TOO LATE. The function of the Park requires animals to have the ability to migrate to higher ground during floods.</p> <p>This is done in Parks like Kruger NP and I think Hluhluwe-Imfolozi have also done this. Once vehicle carrying capacity has been reached you have to wait for a vehicle to come out before another can go in. As for throwing of rubbish - perhaps legislate for steeper penalties for throwing rubbish in NP's</p> <p>THIS IS KEY - Migration of animals out of the park to higher ground during floods has been key. It is CRITICALLY IMPORTANT for functioning of the system that some corridors are secured and maintained to ensure that migration is still possible.</p> <p>Agree - Aliens are a costly problem and can significantly affect habitats for rhino.</p> <p>WHY? Everything is made of "chemicals". Need to put things into perspective. What is better - good habitat lost to aliens or effective clearing and retreatment of aliens to secure areas of good habitat. Why not consider changing your rules to allow the use of biodegradable herbicides that breakdown quickly and don't have a long term residual effect?</p> <p>EXCELLENT PLAN as presumably this would help secure some corridor routes into the higher areas during floods. Perhaps there are opportunities for peripheral tourist developments at the edge of such areas that can hopefully provide some jobs for local communities.</p> <p>Agree</p> <p>Striking maps - EMPHASISES THE URGENCY OF SORTING OUT</p>

CORRIDORS TO HIGHER GROUND ASAP BEFORE IT IS TOO LATE

NO it is not the largest - the White rhino (or possible GOH) is the largest rhino. BR are quite a bit smaller than WR and GOH Rhino . There is not much to chose between GOH and Whites in terms of size.

Granted - the Sumatran is the hairiest by far and hair can be visible on its flanks but other rhinos can also have hair even at very sparse densities. BR and WR also have hair on the tips of their ears

Not all are browsers. The white rhino is a grazer. The black is a browser and GOH a mixed feeder eating browse and grass. White rhino also do not only favour open areas as the broadleaved, highly palatable and favoured Panicum maximum and Panicum deustum grasses are found growing under tree canopies.

3.5 years as an average is a little long and in Africa would be indicative of a population probably above its maximum productivity density. Under ideal conditions where densities are below Ecological Carrying Capacity (ECC) both Black and White rhinos can have average intercalving intervals of around 2 to 2.5 years. No reason to think that GOH should have any different demography. In Africa we would consider ICI's of <2.5 years as good to excellent. 2.5-3 as good to moderate, 3-3.5 moderate to poor and >3.5 as poor to very poor. This may suggest that you have nothing to lose by translocating more rhino to found or boost GOH populations in other areas. Ultimately if you hardly remove any rhino then if dispersal is prevented densities are likely to increase to the point the productivity suffers.

20,424 is updated figure - round to 20,420
Updated figure 1,959 rounded to 1,960
updated to 2,323 or round to 2,320
5,08a is revised figure but round to 5,080

INCORRECT - The TRAFFIC document notes that there has been one proper double blind clinical trial that was undertaken in Taiwan. IN this study rhino horn was found to have statistically significant fever reducing properties and was superior to buffalo horn which also reduced fever. While the placebo control had no fever reducing effects, a cheaper western medicine was the best fever reducer as it reduced temperature by more than rhino horn, and did so for a longer period. Thus rhino horn did appear to have fever reducing powers in this case; albeit not as good as the cheaper western medicine. I recall that in one other study, dosages of horn that were higher than would ever be given did appear to have some fever reducing effect. However I think another study didn't show any effect. However this issue is not just one of efficacy or not of specific treatments but perceptions of the people taking the supposed treatment. In the same way some people still buy homeopathic remedies in the west when they may have been diluted so much that they may not contain

even a molecule of active ingredient ! Even

So far this year (as of 17 April) a total of 294 have been poached in SA. This translates to 2.75/day. While this is high and approaching levels that will not be sustainable the good news is that this is very similar to the average numbers of rhinos poached/day in SA for the last three quarters of 2013. Thus poaching levels in S.Africa appear to have stabilised over the last year and the exponential increase appears to have levelled off. Hopefully this is not just a temporary respite before poaching exponentially increases again.

Poaching fuelled by the demand - this currently has to be supplied by killing rhinos as there currently is no legal international trade and there is a limit to the number of existing horns that can be stolen from museums etc. Demand reduction efforts are likely to be a key part of any solution.

Interestingly the new trade dynamic in Viet Nam appears to favour horns from African rhino as these are larger and currently high prices are being paid/kg. Historically Asian horns fetched much higher prices but today it may be more profitable for criminals to poach African rhinos given the greater amount of horn they get per rhino. One could hypothesize that possibly this may be giving some protection to Asian rhinos currently as the relative poaching rates of Asian rhinos appear lower than in African countries being affected by the big upsurge in rhino poaching. However the other argument is that given the high prices being paid/kg it still will be worthwhile for a poacher to kill a calf rhino in Africa or an Asian rhino. Thus any advantage Asian rhinos may currently have will be limited. Good protection will remain crucial. We have learned the same with dehorned rhinos in Africa. Dehorning alone is not a solution. If it is going to be applied it has to be as part of an integrated strategy that includes effective law enforcement.

Bit of an overstatement. Yes we have a serious problem and if we don't get on top of it rhinos do face an uncertain future.

Agree with first sentence but not with second - Poaching in Kaziranga NP is only marginally higher/km² than Kruger NP. Really both rates are pretty much the same. The number of rhinos poached/km²/year in Kaziranga in 2013 (27 in 858.98km²) was 0.0314 compared to 606 in Kruger's 19,633 km² in 2013 which came to a very similar 0.0309. Both round to 0.31.

Good to see field rangers getting better equipped.

Very important to have good intelligence and good analysis (including social network analysis) to identify key players in trade. Also important to use connectivity metrics to work out who to focus on to maximally disrupt networks. Also important to expand intelligence outside the field and to put

greater emphasis on levels 3-5 in criminal pyramid rather than just focusing on levels 1 and 2 at ground level. It has been suggested that efforts should also focus on using international anti-money laundering provisions to seize assets from syndicates and to cut their funding whilst hopefully also generating some revenue to help fund enhanced field efforts.

South Africa's CSIR (Council for Scientific and Industrial Research) undertook comparative tests under field conditions of about 50 UAV's. However these are not a substitute for getting the basics of field law enforcement right. Need to be careful not to just buy the first toy demonstrated. I suggest you get in touch with CSIR guys to learn about what technology appears useful and what not. If you want to let me know and I can give you contact information.

Although more clearly needs to be done to address the problem of closing corridors and access to higher land outside of the park. This will be necessary to ensure the ecological functioning of the area.

Again only as good as your ability to react when your UAV detects something.

One thing I don't see emphasised is the importance of getting the right calibre of field ranger with good bush skills. One problem in some areas of Africa has been an inadequate selection process where selection has not been physically demanding enough with too much emphasis on paper skills. However I have just noticed that later on you do emphasise the importance of well training and well motivated staff. Agree. Tony Conway did an analysis of a number of KwaZulu-Natal Rhino Parks - some of which had experienced a bit or a lot of poaching and others had experienced very little or none. He found that IUCN's measure of conservation effectiveness was not a good predictor of poaching. However if I recall correctly three things were related to rhino poaching. Not surprisingly Park leadership was critical as it is often said a fish rots from the head down. Where there was poor patrol coverage and standard operating procedures were not being properly followed you had a poor park head. In addition field ranger density had an influence with good parks having at least 1 man/10km². (This may seem very low compared to Kaziranga but the men are better paid and equipped).

doesn't have to be ...

or a contractual National Park where some of the land remains privately or community owned but the park it now forms part of sets the ground rules as to what can and can't happen in the area?

Not sure I totally agree here. It could sustain a significant biomass of wildlife in the long run because you have regular inputs of lots of nutrients following floods. However if Kaziranga becomes an island due to settlement expansion and

	<p>increased disturbance I do agree that the natural process of dispersal will then be threatened and one would need to routinely translocate rhinos out to new areas to keep the population productive (as for example has been the case with Hluhluwe-iMfolozi). It might sustain wildlife but at the risk of much poorer breeding performance and perhaps some negative habitat changes caused by artificially high levels of grazing/browsing. The potential stopping of migration out to high ground at times of floods is very worrying and the proposals to buy up tea gardens and consolidate them into the park is to be welcomed. Essential to ensure corridors and access to higher ground is maintained before it is too late. You don't want what happened to Nairobi National Park happening. There corridors gradually were allowed to close significantly affecting historical migratory species such as Wildebeest that used to migrate in and out of the park in numbers. The more a reserve becomes an "island" the more you need to actively manage including translocating surplus animals out in order to simulate what used to be "natural processes".</p> <p>This is why in Africa most countries actively manage their rhinos as a metapopulation.</p>
<p>BHASKAR J. BARUA, Managing Director, Luit Holidays Joint Secretary & Spokesperson, Tour Operators Association of Assam (TOAA) Managing Agoratori Resort Member Local Advisory Committee of Kaziranga Tiger Reserve</p>	<p>EMPOWERMENT OF LOCAL PEOPLE TO BE THE MAIN STAY OF TOURISM SERVICES IN KAZIRANGA SUMMARY</p> <p>Kaziranga being a premier National Park in the world Wildlife Map is also an UNESCO World Heritage site as well as a Tiger Reserve and an Important Bird Area. So it is no wonder that this place attracts tourists of different hues and shades, from diverse places, of diverse interest groups, of different expectation levels. It is also no surprise therefore that Kaziranga is the pivot around which the entire tourism scenario in North East India revolves.</p> <p>The recent spurt in Poaching activities at Kaziranga and the resultant negative publicity surrounding it can be attributed amongst many other things to rising unemployment amongst the local villages surrounding the park - specially the lower strata of the society like the Tea Gardens and the Tribal Villages, the sense of disconnect of the local population with the management of the park and the lack of confidence amongst them to be a part of the Tourism Bandwagon. One need not reiterate on the potential Tourism has in empowering the local population towards direct and indirect employment.</p> <p>The empowerment and employability quotient can take various forms – from basic skills like Front Office Jobs, Food & Beverage, Housekeeping, Driving, Gardening, Cooking, to Medium Level Skills like Guides and Naturalists to High Level skills like Interpreters and Proficiency in Foreign Language such as French, German, Chinese, etc. to Top End Skills like Birding and Wildlife Photography.</p> <p>Moreover Kaziranga being primarily a Wildlife destination, every individual related directly or indirectly in tourism activities (right from</p>

the driver to the waiters to the sales person in the market, etc) should have a basic knowledge of the wildlife scene here and should be able to communicate the same to the visitors at least in proper English.

TOURISM AND CONSERVATION

It needs no re-iteration that tourism and conservation are opposite sides of the same coin. Given the huge potential available at Kaziranga, tourism by itself can be the main lever for ushering in socio-economic development of the area. The emphasis should be on every household of the area being benefitted directly or indirectly from tourism activities here. The immediate need of the hour is to first empower the marginalized section of the society here towards the service component of tourism – before venturing into bigger and capital intensive activities. This will go a long way in minimizing the immediate menace of poaching activities, if not altogether.

ANALYSIS OF THE SERVICE TRENDS PREVAILING AT KAZIRANGA

- Local youths presently employed at the various resorts and guest houses are mostly in the entry level – receptionists, waiters, housekeeping, dish washing, etc.
- A majority of these local youths are in the Class X / (+) educational ability and come from the strata of society where their income is an augmentation of the already steady income source in the family – either through cultivation, small business or Government Jobs.
- The ability of these youths to climb up the management ladder is stemmed due to inadequacy of training and lack of communication, networking, entrepreneurial and leadership skills.
- This has given rise to a sense of being neglected – leading to discontent amongst them, when they see mid level management staff is being brought from outside the local area, and they are stuck with a monotonous and menial job for a major part of their prime.
- The benefits of tourism has yet to percolate down to the strata of society whose income levels are just above the poverty line, viz. Tea Garden Community and the Tribal Communities living in the fringe areas. Lack of education, awareness and training amongst the youths of these communities has ensured that they have been bypassed from the benefits accruing out of tourism activities in Kaziranga.

NEED OF THE HOUR

- Empower the unemployed local Tea Garden and Tribal youths and other communities in Service, hospitality, Housekeeping, Guiding, English Communication Skills, Leadership & Entrepreneurial skills, so that they can enter the Sector by

being employable and then onwards to be service providers themselves to partake of the tourism potential available here.

Note: The beneficiaries of this program at a later stage after practical experience can be trained further to enjoy the benefits of the various Productive Schemes of the Government - such as being Home Stay providers, for instance.

AIM OF THE PROJECT

The aim of this project is to improve the economic stability of the poor families living within the fringe areas of Kaziranga National Park as well as instill a level of confidence and awareness amongst the local Educated Youths to be self reliant. The project is to start up a tourism services initiative together with the local poor families within the reach of tourists' attraction areas in Kaziranga. Tourism industry requiring heavy capital investment is locking out most of the local people within these areas. Mostly affected are the poor families who are missing job and income generation opportunities since they are not involved in the exploitation of their available natural resources, through tourists' accommodation, tour guiding and networking for socio-economic development. The Government of Assam through the Department of Tourism has already announced The Assam Rural Home Stay Tourism Scheme-2012. But for the scheme to be a success, the rural people first needs to be empowered to handle the demands of the tourists – right from cleanliness, sanitation, service, housekeeping, guiding, etc. not to speak about the ability to communicate in English – to understand and comprehend the needs of the tourists. The main focus of this training project is not just to make one employable but to mentor and hand held them to be self employers and employment avenue creators.

For instance, for these home stays to be affordable without compromising on the services, the foremost requirement will be to empower the owners to understand all facets of tourism services – beginning from networking to preparation of itinerary, activities, reception, service, housekeeping, guiding, communication skills, etiquette, etc. so that they do not have to depend upon paid / salaried employees. The training will focus in guiding the youths to create better understanding amongst the visitors of local customs, their importance and continued relevance in the ever changing world.

GOALS AND OBJECTIVES

The goal of this project is to improve the economic stability of the poor families living within the reach of tourists' attraction areas in Kaziranga.

SPECIFIC OBJECTIVES

- To newly empower 200 poor unemployed youths from the Tea garden, Tribal and other communities to partake the opportunities provided by tourism at Kaziranga – to make them employable / self employed and subsequently provide an opportunity for internship / volunteering and further skills development before they are capable of venturing on their

	<p>own.</p> <ul style="list-style-type: none"> • To upgrade the soft skill set levels of 200 educated youths by imparting training in Personality Development, English Communication Skills, Personal Grooming, Etiquette and Leadership and Entrepreneurial Skills to enable them to be employed at the Mid Management Strata / capable to venture on their own for in home stay based tourism activities in Kaziranga for economic stability, poverty reduction and employment generation. • To involve 100 youths in Wildlife Guiding Activities with better communication skills in English. • To help create / mentor an affordable, reliable, effective and secure infrastructure for low income tourists visiting Kaziranga. <p>JUSTIFICATION / BACKGROUND</p> <p>Kaziranga is a major international tourist destination receiving about five million visitors / year. Being an expensive tourist's destination most of the visitors are of high income levels. Most of these visitors prefer staying in expensive hotels and use expensive transportation means to visit the areas. This is only benefiting the huge investors in tourism industry leaving out the locals bordering the visited areas. Over 99% of the local communities living within tourists attraction areas in Kaziranga are not involved in tourism activities for socio-economic development. Due to this, conflicts between the locals and government policy implementers on conservation is constantly experienced leading to less conducive environments for visitors. This proposed pilot project is therefore to involve the local families in tourism industry for economic stability and bring about the conservation of the environment and natural resources for posterity. This will also help reduce the cost of visiting Kaziranga for low income visitors.</p> <p>BENEFICIARIES</p> <ul style="list-style-type: none"> • 200 poor family members living within tourists' attraction sites in Kaziranga to be employed / self employed. • 200 employed / self employed youths to further develop their skills so as to enable them to jump to a better social stratum. • 100 unemployed Wildlife Guides
	<p>Ref.: As discussion in the International Conference held at NEDFI Conference Hall, Dispur by our representative on 20.05.2014, with the Amicus curie Mr. P. N. Choudhury of Honourable Guwahati High Court.</p> <p>Dear Sir,</p>

We, the members of Greater Kaziranga Human Resource and Environment Protection Committee, would like to put forward the following suggestions, for development safety and security of Kaziranga National Park as well as the protection of world famous One Horned Rhinoceros, for doing the needful please. That Sir,

- (1) The development of particular place or society mainly depends on many factors. One of such main factors is the Communication aspect. As there are no Air, Water or Railway communication to Kaziranga, the tourists (both domestic and foreigner) and the local people are solely dependent on the Road Communication. In Kaziranga the N.H. 37 is passing through the southern boundary of the Kaziranga National Park from Jakhlabondha to Bokakhat, and this road is the only means of communication connection upper Assam and Lower Assam. Hence this N.H. 37 is practically termed as the 'Life Line' of Assam and the Assamese people. Moreover almost 6.50 lakh inhabitants are dwelling in both the sides of N.H. 37, including many revenue villages in and around the fringe area of Kaziranga National Park from Koliabor to Numaligarh. We feel proud to mention here that these inhabitants are the lovers of wild animals of Kaziranga National Park and they act like the honorary guards for the protection of these animals, particularly the one horned rhinoceros.
- 2.(a) When we think for the overall development of Kaziranga National Park we can not avoid or ignore the aspect of development of these villagers, local people, local socioeconomic conditions of the region as a whole, and instead accuring the good services and dedication of some local youths for the benefit of the park.

But it is seen that, during construction of East-West corridor connection Assam with the rest of the country - some NGOs in the name of animal lovers, who are using Kaziranga and its habitates as their source of earning livelihood - ignoring the human aspect and its development had pressurized the Govt. as well as the National Highway Authority of India to drop the construction of the stretch of N.H. 37 from Koliabor to Numaligarh on the false plea that it is

passing through the Kaziranga National Park.

Local people were agitating on this false issue as the N.H. 37 in this stretch have passed through outside the Park of its Southern boundary, touching only 6 or 7 places of its new additions. But the authorities having not expert opinion of their own, and solely dependent on these NGOs, did not hesitate to ignore the human aspect.

- (a) Sir, instead of trying to establish a hypothetical fact that N.H. 37 from Koliabor to Numaligarh is the root of all evils - let us try to establish the real fact that - this stretch may be converted to a developed 4 lane road by using modern technology in a scientific way - which will carry civilization to this World Heritage Site, dedicating to both animal and human being. At present build up safe passages as short term measures, Fly overs where necessary.
- (b) Taking in to confidence the villagers of fringe villages, local people - try to engage the local Human Resource for the protection developmental and proper conservation works of Kaziranga National Park. Also give emphasis for their all round development.

In this connection we would like to draw your attention to the fact that, now a days Karbi Anglong area is not safe for animals like Rhinoceros, deers etc. as present incidents of rhinopoaching in Kaziranga National Park reveals the involvement of the militant groups. Moreover the Forest officials from Karbi Anglong present at the conference expressed their inability to give protection to the stray rhinos crossing over to the side of Karbi Anglong area.

Hence our suggestion, we should create sufficient highland with plantation of suitable jungle for rhino. These high land areas should be created in the available and suitable selected 10-12 places each measuring one square km or so. While constructing such high lands various water bodies will automatically be created for the use of animals during hot summer.

	<p>As the Kaziranga National Park is heavily a flood prone area due to the mighty Brahmaputra rivers, it is closely associated with EROSION of the park area. We have already lost our years long heritage with the loss of Arimora which has been eroded. Our suggestion in this regard is : (d) Convince the Central Govt. to consider this natural calamity as the national problem which is a serious threat to the World Heritage Site - Kaziranga National Park. The Central Govt. to use modern technology to curb the aggression of flood and to regain the lost area for the use of the animals.</p> <p>(e) The small island of char area in Brahmaputra and the foot hills of Burhapahar area are day by day grabbing by new unknown faces. We suspect these people invite and give shelter to poachers. Please arrange to deploy more trained security personal equipped with modern arms and weapons to face the poachers bravely.</p> <p>(f) Further while enforcing any new law abiding in the Kaziranga National Park area, relating to the wild life, we invite public hearing and participation of local people to maintain congenial atmosphere in future.</p> <p>Hope our suggestions will receive due importance and you will act accordingly, which we believe, will help to bridge a congenial atmosphere to build up safety and security to one horned rhinoceros, as well.</p> <p style="text-align: center;">With sincere regards, Truly yours.</p> <p>Munindra Nath Sarmah (President) Deba Pradip Bora (Gen. Secy)</p>
<p>Ron Chandler President Conservation Initiative for the Asian Elephant, Inc. 352.215.8400 CIFAEinc@gmail.c om http://Conservation InitiativefortheAsia nElephant.Bellstri</p>	<p>Dear Mr. Yadava, I trust this letter finds you in the best of health and spirits. Conservation Initiative for the Asian Elephant (CIFAE) is a US based non-profit that has supported projects in Assam before, most notably the recent project titled "A Forest Department-Community to improve the protection of western Hoolock gibbons in Jeypore RF, Upper Assam" that was co-funded by USFWS.</p> <p>I have had the honor of visiting your magnificent Kaziranga NP and working with local officials and NGOs in the area to assist them in</p>

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efforts to preserve wildlife as well as help develop sustainable local economies. In response to your recent appeal, please find following our recommendations on how to improve protection and management of Kaziranga NP. I hope that you find these suggestions useful in your deliberations during meetings in April and May 2014, and hope that you will not hesitate to contact me if there is anything that CIFA can do to assist you.

While we fully recognize that Kaziranga NP is one of the best protected parks in India, and while we also realize that Kaziranga's magnificence is a testament to the sacrifices made by the officers and field staff posted there, we offer the following recommendations.

1. We believe that there is a need to recruit younger forest guards so they can be mentored by the experienced older guards and game watchers. This will help to ensure that Kaziranga NP continues its fine tradition of dedicated field staff when retirement or illness occurs.

It is essential that youthful guards are recruited from neighbouring communities of the Park to ensure that they have a stake in seeing wildlife thrive in Kaziranga NP.

2. Field staff in Kaziranga NP make great sacrifices leaving their families to fend for themselves for months on end.

To support their heroic efforts and thus build and maintain morale we recommend that they and their families receive better access to healthcare and education. To accomplish this we recommend that officers and staff receive increased healthcare benefits, additional days of leave to attend to emergencies, and for special scholarships to support their children's education.

As you know, when the basic needs of field staff are provided their morale improves and consequently their efforts to protect Kaziranga NP.

3. Land surrounding the boundaries of Kaziranga NP is often used by wildlife especially during the floods. This land is subject seemingly unrestricted land use planning resulting haphazard construction of resorts, shops, and industries that destroy opportunities for multi-purpose planning that allows for wildlife as well as economic development.

We recommend establishment of Kaziranga Development Authority, a governing body that would be responsible for ensuring that development, if allowed, does not block wildlife movement. In addition, the Kaziranga Development Authority would be responsible for ensuring that land use changes by local people for their own livelihoods would be permitted in such a way as to protect wildlife movement or that they received appropriate compensation should their land be part of a critical wildlife movement corridor or highland escape during floods.

The Kaziranga Development Authority would also have the authority to accept or reject projects in the Karbi Anglong that might affect the

	<p>wildlife of Kaziranga NP. A similar development authority already exists in a few places in India and abroad and these could be used as a template to develop the Kaziranga Development Authority.</p> <p>4. Related to Recommendation 3 (above) is the essential acquisition of critical pieces of privately owned land that are within known wildlife corridors or that are used as refuges during floods to ensure that these lands remain available to wildlife for prosperity. Moreover, acquisition and protection of land surrounding Kaziranga NP is of critical importance for buffering against future catastrophic effects of dam building Tibet and climate change river flood regimes. Protecting land around Kaziranga NP would also provide human refuge in times of flooding and other disasters caused by climate change and thoughtless water manipulation outside India's borders. Generous financial and resettlement packages should be offered to those asked to give up their lands to keep Kaziranga NP healthy and its wildlife safe. Finally, to ensure that wildlife have access to Karbi Anglong Hills for perpetuity, we believe that infrastructure currently blocking or restricting wildlife corridors between Kaziranga NP and Karbi Anglong Hills should be demolished, and the stakeholders affected be adequately compensated.</p> <p>5. We are aware that very few of rhino poaching cases have resulted in arrests and convictions. Therefore it is necessary to establish a dedicated mobile forensic in Kaziranga NP. This unit would need to be staffed with experts in scene-of-crime investigation and forensic detectives who can then build solid evidence-based cases through the use of cutting edge technology such as genetic fingerprinting from rhino and poacher tissue samples taken at crime scenes. Such evidence would lead to apprehension and conviction of perpetrators under the Indian Wildlife Act which if applied is quite severe.</p> <p>Finally, it is essential that funds allocated to Kaziranga NP from the State Government as well as from NTCA and Project Elephant and other centrally sponsored schemes reach the park in a timely manner so that these funds can be used to ensure effective protection of Kaziranga's wildlife. Our commitment to assist Kaziranga NP authorities in any way possible is sincere and steadfast. We hope that you will call upon us for assistance.</p> <p>Thanking you for the opportunity to provide suggestions toward effective long-lasting improvements for anti-poaching efforts and management in Kaziranga NP and Karbi Anglong region.</p> <p>With sincere thanks,</p>
Ravi Changty	<p>The following points can be considered :</p> <ol style="list-style-type: none"> 1. Page 3: We need more Highways: A map / graphical

	<p>representation of the alternative highways to be developed can be provided, as it will easier for the readers to understand.</p> <ol style="list-style-type: none"> 2. ATV s for the rangers for patrolling. 3. K-9 team to be developed. 4. Invisible Fencing. 5. VTS for all the jeep safaries tagged with RFID with geo-fencing
<p>Dr. Bibhab Kumar Talukdar, Chair of IUCN/SSC Asian Rhino Specialist Group Secretary General cum CEO of Aaranyak, Asia Coordinator of International Rhino Foundation</p>	<p style="text-align: center;">RHINO PIL AND MEASURES NEEDED TO CHECK FURTHER RHINO POACHING IN KAZIRANGA, ASSAM</p> <p style="text-align: center;">Suggestions from : Dr. Bibhab Kumar Talukdar, Chair of IUCN/SSC; Asian Rhino Specialist Group Secretary General cum CEO of Aaranyak Asia Coordinator of International Rhino Foundation</p> <ul style="list-style-type: none"> • Director KNP may have received many suggestions from many people/agencies. It is time to prioritize based on the needs and wants to move forward realising that fund could be a limiting factor to what we need and what we want. So priority should be to find out the needs at this stage rather than wants. • Let's focus on what could prevent further poaching of rhinos? I feel <u>intelligence</u> gathering on movement of poachers, then <u>effecting action on such intelligence</u> to prevent poaching preferably when poachers are still outside the park and if arrests are made, <u>ensure conviction by putting a dedicated team of forest officials to pursue the cases</u> from A-Z. Without conviction, I feel, we can't show supremacy over poachers. Arrest is just the first steps, but if arrested persons are not convicted they become hardcore poachers and will create some more poachers. <u>For this I feel funds are required and has to be top priority agenda to check poaching.</u> • Welfare of frontline and all forest staffs working in rhino bearing areas must be ensured with proper support that includes field gears, good health and physical and mental training at regular intervals. Whatever machines/tools we use to prevent poaching, it will be these ground forest staffs that need to be fit first to use the machine and tools. <u>Sending young forest staffs for combating training in batches should be the priority.</u> • To find out the key sponsors or abettors involved in rhino poaching, KNP authorities should immediately collect information from Golaghat and Kaliabor and Biswanath Court

	<p>with regards to - <u>which are persons taking bail for the arrested poachers need to be identified</u> and start investigation from there. This will give a clear picture on men behind poachers. I suggest each ACF of Kaziranga NP may be given responsibility to pursue rhino poaching related cases in Golaghat, Kaliabor (Now perhaps Nagaon court) and Biswanath (now may be Tezpur) Court to ensure speedy conviction. These ACFs may be assisted by new range officers who may be attached to the ACF for exclusively dealing with court cases and anti-poaching operations. Incentives both financial and professional should be given to the team for successful conviction of rhino poachers.</p> <ul style="list-style-type: none"> • All efforts must be made to garner increasing support towards rhino conservation from fringe villagers of Kaziranga NP. The differences between fringe villagers and forest department need to be sorted out by establishing a committee which will try to strengthen the bridge between the local communities and Kaziranga National Park authorities. This effort will help in building and strengthening second line of defence to protect rhinos. • Before purchasing sophisticated equipment for surveillance of the rhino bearing areas, its efficacy in field condition may be tested and the countries in Africa who used such technology may be contacted for their review. Not all surveillance equipments work everywhere.
<p>Dipankar Ghose, Ph.D. Director - Species & Landscapes Programme WWF-India Secretariat 172 B Lodi Estate Max Mueller Marg New Delhi 110 003 India Telefax: ++ 91 11 4150 4782 dghose@wwfindia.net www.wwfindia.org</p>	<p>Dear Sir,</p> <p>This has reference to your email on the subject matter, dated 21st May 2014, written to our Secretary General and CEO. We have gone through the presentation sent by you and have also looked at that in the light of the report on wildlife connectivity that our colleagues submitted to your office some weeks back. Following are some of the points that we would request you to include in the final report that you would be submitting in this regard.</p> <p>Securing Corridors around Kaziranga</p> <p>The presentation shared by the Field Director, Kaziranga National Park (henceforth KNP) points out different land uses that are hampering animal movement through the corridors and several solutions have been mentioned. We could also stress that each stakeholder group (hotel and resort owners, dhaba owners, habitation/ settlement i.e. different communities in those, tea estates, quarry operator and state agencies) will have to be addressed separately and differently to address the issue of corridor fragmentation. The said presentation also points out that while connectivity across the landscape is a concern, there are priority areas that need to be secured, some because those are still not highly disturbed and others because they are important but</p>

greatly threatened due to various activities.

Existing corridors should be appropriately identified after consulting with stakeholders and NGOs who have been working on corridors and then demarcated. Subsequently the corridors need to be secured by the government.

Fragmentation of Amguri corridor has been mentioned in the presentation shared by the Field Director, KNP. Measures for securing this corridor and others need to be included in the Tiger Conservation Plan (TCP) for Kaziranga. For Maloni - Burapahar corridor, details on the area and an economic analysis of whether it is feasible to purchase that land are required. What measures is the govt. taking for restoring Kanchanjhuri corridor, needs to be detailed. How much area of the Hatikhuli TE needs to be purchased and what is the amount required for that, has to be mentioned in the TCP.

Mission: Poaching-free Kaziranga

WWF-India is willing to assist the Assam state Forest Department to address the issue of lack of motivation and training for frontline staff. WWF-India and Assam Forest Dept. already has an agreement for constituting the annual Assam *Vanya Prani* Mitra Award for staff with exemplary contribution in wildlife conservation within the state. Extra-ordinary performance of select staff of Kaziranga needs to be highlighted and those staff need to be nominated for the said award.

The presentation mentioned that the anti-poaching camps are not in a good shape, there has to be a strategy for the government to improve the situation.

1. The northern boundary of the Park needs increased surveillance and protection to be provided to multiple entry points through the river island/ sand bars (*Chapori*) all along the Brahmaputra river course adjoining the Park.
 - a. Support of River Police may be sought.
 - b. Imposition of prohibitory orders on movement of vessels during dusk-to-dawn may be considered. Fishing in these stretches during day for livelihood of bonafide local people might be allowed.
2. Bagser Reserve Forest to the south of the park (adjoining Burapahar Range) is a known conduit for poachers striking Burapahar. The said area has to be secured to reduce this threat.
 - a. Bagser Reserve Forest may be added to the Park to bring it under the same management for increased patrolling and subsequently securing the area.
 - b. The hilly areas of Bagser Reserve Forest would serve as a natural 'highland' for animals during floods, and with a higher degree of protection this area will help in reducing flood vulnerability for the large mammals of Kaziranga.

	<p>3. Effective coordination with Police Department is likely to help in curbing wildlife crime as the legal follow-up of most of the poaching related cases are followed up by police. Coordination with the Forensics laboratories is also important to get reports on time to be able to charge arrested persons within the legal timeframe.</p> <p>4. Inter-state coordination, especially with Nagaland and Manipur, may prove to be helpful in blocking wildlife trade routes and arresting kingpins who control the trade within Indian boundary.</p> <p>5. A separate legal cell needs to be set up within the Forest Dept. to deal with all legal matters related to poaching and other wildlife crime as this requires dedicated human resource.</p> <p>6. Monitoring of patrolling efforts needs to be carried out using LEM tools.</p> <p>7. Traditional foot patrols and elephant patrols are to be judiciously used.</p> <p>Landscape Level Conservation Proper land cover zonation needs to be prepared and master plan developed. After that an autonomous body needs to be formed to monitor and implement the master plan through a special Act.</p> <p>Balancing Development and Conservation A cell dedicated to maintaining community liaison is suggested to build strong park-people relationship. The cell should be entrusted with activities related to Eco-Development Committee or similar such initiatives to reach out to the fringe villages and build relations.</p> <p>National Highway 37 Overpass/ underpass, as suitable, should be constructed at identified critical corridor stretches that will render the National Highway functional with regulated vehicle movement. An alternate road to the present National Highway should also be developed keeping in mind increased traffic in future.</p> <p>Please get back to us for any clarification.</p> <p>Thank you and best regards</p>
<p>Bhaskar Choudhury Reg Head (Assam) and Head Vet NE Wildlife Trust of India Tel: 91- 9435748840</p>	<p>Concept note: Role of veterinary professionals in conservation of Greater one horned rhinoceros in Assam with particular reference to Kaziranga National Park</p> <p>There are three clear roles to my opinion, being a veterinarian myself and also having a working experience of 14 years in wildlife health, management and rehabilitation in Assam. Looking at the population dynamics of the species and the threats</p>

it is facing and going to face in near future, I have categorised the role of a veterinary professional into five major areas to see the species in a better shape tomorrow, I have also put across the planning of resources that are available to the Forest department for accomplishment of the roles (table1).

1. Fundamental studies on basic biology of rhinoceros (age estimation, normal physiology)
2. Population management (local overabundances) through translocation:
3. Health and welfare needs of individual animals in distress
4. Epidemiological investigation of susceptible diseases and its prevention
5. A veterinarian can bridge the gap of community with the forest department by providing technical support of livestock husbandry to fringe villagers.

Resources available as of now:

1. Forest Veterinary Officer,
2. Centre for Wildlife rehabilitation and Conservation (CWRC) has at least five full time veterinarians who are serving the department but can be utilised better.
3. Department of animal husbandry and veterinary, Bokakhat.
4. Professor of veterinary college, Guwahati on call.

Questions, resources and feasibility:

Area of work	Action points	Feasibility	Resources (manpower)
Answer to fundamental biological questions (age/physiology)	Biometric study of available skull with forest department for age estimation, collection of data and samples during Post mortem examination	Very high	FVO, CWRC veterinarians in consultation with Veterinary College, Guwahati
Population management through translocation	Already undergoing through IRV 2020	High	IRV 2020 team
Health and welfare needs of individuals in distress	CWRC has been handling this successfully in collaboration with the department	Very high	CWRC and trained forest staff
Study disease epidemiology	Formulating epidemiological model, collection and storage of biological samples	High	CWRC, veterinary college

	<p>Bridging the gap Organize farmers meet Very high AH and within KNP fringe villagers within KNP fringe villagers Department, at least once every quarter at least once every quarter Bokakhat, Krishi Vigyan Kendra, CWRC</p> <p>The above mentioned action points will give us not only comprehensive information on the species, but also link it to the community without involvement of major financial resources.</p> <p>Regards</p>
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Valmik Thapar	<p>I believe that to strengthen management and protection in wildlife rich landscapes requires innovative policy adaptations. In India an enormous talent lives outside the realm of the government system and the officer. This talent has to be harnessed for wildlife. We have examples of how Nandan Nilekani and Sam Pitroda were given Cabinet rank and put in control of government offices to complete a mission. We have examples of how more than 100 ambassadors have been appointed to missions abroad even though they were never a part of the Indian Foreign Service. Even in the IAS dozens of senior officers including Secretary rank are employed each year on short and long term contracts.</p> <p>The time has come to fo the same in our national parks and tiger reserves. Government rules permit such inductions in cadre..non cadre and consultancy posts. In places like Kaziranga the Field Director needs to engage on short term and long term contracts at least 20 personnel who are experts in wildlife science..anti poaching..tourism..people welfare..botany..water conservation..etc etc. All these persons are given the status of CF..DFO..ACF..and become a part of the Field Directors team that manages and protects the park. Each one will have an office and forest staff will be answerable to them. This will create great strength in the team and such a joint approach will overcome many problems. Suchh innovative strategies can only be welcomed and the Rules of Government allow for this. It is much better then Dehorning Rhinos.</p> <p>VALMIK THAPAR 9.5.2014</p>
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<p>BHASKAR J. BARUA, Managing Director, Luit Holidays Joint Secretary & Spokesperson,</p>	<p>SUGGESTIONS / CONTRIBUTIONS</p> <p>(j). Promote Kaziranga as a Birding Destination. This will help in bringing in more discerning and responsible tourists. This will also encourage visitors to make repeated visits.</p> <p>In this regard, I along with Dr. Kamini Barua of the</p>
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<p>Tour Operators Association of Assam (TOAA) Managing Agoratoli Resort Member Local Advisory Committee of Kaziranga Tiger Reserve</p>	<p>Department of Ecology, University of Leuphama, Luneberg, Germany presented a paper on the prospects of Birding Tourism at Darwin in Australia during the celebration of the Wildlife Week, 2013 organised by Wildlife Tourism, Australia.</p> <p>(k). The carrying capacity of the park may be notified and steps taken to ensure the no. of visits permissible during a day. These fixed no. of visits should spread across all the four ranges and should be strictly on a first come first basis. For this to be implemented effectively and transparently, the official website of KNP should have provisions for pre / online booking of safaris.</p> <p>(l). The entry fees should be increased for Indians and decreased for foreigners to be brought at par – say for instance Rs. 200.00 per person. This will go a long way in increasing the revenues as well as discourage casual visitors who visit the park just for fun.</p> <p>(m). The department should initiate steps in association with private partners for training local youths as Wildlife / Birding Guides with proper communication skills. Apart from the usual benefits accruing to the local community, this will also go a long way in inculcating amongst the family members of these youths not to indulge in anti-conservation activities as well as ensure the enrichment of the experience of the visitors.</p> <p>(n). Ban the use and carriage of any plastic items inside the park.</p> <p>(o). Immediately take steps in association with the fringe area people to stop cattle grazing inside the park. Unhindered cattle grazing and even movement of domestic animals like Stray Dogs have come to such a pass that we are facing at a disaster which is of a magnitude much higher than poaching.</p>
<p>Kamal Gogoi AASHRAY LODGE Kaziranga M.No:9435478339</p>	<p style="text-align: right;">Date: 24-05-2014</p> <p>Sir,</p> <p>From reliable sources I have to know that views regarding the conservation of Kaziranga National Park have been asked by you and as a sensitive and well wisher of this great world heritage site, I would like to present some of my views on the aforesaid subject. The recent activities of poachers and harmful effects of the same has created a great deal of stir among the people. The undersigned is a native of Lukhurakhania villages, a historical place of Kaziranga. As a native, I am well</p>

connected with this park from birth, so I am well aware of its present condition more than anyone else. I was awarded by Governor of Assam in 1991 for my active role in saving this World Heritage site, in different way and also participated many times in its wildlife census work on the request of concerned authorities. Following are the hindrances in the path of conservation of the Kaziranga Wildlife from my point of view:

1. The gradual extension of tourism in Kaziranga, results in the population explosion in this area. For the Profit motive only many businessmen from Assam and different parts of the country rushing here and establishing their luxurious hotels and other types of business. As a result a large portion of area covering from Burahpahar hills to Dhanshri River and Karbi Hills. (South of Diffla river) have been affected severely. The chief factors are illegal residences, tea gardens, stone crushers Etc. and along with these the luxurious hotels. So the wildlife of the national Park has been gradually shifting to eastern and western part from its core area. This shifting has benefitted the Poachers of Kanchanjuri and Agaratali area where a numbers of rhinos have been killed. As wildlife do not understand the boundaries created by man.

During the year of 1987, while as a student close to the national Park. I started my career as the first ever tourist guide and jeep driver and later on I started an eco-tourist lodge with three rooms in my home, to guide the local people for their socio – economic development. The villagers, inhabited close to the Park have constantly been disturbed by the wildlife of the Park, destroying paddy fields, killing domestic animal and villager's life and assets as well. So it was an important step to introduce the concept of eco-tourism only for the villagers living close to the national Park. First, ever conscious organization supported my concept, but as time passed the chief aim of the concept was brutally crushed down. And businessman from different place of Assam and other parts of India like Guwahati, Jorhat, Dibrugarh, Golaghat, Mumbai, Delhi, Kolkata, came to establish the luxurious hotels and lodges. These People are not the victims of the National park and they have no any contribution to the Park. In that case why

should we permit them to establish their polluting business in the Kaziranga National Park ?

We see that agricultural fields have been used for other purposes and hills areas have been cutting down to plain lands and these activities have severely affected the bio-diversity of the Kaziranga. The civil sub-division and District Administrative authorities (civil) both alienated the Forest Department and permitted these capitalist to exploit and harm this bio-diversity of the national Park. Rapidly the truth is that the safety and security of this world heritage site solely depends on selfless endeavourment of both government and non –governmental organization equality. The native people surrounded this national park have been constantly been victimize by the wildlife of this park now and then but these outsiders are never been hampered by the same. So why should these People be allowed to incur profit from the national park in any way or means many access of forest land which were used to be the habitat of different types of wildlife are now converted to hotels and resorts of aforesaid business class people. As a result these wildlife have been victims of both poaches and road accidents eventually, So, to get rid of this serious threat, I would like to point out some important steps or points which I think is the need of the hour:

- a) At first there should be a division of the population of the Kaziranga and surrounding places. The division should be a) Age old indigenous people b) Newly settled people . The inhabitants of move that 50 years should only considered as indigenous only.
- b) Rapid extension of tourism in kaziranga should be checked. The local people surrounding the national park should only be permitted to do direct tourism business in the national Park, whether it is jeep safari or the hotel business. Some local inhabitants which have been constantly hampered by the wildlife of the national park, should get some social, moral and economic support from the concerned authorities of the national park.
- c) Urge the tourists to enjoy the beauty of the national park by staying only in the eco-tourism or eco-village.

- d) The tourists which prefers to stay in luxurious hotels and resorts established by capitalist of outside should not be allowed to visit the national park.
- e) The Forest Department, Should take necessary steps to engage the local people directly in tourism business and should encourage and cooperate them in this regard that should be also after verifying their identity only.
- f) The landowners surrounding the national park, who want to sell their lands, should sell the lands only to Forest Department and local people only , strictly not to other outside business class people.
- g) The Jeep Safari business should also made limited to local people only. For this they should have to produce their permanent residencial certificate. The Jeep safari programme should be run with keeping in view the Socio-Economic Development of the local people only.
- h) The roadside dhabas, covering from Burhapahar Hills to Kohara should be closed or try to stop the illegal parking of heavy vehicles by the national highway 37 from 7 Pm to till 7 am everyday.
- i) And if above steps will be failed to implement then stop the visiting programme of the Kaziranga National Park for an uncertain period of time.
- j. The Elephant safari Programme of Bagori range should be completely with drown and entire area should be converted to forest area (middle) only. The Chief reason behind the rapid population growth at this area is undoubtedly the tourism business, flourishing in this part. For the last ten years. This area is entirely covered with suspected citizens. And these people along with other outsiders coming for business purposes have been causing a serious threat to this part of the National Park. One this Freeland has turned to a base of several antisocial activates full with suspected citizens.
- 2. FEELINGS OF THE LOCAL PEOPLE OF KAZIRANGA NATIONAL PARK:**
Kaziranga has been a favorite child of the local inhabitants since the time of Lord Curzon. These People were directly or indirectly involved with this park a long time before it

was declared as National Park Status. The Village People near the Park used to earn their living by collecting fire woods, fish grasses etc. incurred from kaziranga. It used be the grazing field for the cattle's and thus was the only source of their livelihood. But after the declaration of national park status their sources of income have blocked which obviously disappointed these section of the people. The relation between the forest department and the local people has been deteriorating day by day. To solve this serious problem following steps should be taken as earnest as possible:-

1. Some artificial highlands should be created from Dhansrimukh river to Burapahar Hills, (North of Difflo river) the boundary area of the park. So that the wild animals could stay safely during the time of annual flood.
2. Proper Irrigation and other facilities should be provided to the local cultivators, so that they could engage in agriculture activities through out the year and thus could recognize by any illegal or suspected activities or immigration as like older days.
3. Steps should be taken to establish some industrial based on agricultural produce which could be a boon to uplift the socio-Economic condition of the indigenous people.
4. In case of any types of loses incurred by these people from wildlife of the national park, proper compensation should be provided to the victims without any delay.
5. The youth of the village should be appointed for the post of forest guard. And the inexperience forest guard appointed in 2012/14 should be removed as they have no any practical knowledge about this national park which is the most essential qualification for the post of forest guard.

3. GRIVENCES OF CAUSAL FOREST GUARDS

A great deal of casual workers have been serving in kaziranga national park without any proper payment or wages for the last long years but they are job is still to be permanent , on the other hand many newly appointed jobs have regularised neglecting them. So

	<p>we appeal that these forest guards should be regularised instantly before any new appointment</p> <p>4. <u>APPOINTMENT OF V.D.P.</u></p> <p>As the forest department and police department both has failed that to stop the illegal poaching activities. So a legal V.D.P. should be appointed for a longer period of time on contractual basis.</p> <p>5. Avoid deforestation activities in karbi hills area so that it remains as natural habitat.</p> <p>6. All the organizations outside kaziranga should be banned .</p> <p>7. Tell the media not to publish any types of instigating news or rumours.</p> <p>8. Restrict the use of mobile phones inside the national park by tourist or the forest guard.</p> <p>9. A strong task force should be made and the development works are to be executed after the proper consent of the committee. The head of the committee should be and impartial and educated person.</p> <p>10. The local sensitive citizen should be selected and awarded with honorary forest guard award as an encouragement process.</p> <p>11. All the accused poachers and related to them should be detained in transit camp.</p> <p>As a sensitive well wisher and local inhabitant of kaziranga, I put forward my views through these point. I hope you would try your best to retain the greatness of this world Heritage site by taking necessary actions for its all round development.</p> <p>Thanking you</p> <p>Yours faithfully Mr. Kamal Gogoi</p>
<p>Vivek Menon, Executive Director, WTI</p>	<p>Shri R.P.Agarwalla, IFS Principal Chief Conservator of Forests & Chief Wildlife Warden, Assam Forest Department, Govt. of Assam Basistha Forest Complex, Guwahati, Assam-781028</p>

	<p>Dear Shri Agarwalla,</p> <p>I am very happy to know that the Assam forest department is taking number of measures at inviting comments from civil society on conservation of rhinos and Kaziranga NP.</p> <p>I am thankful to you inviting me to these deliberations which unfortunately due to prior commitments, I am unable to attend. However, I have requested Dr. P.C. Bhattachrjee, Trustee, Wildlife Trust of India (WTI) to Head the delegation which includes Dr. Rathin Barman, Project Manager, CWRC, Dr. Bhskar Choudhury, Regional Head, Assam and other team members from our CWRC Field Station.</p> <p>I am also enclosing herewith a report that I had written for TRAFFIC International Network more than 20 years ago entitled "UNDER SIEGE – Poaching and protection of Greater One-horned rhinoceros in India". You will note that many things that were present 20 years ago have come back in a cyclical fashion and therefore, many recommendation that I have given the could still be considered,. You may feel free to draw from this report while planning for protection of rhinos in Kaziranga. In addition, I will prepare a more updated note on what needs to be done to curb rhino poaching and this will be sent you earlier next week.</p> <p>With best wishes,</p> <p>Yours sincerely</p> <p>Vivek Menon Executive Director</p> <p>Encl. As above.</p> <p>Copy to 1. Mr. M.K.Yadava, Director, Kaziranga National Park, Bokakhat, Dist.- Golaghat, Assam 2. Dr. P.C.Bhattachrjee, Trust, WTI. 3. Dr. Rathin Barman, Project Manager,CWRC 4. Dr. Bhaskar Choudhury, Regional Head, Assam</p>
<p>N.I.Hussain,IPS (Retd.)</p> <p>Chief Vigilance Officer, APDCL & Director (Security).</p>	<p><u>MEASURES FRO PROTECTION OF RHINOS AT KAZIRANGA NATIONAL PARK</u></p> <p>The indiscriminate and unabated killings of Rhinos In Assam during last couple of years particularly in Kaziranga National park, which got the status of a world heritage site being the only surviving natural habitat of the famous one-hundred rhinos, has underlined two bitter facts in capital letters. That, we Assamese people are too</p>

<p>ASEB, Bijuli Bhawan, Paltanbazar, Guwahati-1</p>	<p>incompetent to neutralize a handful of poachers who have been killing one Rhino after another on a daily basis with impunity and in blatant defiance of the state machinery and that we are too insensitive of comprehending the fact that due to incompetence and callousness on the part of the present generation Assamese, this majestic which have been roaming this blessed land of ours since the pre-historic days will become extinct from the face of the earth in another 20/30 years if effective measures are not taken immediately at war-footing for its protection.</p> <p>The piecemeal measures that have so far been taken to protect the animal, have not yielded any tangible result as evident in the continued killing spree of the animal, rather it has emboldened the poachers to adopt new and more brutal methods of killing to feed an ever growing market of rhino horns that has been thriving on myths and superstitions. The entry of several break-away groups of extremists into the rhino poaching scene lately has added a new dimension to the menace calling for some very strong practical measures, not high sounding rhetorics. The need of the hour is therefore to chalk out a well-thought-out and well coordinated operational plan defining the roles of various concerned departments like forest, Police, PWD etc. besides the district administration and put the same in place duly backed by sufficient man-power, equipments and other logistics. I suggest the following measures to be incorporated in the operational plan if found feasible.</p> <ul style="list-style-type: none"> j) Since extremist elements and professional poachers are having a free run in Kaziranga and its vicinity to strike at will, the first and foremost task on the part of Govt. is to effect "Area Dominance" by inducting 2 (two) full battalions of regular Assam Armed Bn into the area which will serve as a strong deterrent to the poachers and other anti-socials preventing them from venturing into the National Park and adjoining areas. k) The vulnerable areas, poaching point of view, should be identified and atleast 12 (twelve) nos. of BOP type Police posts should be set-up at strategic points which will be manned by the above noted AP Bn personnel in two platoon strength. While these BOPs will be commanded by officers of Sr.S.I. or ABI rank, there should be three wing Headquarters of Company strength which will be commanded by young Dy.SP/Asst. Commandants. l) The Area responsibility of each BOPs should be earmarked and the AP Bn personnel will cover their area through foot-patrolling, ambush patrolling, night patrolling etc. so that no intruder can slip into their area and kill animals. A SOP (standard operating procedure) should also be prepared for the BOP personnel so they can perform their task without confusion in coordination with forest personnel and nearby
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BOPs.

- m) Besides wireless communication, each BOPs should be equipped with sufficient nos. of mobile phones so that vital informations can be exchanged between BOPs, wing Headquarters and also with informers to be engaged by wing commanders. Few reliable persons of villages located in fringe areas of Kaziranga National Park should be engaged as informers on payment of nominal source money and they should be issued mobile phones so that any movement of suspicious persons near their villages could be informed to the nearest BOP without loss of time. In case of network problem in the area, service providers may be requested to erect one or two towers at suitable points to provide foot print to Kaziranga and adjoining areas.
- n) Each BOPs should be allotted two vehicles (One GYPSY and one SUV) so that AP Bn personnel can rush to the spot on receipt of information about suspicious movement and engage/ neutralize the intruders before damage is done.
- o) Besides sophisticated weapons like AK-47, AK-56 etc, the BOP personnel should be equipped with sufficient nos. of binoculars, night-vision devices, flash lights, search lights etc, to enable them to perform their task in a professional manner.
- p) Concerned district authorities may be asked to promulgate prohibitory orders under section 144 of Cr. P.C. restricting movement of persons with any type of fire arms inside Kaziranga and adjoining areas with the exception of Police, Security force and forest personnel. The district administration may also be asked to put restriction on general from putting on Khaki or army fatigue colored apparel inside Kaziranga and nearby areas so that extremist elements and poachers cannot enter Kaziranga masquerading as police or forest personnel.
- q) To avoid confusion and possible mistaken identity, it should be made mandatory on the part of Police and forest personnel deployed in Kaziranga to remain in full uniform while on duty and they should be asked to put on their name plates and invariably display their photo identity cards.
- r) On the Northern side of the National Park, two river police outposts with sufficient nos. of AP Bn personnel and power boats should be set up at two convenient places so that proper watch can be maintained over Kaziranga by carrying out river patrols on Brahmaputra.
- s) As a long time measure, PWD authorities, in co-ordination with forest department may identify the most frequented animal corridors of Kaziranga across the National Highway and prepare proposal for construction of 5/6 fly-overs (very High) of 2/3 KMs length over those corridors so that animals can cross over to Karbi Hills during high floods, forest fire or

	<p>other natural calamities without fear of being run over by speeding vehicles or felling to poacher's bullets.</p> <p>t) The Commandants of the two dedicated battalions should be entrusted with the task of making their own fool-proof operational plans to make Kaziranga Kaziranga a poacher-free zone. These two dedicated AP Bn should not be entrusted with any duties other than protecting the rhinos and other animals of Kaziranga from the poacher's bullets.</p>
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Comments on Chapters

Chapter	Name	Comments
2	Richard Emslie	<p>Page 10 - "now increasingly become difficult for the wild animals to move across to the Hills during high flood season," and Page 15 Fragmentation of Corridors - The need to maintain and secure corridors is a MAJOR issue that needs to be addressed. As outlined on p15 this may require purchase of land such as old tea gardens.</p> <p>Having a long term Assam Rhino Range Expansion Program is desirable but just like the BRREP project which started in KwaZulu-Natal province but has since expanded outside the province; once all the suitable local areas for re-established populations within Assam have been stocked; then for the good of the species other alternatives outside Assam should then be looked at. In order to keep Kaziranga productive it will be necessary to translocate some animals out.</p> <p>P19 Mimosa is a serious problem. As I suggested earlier the rule stipulating no chemicals can be used inside the park should be re-examined. Not all herbicides are long acting.</p> <p>P20 The present is the time to be expanding the park's estate before it is too late. Where possible opportunities should be</p>

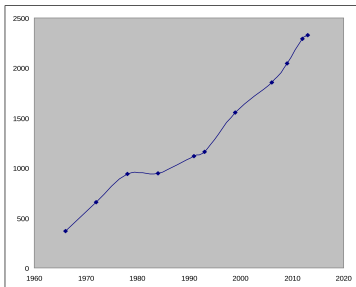
		looked for where local communities could benefit from having the park next door.
2	PC Bhattacharjee	Dear all Few points: Page 8 : It is better to give full reference of the study made by Sharma and Acharjee with year. Page 12 : expert committee- year ? Page 15: Number of corridors ? :All of them possibly donot come under the existing list of corridors. Some of them might be "stress dependent alternative movement tracks".Possibly there were only 4 corridors , which are being disturbed and more opportunistic locations are being used.A bit of explanation might be better. Other : creation of "high land " within the park - with the de-siltation of the wetland-(two in one activity) should be mentioned as a part of crossing the NH. P.C.Bhattacharjee
2	Ranjit Barthakur	Please go ahead.... Regards, Ranjit Barthakur
2	B S Bonal	The efforts put by you for preparing the draft report is really appreciable. However, the following are some of the suggestions for your consideration and to include appropriately if deem fit: 1. On the introduction of the members against B.S.Bonal, if you feel, may include following too, in addition to what you have mentioned : He has a long standing experience in wildlife management both in in-situ and ex-situ for more than 27 years that includes more than 7 years in Kaziranga National Park as DFO and Director, as Dy. Field Director in Manas National Park and Director, Assam State Zoo, Guwahati and National Zoological Park, New Delhi. He played a key role as Founder Chief Operating Officer (COO) of Core Committee of Task Force for Rhino Translocation within Assam under IRV 2020. 2. I did not find the component of <u>staff welfare</u> . As you know, the Karizanga National Park Staff

		<p>Welfare Society (KNPSWS) was constituted in 1999 which has been strengthened over the period and extended help not only to the staff of KNP but even to the people concern for protection of rhinos in Kaziranga – same could be mentioned to strengthen further in the report.</p> <p>3. Under the head <u>habitat- degradation</u> – the effective control on use of 'pesticides' by tea gardens situated in the upper stream of Brahamputra beyond Kaziranga and surrounding Kaziranga National Park, as well as use of "invasive species" viz Memosa etc. for soil amelioration that the tea garden people have been using – could be included.</p> <p>4. The declaration of <u>Eco Sensitive Zone</u> should be expedited to control future unplanned development in the vicinity of Kaziranga.</p> <p>5. Involvement of existing hoteliers or resort people to assist in anti poaching work to Kaziranga authority for keeping eye on movement of such poachers/ traders etc. I remember, there was a body called "Shaku" i.e. 'eye' constituted evolving hoteliers & other stakeholders in order to help the Kaziranga authority – That should be incorporated somewhere in the report.</p> <p>6. The "Kaziranga National Park Samanvaya Committee" involving the local people was formed who used to be very helping hand for information gathering etc. - also needs to be revived and revamped.</p> <p>7. To control the erosion on southern bank of Brahamputra at Kaziranga from Dhanbari-Agaratoli to Arimora and Bhawani, there were suggestions to construct embankment or spur at the upper stream of Brahamputra <u>at the confluence of Dhanshree and Brahamputra</u> to check the course of Brahamputra water coming towards further south that had already caused damage to Dhanshree, Debeshwari areas.</p>
2	Rajendra Garawad	I have a minor correction to suggest. In the profile of members, I would like to request you to change the sentence 'He has done

		<p>considerable primary work on rhino population dynamics ' as'He has done considerable primary work on population dynamics of Kaziranga rhinos'. Rest of the description is ok. The reasons for this change is that much work has already been done on the Nepal rhino by Laurie but there was no study on Kaziranga rhinos till I did it my thesis work on it.</p> <p>Further, I would like to suggest about the inclusion about 'functional connectivity' and 'Precautionary principle approach' in the report at suitable place as these concepts will be useful for the park at a later date.</p> <p>Thank you and Regards,</p>
4	Richard Emslie	<p>Re chapter 4</p> <p>Amazed how small the foreign tourist number still is. While tourism needs to be managed to make sure one doesn't destroy or pollute the conservation area it also offers opportunities to create jobs and businesses to help benefit and economically empower poor local people living around the park. Having them on sides is obviously better than them feeling alienated and disliking the Park.</p>
4	Hirdesh Mishra	<p>This chapter is also ok.</p> <p>You have done lot of hard work.</p> <p>You have mentioned many to do items in this entire document. They are found almost on all pages.</p> <p>So we will perhaps need to put all these in a to do task sheet with probable dates to track them.</p> <p>Any thoughts Sir?</p>
4	Sonali Ghosh	<p>1. Since 87% of the fringe villagers are marginal or landless, it would be important to link tourism as an alternate livelihood support (seasonal / non-paddy season) through EDCs.</p> <p>2. Very short and abrupt Chapter as compared to other Chapters.</p>
5	Keshav Varma	<p>These are good points.</p> <p>My suggestion is that we involve the Divisional Commissioners in ensuring that</p>

		<p>all aspects of district administration are involved including the police . Usually Div Commissioners have the time</p> <p>Deputy Commissioners / DMS should be fed with evidence on encroachments that are interfering with the corridors. You must make that evidence public knowledge through NGOs</p> <p>Develop a good alliance in Delhi, say a Rhino Club , to ensure the news goes to the right circles. Regular communication can work wonders</p> <p>Ask media to write about staff that has taken firm action against poachers. Celebrate them</p>
5	B S Bonal	<p>Regarding UAV, if the army are not inclined to give the operational part to Kaziranga National Park authority, then it could always be done by army themselves to operate for the same in collaboration with Kaziranga National Park authority/</p> <p>10. Regarding the de-horning of Rhinoceros – I am of the view that <u>it should not be adopted as policy in any case.</u> However, if opportunity comes, could be done as side activities along with collection of blood samples, taking measurement etc. while tranquilizing the animals during the process of rationalization and translocate to new site. I repeat not to use the dehorning as a policy.</p>
6	Richard Emslie	<p>Black rhino NOT largest member of rhinos found out of 5 species. Rather say it is a browsing rhino unlike the white rhino which is a grazer or GOH which is a mixed feeder.</p> <p>Javan – could say from having a wide distribution it is now currently restricted to only one population.</p> <p>Page 48</p> <p>Would be good to also show the Kaz numbers as a graph showing the success story. Maybe there is a danger here in that someone may think "What is the problem?". If so could add a comment like – While numbers continue to increase, poaching has also increased in recent years. While current levels of poaching are sustainable (there are still more births than deaths in the population) it will be necessary to</p>

redouble efforts to prevent poaching escalating further and reaching the tipping point where deaths start to exceed births and rhino numbers start to decline again.



Page 50

I know you have done very few translocations but any introductions or removals (i.e translocations in or out) should also be listed in the table on Page 50

Also to interpret it would be good to express total losses as a % of population size (perhaps extrapolating population size for years between counts. For example in 2013 this comes to 4.34%. However usually net population growth rates refer to the next gain after births and natural mortalities are taken into account. Key figure is poaching level as % of population which in 2013 would be only 1.34% of the population which is clearly still a sustainable level. You could have this level poached every year and it is likely that numbers would still rise for a while until (all else such as ECC remaining equal) the population should start to stabilise at a level just below ECC that could sustain that level of annual offtake. In Africa to keep established populations productive and try to meet metapopulation minimum growth targets of 5% we would recommend taking off 5% of an established population annually (but

	<p>making allowances for any poaching) so at a poaching rate of 1.34% we would consider it OK to go ahead and translocated out another 85 animals (3.64% of population) out of a 2013 Kaziranga sized population.</p> <p>Do you have your translocation information by year (number of rhinos translocated in and out of Kaziranga). I could then redo the analysis and possible write you something on the apparent decline in population performance following its increase in density.</p> <p>Page 52 - Confusion here over the term removal. In Africa this would refer to translocations. Suggest put losses (poaching + natural mortality) and gains (births)</p> <p>P53 Some studies (Richard Emslie 2005 <i>and updated in 2014</i>)</p> <p>Also not sure your "no of years for total removal" is a useful analysis. I think poaching as % of population size would be more useful – this for example would be 3.28% in 1984 and just under an estimated 5% in 1985. However the population still continued to grow at this rate as densities were likely to be well below ECC and underlying growth rates were likely in excess of 5%. If you had been losing 10% of your rhinos to poaching each year that would have not be sustainable.</p> <p>Better to say Kaziranga has started showing signs of density dependent reductions in population growth rates rather than "may be reaching density dependent growth"</p> <p>The number of one year old calves/female is useful data that clearly shows a decline in reproductive performance over time. If you have the breakdowns to do it I would suggest you also show calves (<3.5 years) to adult female and 1 year old calves to adult female (rather than just total female population. The number of calves (<3.5yrs) per adult female is a good indicator of both intercalving intervals and calf mortality rates. Another thing you could look at would be % of population that is calves <3.5 years and % that is calves <1 year. Trouble with only looking at 1 year at a time is there is a lot of noise in</p>
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the data. Growth rates vary a lot from year to year and there are birth lags as a female that gives birth this year can't give birth the next. For that reason it is a good idea to model underlying growth rates for a three year window. You then move the window one year ahead and redo the calculations. Such a moving window analysis helps smooth out much of the year to year noise in the data and allows you to better look at the underlying patterns in the data.

The SADC RMG has been collecting annual standardised status reports on its black rhino populations since 1989 and from time to time Keryn Adcock has done an analysis of all this data. She can provide you with interpretations of what different calves/adult female ratios etc mean in terms of black rhino. If you want to ask her to interpret a number she can be skyped at keryn57 or emailed at keryna@telkomsa.net.

Points you don't really mention are that in order to improve productivity of the Kaziranga population it will be necessary to remove more animals every year but this assumes there are enough suitable new homes where you can invest rhino. Also reduced underlying growth rates have the same effects ultimately as poaching – you end up with fewer rhino. If you had a metapopulation of 2000 rhinos and were able to manage them to get 7% growth for a decade compared to only 3% for a decade the difference in 10 years would be 1,246 fewer rhino. A lost rhino is a lost rhino whether it was poached or whether it wasn't born or died to suboptimal biological management. If you are not moving surplus animals to new areas another way to try to improve productivity is to expand the area available to rhinos in the park boosting the park's EEC in the process.

The other issue is that while current levels of poaching are sustainable a continued increase in poaching levels has the potential to become unsustainable and threaten to start reversing the gains achieved over the last century. Now is the time to act to keep poaching at manageable levels before it is too late and out of control poaching starts to cause population declines.

		<p>However at least the poaching you are experiencing should help improve underlying performance. As I showed in my 2005 and updated 2014 analyses this appears to have been the case before when for a period following heavier poaching underlying reproductive performance actual increased before tailing off again once poaching was brought back to very low levels and densities continued to increase.</p> <p>However what would be interesting is to contrast the relative impact of your major floods on mortalities compared to poaching levels (inside park and outside park boundaries). This may highlight the importance of having suitable high ground areas outside the park (such as tea gardens) added to the park's estate.</p>
6 (Revised)	B S Bonal	<p>Congrats for compiling such a nice documents with more input to it.</p> <p>I wish that due credit and reference be made of the contributors ie founder DFO, Directors and all those had been there with all the odds and also conducted Census of rhino and other animals which it self is a herculean exercise.. special mention be made of Lat P Lahon, Muhi Miri etc.</p> <p>Thanks</p>
6	Sonali Ghosh	<ol style="list-style-type: none"> 1. The description on Rhino needs references as several facts are stated. 2. Section 6.2.1...the method should be stated as TOTAL COUNT instead of direct visual count. A block map with a pictorial representation would be great, as this is unique to Kaziranga and must be highlighted. 3. with improvements in technology and the launch of SMART, why can't the compartments managed/monitored on a real time basis. Infact they should form the basic unit for each and every conservation action in the field. With expansion, does 81 compartments also need a revision? 4. The merits and demerits of the direct visual count methods must be discussed more on a scientific basis. Has there been any publications (from elsewhere) that suggests changes to improve this method ? The linear regression and mortality predictions is a very simplistic depiction of a highly complex model for which standardised PHVA/Resource function models are available. It would be good to conduct one of these workshops

		<p>for Rhinos at Kaziranga .</p> <p>5. Density dependant reduction of population argument needs some strong backing with peer-reviewed published information. Calf per capita female ratio is too low to indicate a declining trend. <u>What about carrying capacity? And whether the existing carrying capacity of KNO can be increased?</u></p> <p>3. Conclusion (FOR THE VERY EXHAUSTIVE CHAPTER, THE CONCLUSIONS READS VERY ABRUPTLY AND NEED MORE COHESIVENESS)</p> <p style="padding-left: 40px;">A net gain of 10 or below would lead the population to decline. Currently it is 39, but may get hit by excessive poaching, if not controlled. (Please rephrase, not clear; net gain of what ? what is 39?)</p> <p style="padding-left: 40px;">3.If poaching is brought to halt, some population, about 25 in numbers, must be translocated elsewhere in safe rhino habitats to keep the population of Kaziranga productive. (Please rephrase, not clear; only 25?)</p>
7	Rajendra Garawad	<p>Dear Sir,</p> <p>thank you very much for sharing the document on Kaziranga. I think the writeup has come up very well and this document will not only serve the purpose of the court but it will also act as a reference for Kaziranga. It shows the critical thinking done while preparing the document and your writing inspires me</p>
7	K Ramesh	<p>The document looks fine from the perspective of requirement for court. I have marked a few typo/space issues. I have also been thinking as to why we should not target good proportion of males for VHF and satellite collars so that we can keep close vigil of the area. Meanwhile, based on what you have generated, create a risk map</p>

		and provide enhanced security whenever the animal moves to risk zone. Just a thought.
7	B S Bonal	<p>8. In Chapter 7 – in connection with the anti poaching work – perhaps you could refer the “anti poaching activities” followed in the past with <u>three layer</u> barriers (may be available in your office or in Kaziranga Centenary Website)</p> <p>(i) Anti poaching staff inside the park</p> <p>(ii) Surrounding villages through the various working societies or groups to have a better network.</p> <p>(iii) Involving various line departments viz. police, BSF, Civil Administration, Army etc. which was to be covered in <u>three phases</u> :</p> <p>(a) Pro-active phase before entering to the park with proactive action.</p> <p>(b) Re-active phase – reaction of the anti poaching staff inside the park with Reactive action &</p> <p>(c) The post exit phase – follow up action with judiciary action.</p> <p>To this effect, you could refer to the proceedings of the Rhino Specialist Group Meeting held in Kaziranga National Park in 1998.</p>
11-14	Rajendra Garawad	<p>thanks for sharing the document containing many innovative approaches for managing Kaziranga. I had a quick glance on the document and I have suggestion for page 122 under GIS. I have tried my hands at GARIASI and I must say that the software at this stage is not that user friendly. The user manual is far from complete and the software gave me an impression that it is a combination of QGIS and GRASS perhaps with some added features.</p> <p>In my personal view, we should promote a bundle of free software (of which you are an ardent supporter) with a scope for inclusion of GRASS, QGIS and others like SAGA etc. I have been using both QGIS and GRASS for the last 6 years and I feel that these are quite powerful and may fulfill the tasks of</p>

		<p>Kaziranga. I am enclosing a presentation on flooding simulation of Kaziranga carried out by me in GRASS for your kind information.</p> <p>The steps followed were as follows: I downloaded SRTM data for Kaziranga and overlaid it on fcc of Kaziranga. Next I found out the elevation at seed point towards the east of Agaratoli range which was around 60 metre or so. At this seed point the water level was progressively increased above the elevation to find out the water spread in the downstream. Although it is a crude model with very little data, still it perfectly simulated the flow of water in Kaziranga. In the previous management plan of Kaziranga it is written that whenever the first wave of flood arrives, water enters Kaziranga from Burapahar side then moves eastwards. Surprisingly, a similar water movement pattern was also noticed in the simulation.</p> <p>Sir, I am happy to read that you have not supported the splitting of Kaziranga into multiple divisions (page 152-153) and instead gave importance to unified command control. Dividing KNP into 4 divisions will bring in more politics, reduced efficiency and there will be sudden spurt in blame game by various officers. Finally, Kaziranga will lose importance due to internal squabbling between officers. Therefore, Kaziranga should not be divided further at any cost. Instead more officers can be brought in for specialized tasks as suggested by you.</p>
15	Hirdesh Mishra	<p>Excellent compilation and adaptation. Its fantastic. Their Lordships, the HC Judges, will be blown away.</p>
15	Richard Emslie.	<p>No comments except finding ways the Park can help improved the lives of surrounding communities will be key.</p>
15	Sonali Ghosh	<p>1. Is there a way to link Chapter 15 AND Chapter 4 ? ...EDC s would have to be part of the Green Framework, anyway! 2. Kaziranga Landscape under the Green Growth Framework / KLCDA shall be better depicted</p>

		<p>through a Map!</p> <p>3. Why have a separate guideline for KLCDA, when the concept of Kaziranga Tiger Reserve (with zonations etc) already exists ? As of now we are managing our National Parks (and lately Tiger Reserves) as IUCN 11 Protected Area category. The KLCDA though ambitious in some way dilutes this idea of a strict 'wilderness' or nature reserve. Besides, putting monetary terms to conservation is against the basic grain of India's wildlife conservation ethos which is intrinsic and socio-culturally 'tolerant' towards wildlife to a greater extent atleast in Assam.</p> <p>Linkages with TCP and the Biodiversity Committees and KLCDA are not clear and there is a ideology conflict. Are we talking of 'tiger centric' or 'people centric' models of conservation/development.</p> <p>4. Instead links with REDD+ would be ideal.</p> <p>5. does not have a conclusion.</p>
16	Richard Emslie	<p>16.3 Low prosecution rate mentioned since 2006 in 16.3 needs to be addressed. This has been a problem too in many African range states. Having specialist prosecutors (like rec 5 on p211) and meetings with judiciary in the field has helped.</p> <p>The use of asset forfeiture for those convicted is an important tool and I support this proposal. Also could consider provisionally preventing disposal of certain assets prior to trial of suspects to stop them getting rid of assets prior to trial and hiding away the money.</p> <p>Re Dog Squad – essential to have right handlers and also no good if they then don't regularly practice and work with their dogs daily. You cannot expect trained dogs to perform if they have just been left idle for ages without regular stimulation and training. Can think perhaps of different kinds of dogs from sniffer detection dogs, to field tracker dogs and possible attack dogs when you have poacher visual. Postmortem protocol – need to add something on RhoDIS sample collection using approved sample collection kits by accredited sample collector.</p> <p>16.3.5 Fully support development of RhoDIS for GOH. This has been so useful in Africa. Investigators and Prosecutors here are very appreciative of what this adds. Great Cindy and Rod were able to visit.</p>

	<p>In terms of elephant poaching and ivory seizures recommend you as far as is possible follow guidelines as set out in new United Nations Office on Drugs & Crime Guidelines for forensic laboratory methods and procedures of Ivory sampling and analysis (in final stages of peer review prior to publication shortly). You may wish to request Sinead Brophy (Sinead.Brophy@unodc.org) to be put on the mailing list for these guidelines when they are published.</p> <p>16.6 SOP's are recognised as important by some of our top rhino managers like Tony Conway. Also perhaps identify Key Performance Indicators to assess staff by. If you want to discuss with Tony his e-mail is Tonymc@kznwildlife.com</p> <p>You mention a Tiger Conservation Plan – what about a Rhino Conservation Plan? – not just for Kaziranga but also for Assam and India as a whole and perhaps even a joint regional India/Nepal rhino group (such as the SADC RMG).</p> <p>Why must visitors provide a photograph ? You say checking for any plastic bottles or eatables ? This seems a bit tourist unfriendly. In addition to warning for not littering this needs to be backed up with significant penalties for those caught doing so. However in addition to the stick approach perhaps could try carrot approach and use posters to try to foster pride in a rubbish free park.</p> <p>I realise the capacity of wooden bridges may be a problem but another option may be to allow some larger people carrying vehicles that can each carry more people to increase the people/vehicle ratio.</p> <p>As for charging for still cameras – most of these today can also capture video. Smart phones these days can do both too. Take it you are referring to larger video cameras when charging Rs 800. As a foreign tourist I would find it annoying to be charged for bringing in a camera in addition to paying an entry fee when this is not standard practice for many other wildlife areas around the world. I would much prefer the right to take photos/home video to be incorporated the entrance fee. However for commercial photographers and film makers then it is OK to charge a filming fee. Thus would suggest you differentiate between amateurs and professional photographers/film-makers.</p> <p>Again with regards to Range Expansion – fill up Assam first but thinking about what will be best for</p>
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	<p>GOH in the long term would suggest you keep the option of expansion to other areas outside Assam once you have put sufficient founder rhino into all potentially suitable sites in Assam.</p> <p>Pleased to see plans to implement RhoDIS under 16.</p> <p>Also once you have stocked all the possible Assam reserves under your range expansion project (16.8) consideration should be given long term to expanding this programme outside Assam in the same way the Ezemvelo-KZN-Wildlife/MWF Black Rhino Range Expansion Project initially just focussed on KwaZulu-Natal Province in South Africa but has more recently expanded its focus to include other areas in S.Africa and possibly considering other areas in neighbouring countries. By removing animals you can help improve productivity and performance of remaining animals.</p> <p>The graph below shows modelled underlying net annual growth rates (from 1 Jan 2008) after allowing for translocations (blue) and underlying net reproductive performance after allowing for translocations and man-induced mortalities including poaching (orange). I Kaz is India Kaziranga. All the other sites are Key1 rhino areas in the "Big4" African rhino range states. The Kaziranga estimated underlying net average recent (since 2008) growth is 2.43% and underlying net reproductive performance of 2.91%. These are below what we would have as minimum target levels of 5% in Africa and suggest the population's performance is starting to experience density dependent reduction in reproductive performance. The graph below shows that this underlying performance is lower than a number of Key1 African populations that have been more aggressively biologically managed for growth. By way of comparison since 2008 a total of 8 GOH have been translocated from Kaziranga compared to a net 543 removed over the same period from Hluhluwe-iMfolozi Park, Great Fish River GR , Madikwe GR and Pilanesberg NP in South Africa over the same period. These four S.African reserves currently hold an estimated 3,651 black and white rhino compared to Kaziranga's 2,329. If removals from Kaziranga had been at a similar average %</p>
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		level to the 4 SA populations, 346 would have been taken off over the period and thus Kaziranga's removal levels have been around 2.3% of the offtake from these four Key1 S.African rhino areas.
16	Sonali Ghosh	<p>1. The Manas National Park has an area of 500 sq km, and the Manas Tiger Reserve has a notified core area of 840 sq km including the barnadi WLS. Please modify core area as CRITICAL TIGER HABITAT.</p> <p>2. Does not have a conclusion.</p>
16	Amit Sharma	<p>I would like to bring to your notice the following points for consideration -</p> <p>1. The RhODIS data custody should be with the Assam Forest Dept. or a special body under the MoEF instead of NIC/ NTCA/ etc for all practical purpose;</p> <p>2. The Rhino Task Force formed in 2005 is formed in the proposed ARREP form. Kindly refer to the original notification. The IRV2020 is developed to implement the ARREO by the Task Force, as such I believe the present write-up looks a bit contradictory and may be modified as seems necessary. What we need to focus on is to strengthen the IRV2020 program (all its objectives) and more assured funds and manpower.</p> <p>3. Add disease surveillance under R&D for the future management of rhinos.</p> <p>4. Co-ordinated efforts, uniform procedures and central data server for crimes for addressing wildlife crime in all the rhino PA's</p>
17	Sonali Ghosh	<p>1. Sarai Act 1867 should be replaced with the new Land Acquisition Act / Land Development act (2014)</p> <p>2. SMART guard should be ST or LT measure. A long preparatory Phase will yield better results. Immediate removal of old staff may also be detrimental. The reasons as to why they are there (in some cases over 30 years needs to be ascertained first). There needs to be a transitional phase with handing down of knowledge and experience. Staff amenities should be IM instead of SM.</p> <p>3. Section 18.3 Conservation Fee, Congestion Fee etc have been mentioned. Has a road map or details of this been worked? Will this be agreeable to the</p>

		public?..typo error in 7 th line (Rs 50.00) 4. The Chapter Does not have a conclusion.
17-18	Richard Emslie	Under 11 – Would be nice to try adaptive management research on efficacy of short acting herbicides on significant alien plants. In Budget estimates for habitat improvement programme – has an amount been included to support adaptive management research into the effectiveness of different treatments?
17-18	Hirdesh Mishra	Looks fine to me. After all these are estimates of time and money. The concepts are good and PSUs must put their money where there mouth is.
17-18	Hem Chandra Borah	We have gone through your proposed suggestions for submitting to the Honourable High Court in the greater interest of Kaziranga National Park. You have rightly projected many positive aspects for the protection of wildlife in Kaziranga National Park. Yet, your suggestions in some points go against the interest and sentiments of local people who have been residing here since time immemorial. 1. In article 11.5 Eviction of Encroachments’: The villages around Kaziranga are of two types : (i) There were villages around Kaziranga before the declaration of the habitat of one horned Rhino as Kaziranga reserve forest sanctuary in 1908. These villagers residing generation after generation are the sons of the soil. Almost all of them have permanent patta of land under Kaziranga Mouza. 2. The encroachers in Deosur Encroachment are suspected citizens who supposed to give shelter to the poachers and mostly engaged in rampant fishing in the Beels of Kaziranga National Park. This Deosur Encroachment is entirely a play ground of some politicians who

		<p>selected Kaziranga National Park as a right place for re-habilitating some Bangladeshi familiar for their personal and political interest. The entire Deosur Encroachment area including the animal corridors may be evicted using firm hand of the Govt. of Assam and rehabilitate them in some other place.</p> <p>The proposal in chapter - 13 “The Kaziranga Landscape Conservation and Development Authority” seems to be anti-local people. We the people of Kaziranga believe in peaceful co-existence of man and animal. No one will ever forget the sentiment of Nigona Chikari who inspired and convinced Madam Lady Carjon- the wife of the then Viceroy Lord Carjon to conserve one horned rhino in Kaziranga in 1903 and this sentiment still prevails in the mind of the local villagers.</p> <p>This human aspect and sentiments of the local villagers have totally been ignored in your suggestions. There are many instances that these villagers are not enemies of the wildlife but unrecognized forest guards of the park. During flood season they give shelter to the affected animals. They work with the forest guards hand in hand during the flood season. At night they keep vigilance over the affected animals so that they do not fall prey in the hands of poachers.</p> <p>In your language - “Kaziranga is a name attached with the sentiment of the people of Assam, and a word recognized across the Globe as the abode of the Great one horned rhinoceros”. And taking advantage of this sentiment of the local people, some NGOs are sucking Kaziranga as parasites. They pretend to represent the local people. Ignorance and simplicity of the locals are the capitals</p>
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		<p>of these NGOs – whom the Government also relies upon.</p> <p>Should we believe that a huge organization like Forest Department of the Govt. of Assam is still lake of skilled man power for planning and execution of even very small projects of the department? It seems that this forest department is dependent on the NGOs. The time is not far when the department will be administered by such NGOs – sitting in A.C. room from abroad and outside the state.</p> <p>Of late it has come to the knowledge of the local people that on and from 2007, the world heritage site – Kaziranga National Park has been included in the map of tiger reserve and declared the entire area as the core area of tiger reserve.</p> <p>The entire process of converting Kaziranga National Park to a Tiger Project had been carried out silently keeping the local villagers in the dark – although there is a law of the Environment Ministry of India that “Written consent from villagers is a must for new wildlife habitats”. We, the people of Kaziranga donot know when and where the public hearing took place in support of such imposition and enactment of law. The people of Kaziranga could know about the tiger project in Kaziranga seven years after its imposition – although rule prevents for public hearing.</p> <p>We, being the public of this heritage site – believe that imposition of Tiger Project in a place where a rare species like one horned Rhinoceros are surviving with many odds – is not a wise decision. The imposition of tiger project on a world heritage site like KNP is nothing but a cruel and crooked attempt of the Department. The ill-intention of the master minds to create</p>
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the entire area from Koliabor to Numaligarh an under developed area and a paradise for poachers and encroachers have been strongly protested by the local people. We oppose the anti-human activities of the Forest Department in the name of Tiger Projected in Kaziranga National Park area. Further we do not see any reason for funding towards conservation of the wildlife under two different names which may lead to corrupt practices.

Hence, We demand :

1. Withdraw Tiger Project from Kaziranga National Park.
2. Allow all types of development including Tourism in and around Kaziranga.
3. Kaziranga is famous for One-Horned Rhino; not for Tiger. Therefore, keep the fame and name as it is.
4. Convert NH - 37 from Koliabor to Numaligarh to a four lane road for better communication of the tourist visiting Kaziranga National Park and for effective security of the wildlife.
5. Secure the life and land properties of the indigenous people of Kaziranga and do not deprive them from the legacy of paternal land property.
6. We oppose the formation of Kaziranga Landscape Development committee without a public hearing as per constitutional right.
7. We want a public hearing before declarative of Echo-sensitive Zone in Kaziranga. In mapping Echo-Sensitive Zone, the consent of local people must be sought respecting their sentiment. . Any enactment of law , declaration which can hurt the life, livelihood and

		<p>fundamental rights of the local people residing nearby KNP should be avoided.</p> <p>We hope your good self will give positive approach to our demands and suggestion before submitting your proposals to the Honourable High Court.</p>
All	Ramesh Krishnamurthy	<p>Many thanks, and compliments for all the efforts.</p> <p>Once all the chapters are compiled and a zero draft of final report together all chapters may be communicated for final around of inputs.</p>
All	Dr. Rajesh Gopal	<p>Dear Yadavji, Please recall our recent discussion. Put all this in the TCP format which is a statutory requirement and NTCA will recognize only that. Best Rg</p>