

Vol 3 Issue 5 Nov 2013

Impact Factor : 1.9508 (UIF)

ISSN No :2231-5063

Monthly Multidisciplinary
Research Journal

*Golden Research
Thoughts*

Chief Editor
Dr.Tukaram Narayan Shinde

Publisher
Mrs.Laxmi Ashok Yakkaldevi

Associate Editor
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Honorary
Mr.Ashok Yakkaldevi



STUDY ON TIME BUDGETING PATTERN OF INDIAN RHINO IN ORANG NATIONAL PARK OF ASSAM, INDIA



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Abstract: An extensive study was conducted to find out the time budgeting of Indian Rhino in Orang National Park. For this, Scan Animal Sampling (Altman, 1974) was found to be suitable for sampling the activity budgeting of Indian Rhino in Orang National Park. The Ad. Libitum Sampling method (Altman, 1974) was also used to record the important activities between two scans. The study revealed that, the Indian Rhino showed distinct variation of activity pattern throughout the year. A maximum of 46.2% time was spent on feeding activities followed by 18.4% on wallowing, 15.1% on vigilance, 9.1% on locomotion, 8.01% on resting and 3.1% on other miscellaneous activities. The results clearly indicate that, feeding is the guiding factor which has an effect on time allocation in various activities. Similar trend of time allocation on various activities was also found in different seasons. The study group allocated maximum time on feeding activities (55.29%) during winter, followed by pre-monsoon (48.75%) and retreating monsoon (47.34%), whereas, it was lowest (36.96%) during monsoon. On contrary, the study group spent a highest of 16.5% of their total time on locomotion during winter (16.5%) followed by 11.32% during pre-monsoon, 5.07% during retreating monsoon and 3.3% during monsoon. This variation of time spent in various activities were closely associated with the availability of food resources over the season. This clearly indicates that the management of habitat might play a major role for conservation of Indian rhinos in the Brahmaputra Flood Plains Habitat.

Key words: Indian Rhino, time budgeting, activity pattern, Orang National Park.

1. INTRODUCTION:

The allocation of time in different behavioral activities and its distribution pattern in each day is very important aspect to understand the time adjustment of an animal in various feeding habitats to optimize its resource use for growth and development. This activity budgeting also varies depending on the numbers of ecological and biological factors, such as body size (Clutton-Brock & Harvey, 1977; Gaulin, 1979; Struhsaker & Leland, 1979), diet availability (Clutton-Brock, 1977; Zielinski et al., 1983), distribution and abundance of food resources (Milton, 1980; Bhattacharya and Pal, 1982; Srivastava, 1989; Sarkar, 2000) and climatic factors (Bernstein, 1972; Bernstein and Mason, 1963; Chivers, 1969) of an animal.

Since, the activity budgeting helps to understand the species-specific and site-specific time allocation, it is used as a tool to lay out comprehensive conservation strategy for a species in a particular area. Most of the studies on activity budgeting of large herbivores has been done by several authors, such as Indian Rhino by Laurie (1978) & Ghosh (1991) and wild elephant by Sukumar (1989) etc. Again, Laurie (1978, 82) and Bhattacharya & Pal (1982) had studied the diurnal cycle of activity budgeting of Indian rhino in Nepal and West Bengal, but very little attempt was made to study the activity budgeting of Indian rhino in the

Brahmaputra floodplain. Therefore, the present study of activity budgeting of Indian Rhino was an attempt to find out the daily time allocation in different behavioural settings of the species in Orang National Park. This helps to layout the site-specific conservation strategy for the Indian Rhino, especially in Orang National Park or other similar Rhino habitats of the Brahmaputra floodplain area.

MATERIALS AND METHODOLOGY

For convenience of study, field surveys for activity budgeting of Indian Rhinos were done during day light hours in Orang National Park. The night surveys were not possible owing to lack of sufficient infrastructure and security arrangements. Again, the night survey was also not possible due to less visibility for dense habitat condition (thick tall grasses). The following methods were adopted for the study of activity budgeting of Indian Rhino in Orang National Park.

The continuous follow up action of Indian Rhino, using Focal Animal Sampling (Altman, 1974) was not possible, owing to excessive tall grasslands (where the tall grasses overshoot the Rhino height). Hence, Scan Animal Sampling (Altman, 1974) was found to be suitable for sampling the activity budgeting of Indian Rhino in Orang

National Park. The Ad. Libitum Sampling method (Altmann, 1974) was also used to record the important activities between two scans.

The study of Indian Rhino in Orang National Park was followed the “dawn to dusk” investigation methods and the observed behavioural activities were recorded in return to time spent in various activities by all individuals sighted in each 5 minutes time period. For these purposes, data sheets were prepared and carried to the field for instant data recording (Appendix: 6.1). The activity patterns such as feeding, locomotion, comfort, wallowing, vigilance, non-breeding play, breeding play, agnostic and all other behaviours related to its breeding and non-breeding purposes etc. were recorded in the data sheet. Apart from that, the less frequent activities sighted between two scans were also recorded in the data sheets (Ad. Libitum Sampling, Altman, 1974). During data collection, the uniformity was maintained to represent all age and sex compositions of Rhino.

The time allocation for various behavioural activities by an animal may be determined either by availability of time or habitat condition, as well as other ecological factors. To find out this selectivity, the seasonal variation of time spent in different behaviours were compared with the overall time allocation in different activities.

RESULTS

Annual activity budget

The present study revealed that, the Indian Rhino showed distinct variation of activity pattern in different seasons of the year. The Indian Rhino in Orang National Park spent a maximum of 46.2% time on feeding activities, followed by wallowing 18.4%, vigilance 15.1%, locomotion 9.1%, comfort 8.01% and minimum of 5.6% in other miscellaneous activities (Fig-1). The result indicates that, feeding is the guiding factor, which has an effect on time allocation in various activities, possesses by the Indian Rhino.

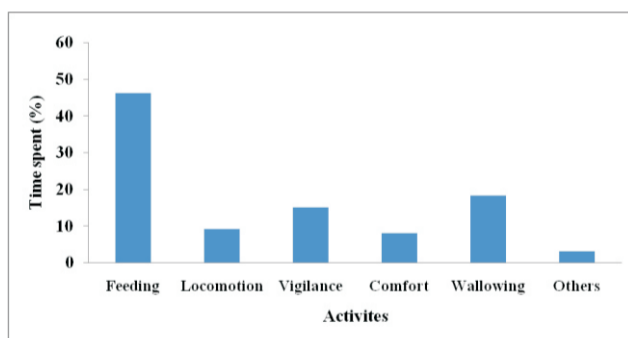


Fig-1 : Annual time budgeting of Indian Rhino in Orang NP

Seasonal Variation of time budgeting

Feeding Activity : Study showed that, the Indian Rhino in Orang National Park allocated maximum time on feeding activities (55.29%) during winter season, followed by pre-monsoon (48.75%) and retreating monsoon (47.34%)

season, whereas, it was lowest (36.96 %) during monsoon season (Fig: 2).

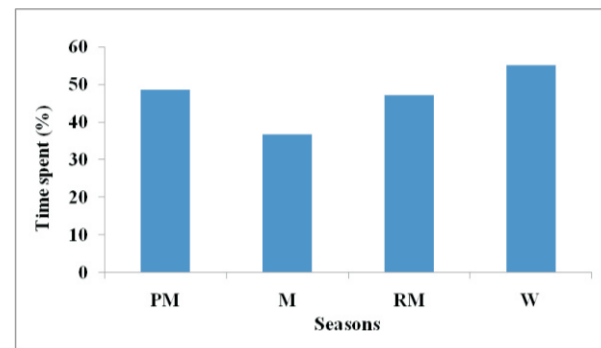


Fig: 2: Seasonal variation of time budgeting on feeding activity

Locomotion : There was also a distinct seasonal variation of time allocation in locomotion activity by the Indian Rhino. The highest percentage of locomotion activity was observed during winter season (16.5%), followed by pre-monsoon (11.32%), retreating monsoon (5.07%) and monsoon season (3.3%) (Fig:3).

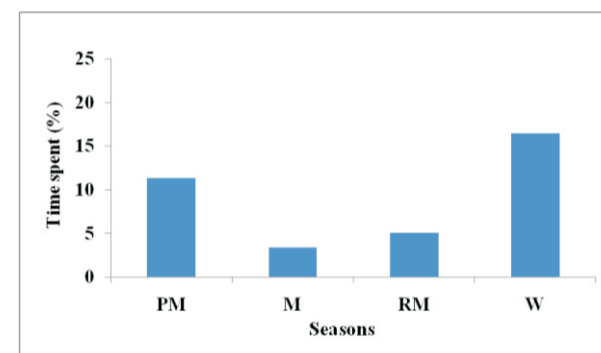


Fig: 3: Seasonal variation of time budgeting on locomotion activity

Wallowing : The study showed that, the variations of time allocation in wallowing activity by Indian Rhino varies in different seasons of the year. The highest time allocation on wallowing activity was found during monsoon season (41.3%), followed by retreating monsoon (17.4%) and pre monsoon (9.1%), whereas lowest (2.2%) time was allocated during winter season in Orang National Park (Fig :4).

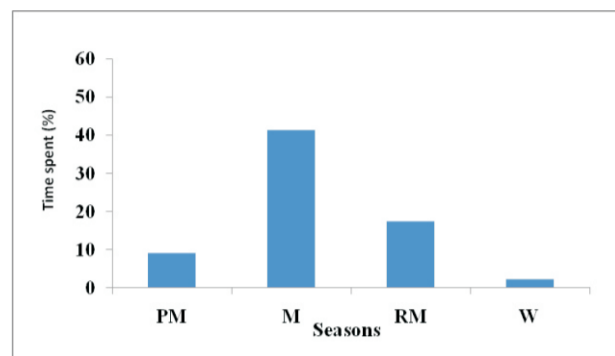


Fig: 4: Seasonal variation of time allocation on wallowing activity

Resting : There was a distinct seasonal variation in time spent on resting activity. A highest of 14.7% time was allotted during retreating monsoon followed by 10.1% in winter, 7.9% in pre-monsoon and only 4.2% in monsoon (Fig:5).

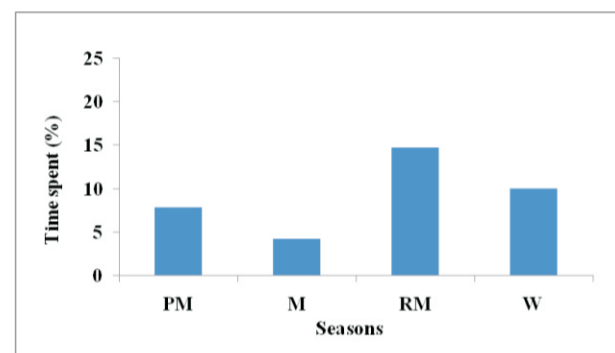


Fig: 5. Seasonal variation of resting activity showed by Indian Rhino

Monitoring : Study revealed that, the Indian Rhino spent almost equal time on monitoring activity (vigilance) in all four seasons of the year. However, the trend of monitoring was increased during winter and it continued till pre-monsoon season (Fig:6).

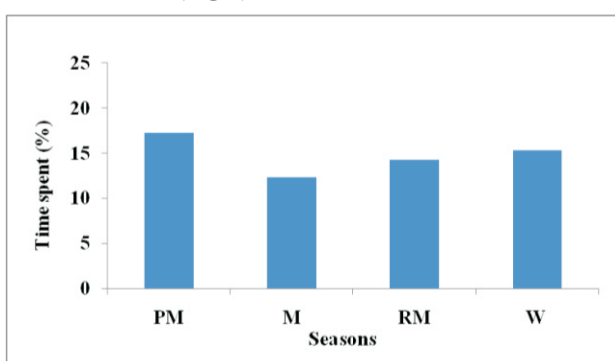


Fig: 6. Seasonal variation of vigilance activity showed by Indian Rhino

Miscellaneous activities

Study showed that, the Indian Rhinos spent 5.6% time in various other miscellaneous activities. During pre-monsoon season, they spent 1.9% time on miscellaneous activities, followed by retreating monsoon (1.8%), monsoon (1.2%), and winter season (0.7%).

DISCUSSION

The earlier studies on activity budgeting of Indian Rhino by Laurie (1978, 82) suggested that, activity budgeting of Indian Rhino mainly depends on the factors like diets quality and distribution and abundance of food resources. The present findings of less time spent on feeding activity during monsoon and maximum in other three seasons are the results of comparatively higher food availability in habitat during monsoon season. So, Indian Rhino in the Orang National Park lives on forage during the season of the scattered distribution of food or less available. The individual rhino has to forage more time to locate the food, resulting into higher time spent on foraging. But, when food is uniformly distributed or comparatively high in the habitat, the individual of Indian rhino spend less time in foraging, leading to less time allocation. However, when time spent on feeding is high, the individuals of Indian rhino again readjust their time in various other activities, as diurnal hours are fixed. Since, "time" is a limiting factor (Dunbar, 1992); the Indian rhino has to determine the cost benefit to spent time in various activities throughout the day. For the survivability and reproduction, proper quantity of energy is needed and therefore, an individual never compromise with the time in feeding activity.

The time saved for comfort was spent 8.01% on resting, 18.4% on wallowing, 15.1% on vigilance and 3.1% on other social behaviour. Laurie (1978) has found that, Indian rhino spent 36.4% of their total time on resting activity in Chitwan National Park, Nepal. Vigilance (monitoring) behaviour is equally necessary for Indian Rhino in different seasons of the year to protect themselves from enemy and hence no significant seasonal variation was observed.

Since, water resource is available during monsoon, so individuals of Indian Rhino select more time on wallowing during monsoon and less time during winter season. The wallowing activity during monsoon may be related to thermo regulation of the body of Indian Rhino. It is also evident from the present study that, the Rhinos are also wallowing during heavy showers of monsoon in Orang national Park and hence, contradict the reasons of thermoregulation alone.

However, the foraging costs in terms of searching, processing and nutritional benefits differ among different food items. Hence, an individual or a group of individuals manage the time allocation in feeding, moving and other activities in order to balance the foraging costs in different food items. Therefore, the time allocation in different activities, especially in foraging activity is greatly influenced by the nature of food (Clutton-Brock, 1975) and their spatial distribution in the habitat.

REFERENCES

- Altmann J. (1974). Observational study of behavior sampling methods. *Behaviour* 49 : 227-267.
- Bernstein I.S. (1972). Daily activity cycles and weather influences on a Pigtail Monkey Group. *Folia Primatol.* 18 : 390-415.
- Bernstein, I.S. and Mason, W.A. (1963). Activity patterns of rhesus monkeys in a social group. *Anim. Behav.* 11: 455-460.
- Bhattacharya, A. and Pal, B.C. (1982): Daily Activity Cycle of Great Indian one horned rhinoceros at Gorumara and Jalapara wildlife sanctuary in West Bengal. *All India Symp. Wild. Biol.* 12:1-5
- Chivers, D.J. (1969). On the daily behavior and spacing of howling monkey groups. *Folia Primatol.* 10: 48-102.
- Clutton-Brock, T.H. (1975). Feeding behaviour of red colobus and black and white colobus in East Africa. *Folia Primatol.* 23: 165-207
- Clutton-Brock, T.H. (1977). Some aspects of intraspecific variation in feeding and ranging behaviour in primates. In *Primate Ecology*, ed. T.H. Clutton-Brock. London : Academic Press.
- Clutton-Brock, T.H. and Harvey, P.H. (1977). Species differences in feeding and ranging behaviour in primates. In *Primate Ecology*, ed. T.H. Clutton-Brock. London : Academic Press.
- Dunbar R.I.M. (1992). Time : a hidden constraint on the behavioural ecology of baboons. *Behav. Ecol. Sociobiol.* 31 : 35-49.
- Gaulin, S. (1979). A Jarman/Bell model of primate feeding niches. *Hum. Ecol.*, 7: 1-20.
- Ghosh, D. (1991). Studies on the Eco-Status of the Indian Rhinoceros *Rhinoceros unicornis* with special reference to altered habitat due to human interference in Jalapara Sanctuary, West Bengal. Ph.D. Thesis, University of Ranchi, India. 1-305.
- Laurie, W. A. (1982). Behavioural Ecology of the Greater One-Horned Rhinoceros (*Rhinoceros unicornis*). *J. Zool.* 196: 307-341.
- Laurie, W.A. (1978). The Ecology and Behaviour Of the Greater One-Horned Rhinoceros. Ph.D. Dissertation, Cambridge University 1-450pp.
- Milton, K. (1980). The Foraging strategy of Howler monkeys: Study in Primate Economics. Columbia Univ. Press, New York.
- Sarkar, P. (2000). Ecology and dynamics of social relationships of Assamese macaque, *Macaca assamensis* (McClelland, 1839). Ph.D. thesis. Gauhati University, India.
- Srivastava A. (1989). Feeding Ecology and Behaviour of Hanuman Langur, *Presbytis entellus*. Ph.D. Thesis. J.N.V. University, Jodhpur.
- Struhsaker T.T. and L. Leland. (1979). Socioecology of five sympatric monkey species in the Kibale Forest, Uganda. In : *Advances in the study of behaviour*, Vol. 9 (eds. by Rosenblatt J.S., R.A. Hinde, C. Beer and M. C. Busnel), Academic press, New York.
- Sukumar R. (1989). The Asian Elephant: Ecology and Management. Cambridge Studies in Applied Ecology and Resources Management. Cambridge University Press, Cambridge. xvii: 251.
- Zielinski W.J., Spencer, W.D., Barrett, R.H. (1983).

Relationship between food habit and activity patterns of pine martens. *J. Mammal.* 64: 387-396.