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## Co-management in Protected Areas: The Case of Cat Tien National Park, Southern Vietnam

GERT POLET

### INTRODUCTION

Many aspects of protected area management in relation to local human communities have been described in literature. Primack (1993) gives a general overview of the various aspects involved. It is clear that protected area management in less-developed areas is a complex matter because, being driven by poverty, local human populations often rely primarily on natural resources that are found in protected areas but which are also exploited by outside actors capitalizing on skewed economic and political powers. However, this is not just a matter of poor socio-economic conditions or unequal political powers; more and more it is understood that virtually no place on earth has not been part of a human utilization system (Lewis 1996). Hence protected areas are situated most often on land that has been traditionally used for many generations by local communities. Thus a large number of cases exist which describe the pressures protected areas are facing from 'encroaching' local populations being driven by poverty.

The general aim of Protected Area Systems has been and is to maintain biodiversity and natural wilderness for future generations. Traditionally this aim has often been operationalized in a management style that severely restricts, if not forbids, human utilization of biological resources situated within the protected area. This management style may be appropriate for areas with unique ecological features that cannot tolerate any (further) human disturbance. It has successfully conserved important biological values in many parts of the world, values which otherwise would likely to have been lost to increasing human populations and expanding socio-economic systems.

The management style that puts all responsibility in the hands of the agency in charge and does not tolerate interference from local communities has, how-

ever, come under a great deal of criticism. It is said that it ignores the fact that virtually all land on Earth is and has been part of human utilization systems. Therefore many protected areas face claims on the resources situated within their boundaries on the basis of traditional and ancestral rights. In other cases, poor socio-economic conditions force local communities to utilize the resources located in protected area regardless of whether that is allowed or not. In this context it has been said that protected areas are based on 'a charming myth, but still a myth: that nature is separate from people, and that nature is diminished whenever people try to live among it' (McNeely in Lewis 1996).

That protected area-local community relations are often conflicting has been well recognized in literature (e.g. Lewis 1996; Borrini-Feyerabend 1997). Recognizing these realities, modern protected area management includes strategies often referred to as 'co-management'. These strategies build on the growing recognition that some local communities have long-standing traditional rights to the resources located in protected areas and that in several cases local communities indeed have managed those resources in a manner that has apparently been sustainable. These co-management strategies are also based on the conviction that, among others, 'social acceptance is crucial for conservation to be sustainable' and that 'the costs of top-down approaches are staggering' (Borrini-Feyerabend 1997).

Borrini-Feyerabend (1997: 21) gives a continuum of 'participation in conservation initiatives' that runs from full control by agencies in charge and no interference or contribution from stakeholders to 'full control by stakeholders and no interference or contribution from agency in charge'. Concrete management styles thus range from 'actively consulting, seeking consensus, negotiating, sharing authority to transferring authority and responsibility' to local communities.

Modern protected areas consist of a core zone and a surrounding buffer zone. An accepted definition of a buffer zone is: 'A zone, peripheral to a national park or equivalent reserve, where restrictions are placed upon resource use or special developments measures are undertaken to enhance the conservation value of the area' (Sayer 1991: 2).

Gilmour (1998) identifies an alternative livelihood approach, an economic development approach and a participatory planning approach in so called integrated conservation-development projects (ICDPs) which became the answers in conservation action to top-down, strict conservation activities of earlier decades. The alternative livelihood approach aims at developing alternative sources that meet the local communities' development needs but which are less harmful for

the environment. The economic development approach reasons that, if standards of living rise, interest in conservation will be enhanced and that it is unrealistic to expect a conservation interest from impoverished communities. The participatory planning approach argues that the more local communities are involved in planning, management and sharing of conservation activities and benefits, the more likely they are to agree to conservation initiatives (Gilmour 1998).

Recent publications in *Oryx* (Vol. 33 [1]; Vol. 33 [4]; e.g. Spinage 1998) argue that modern co-management approaches (such as ICDP's) have proven to be detrimental for ecological values in protected areas. Implementing co-management arrangements requires tremendous efforts to control the arrangements and it is doubted whether present capacities can deal with such complex management structures. Furthermore it is pointed out that biodiversity values have been lost and that the goal of wildlife conservation has not been served by co-management arrangements. Roe *et al.* point out that:

The old is not yet invalid and the new has not yet been coherently argued, much less proven. Just as the old ways of fortress conservation are failing because the instruments used were too blunt, lacking ideological refinement, CMW (Community-based Wildlife Management) in many cases is still quintessential idealism, lacking the robustness and application required for use as a development tool. (Roe *et al.* 2000: 4)

This case study describes the situation of a national park in southern Vietnam in terms of biological values and the socio-economic, political and cultural context it is operating in. An assessment is made of how the current management style of restriction-in-the-core-zone and dialogue-in-the-buffer-zone has worked out in ecological and socio-economic terms and whether alternative approaches are desirable and realistically workable.

#### CAT TIEN NATIONAL PARK

One of the biggest protected areas in Vietnam is Cat Tien National Park, located 150 km north-east of Ho Chi Minh City. The park (73,878 ha) consists of three sectors: Nam Cat Tien (38,202 ha) in Dong Nai Province, Tay Cat Tien (5,382 ha) in Binh Phuoc Province and Cat Loc (30,635 ha) in Lam Dong Province (Cox *et al.* 1995). Cat Loc is separated geographically from the Nam Cat Tien and Tay Cat Tien sectors (see Figure 2.1). Nam Cat Tien received protected status in 1978 and became a national park in 1992. Cat Loc was declared a Rhino sanctuary in 1992. The three sectors were managed separately by the three provinces until 1998, when the three areas were administratively integrated into what is now known as Cat Tien National Park.

Table 2.1: Vegetation cover of Cat Tien National Park

Vegetation Types	Sector totals (hectares)			Park totals	
	Nam Cat Tien	Tay Cat Tien	Cat Loc	Area	% of area
Evergreen forest	7,844	147	9,828	17,819	24.0
• primary	662	25	-	687	0.9
• logged	7,182	122	9,828	17,132	23.1
Semi-evergreen forest	5,097	-	-	5,097	7.0
Bamboo forest	10,519	2,692	16,594	29,805	40.1
Mixed forest	11,760	529	2,072	14,361	19.3
Plantation	-	62	-	62	0.1
Bush/scrub forest	487	-	-	487	0.6
Grasslands	1,109	577	702	2,388	3.2
Cultivation/settlement area	69	1,001	1,439	2,509	3.4
Wetlands and lakes	1,287	343	-	1,603	2.2
Other	30	31	-	61	0.1
Total natural area	38,202	5,382	30,635	74,219	100.0

Source: Cox *et al.*, 1995.

The topography of the park is characterized by areas with steep hills and largely flat areas. Cat Loc, being the southern edge of Vietnam's central plateau, is rather hilly (Cox *et al.* 1995). Although altitudes range only from 200 to 600 metres above sea level, slopes are relatively steep. Cat Tien National Park is located in the monsoon tropical region. Average rainfall is approximately 2,300 mm. Average temperatures are approximately 15–35°C (JICA / MARD 1996).

ECOLOGICAL HIGHLIGHTS

Flora

Table 2.1 provides an overview of the vegetation cover in classes in Cat Tien National Park. Only a minute area can be regarded as pristine. Roughly half of the area's forest has been replaced by bamboo while the remainder of the area consists mainly of logged semi-evergreen forest and mixed forest. Especially the Cat Loc and Tay Cat Tien sectors of the park have been severely denuded by warfare, logging and conversion of forestland into agricultural land.

Nevertheless, Cat Tien National Park harbours the largest lowland tropical forest of southern Vietnam that is still in reasonable condition; it does, moreover, show signs of recovery. It is therefore not surprising that the area is regarded by

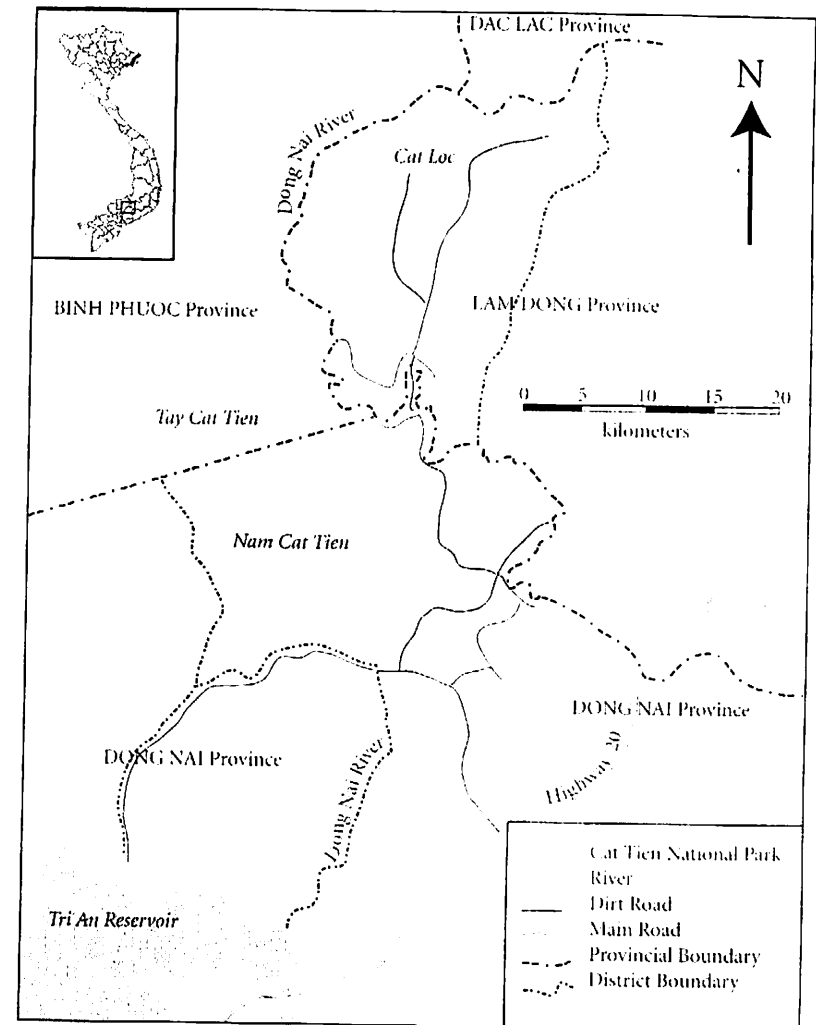


Figure 2.1: The three sectors comprising Cat Tien National Park

both scientists and policy-makers as an irreplaceable ecosystem which deserves to be conserved as an example of Vietnam's original lowland rainforest ecosystem.

Considerable parts of the park suffered from heavy spraying of defoliants during the American war. After the war Vietnam experienced a rapid deforesta-

tion (in 1943, 45 per cent of Vietnam was covered by forest; that figure had dropped to 10–12 per cent by 1989). Principal general factors contributing to this trend are expansion of agriculture into forest areas, commercial logging, fuel-wood consumption and shifting cultivation damage (ANZDEC 1996).

The evergreen forests are dominated by *Dipterocarpaceae* spp. and various *Leguminosae*. The regrowth forests show good signs of recovery and have a well established four-layer structure. The semi-evergreen forests are dominated by *Lagerstroemia* spp. Bamboo forests have developed in areas that were burned for cultivation. Dominant species are *Bambusa balcooa* and *Diospyros mun.* Mixed forests have a mixture of bamboo and tree species. The dominant tree species here are *Lagerstroemia* spp., and *Bambusa balcooa* and *Diospyros mun.* The wetland areas are dominated by *Hydnocarpus anthelmintica* mixed with *Ficus benjamina* (in flood forests) and the seasonally flooded grasslands contain *Saccharum spontaneum*, *S. arundinaceum* and *Neyraudia arundinacea*. One per cent of the species found in Cat Tien National Park is endemic to Vietnam. Rare and endangered plant species found in the park are *Dalbergia bariensis*, *D. mammosa*, *D. cochinchinensis*, *Aquilaria crassa*, *Azelia xylocarpa* and *Calamus poilanei* (Cox *et al.* 1995).

**Fauna**

For most fauna inventories have been made of the diversity present in Cat Tien National Park. However, most of these inventories are incomplete while fish, bats, rodents and reptiles have not yet been studied comprehensively. Table 2.2 provides an overview of the number of species occurring in the park and an overview of those IUCN Red List species found there. The park hosts at least 82 mammal, 318 bird, 58 reptile, 28 amphibian and 130 fish species. In total at least 48 IUCN Red Listed species occur in the park, three of which are critically endangered (the Javan rhinoceros, orange-necked partridge and Siamese crocodile).

Of special significance is the existence of a sub-species of the Javan rhinoceros (*Rhinoceros sondaicus annamiticus*) in the Cat Loc sector of the park. Recent studies and pictures from automatic photo-traps (Polet, Tran Van Mui *et al.* 1999) confirmed the existence of a very small population of five to seven individuals. Based on the analysis of footprint sizes and on-going DNA analysis, it is clear that these rhinos represent a completely different gene pool from that of the Javan rhinoceros in Ujung Kulon (*Rhinoceros sondaicus sondaicus*) in Java, Indonesia. Should the Cat Tien National Park rhinos become extinct, the world will lose a unique sub-species of large mammal.

Another critically endangered species endemic to Cat Tien National Park is the orange-necked partridge (*Arborophila davidi*). Recent studies confirmed its

**Table 2.2:** Overview of number of species and IUCN Red Listed species found in Cat Tien National Park

	Mammals	Birds	Reptiles	Amphibians	Fish
Total no. of species	82 (21)	318 (20)	58 (7)	28 (0)	130 (1)
IUCN Red List 'Critical'	<i>Rhinoceros sondaicus annamiticus</i>	<i>Arborophila davidi</i>	<i>Crocodylus siamensis</i>		
IUCN Red List 'Endangered'	<i>Pygathrix nigripes</i> <i>Panthera tigris corbetti</i> <i>Elephas maximus</i>	<i>Cairina scutulata</i> <i>Pseudibis davisoni</i>			<i>Scleropages formosus</i>
IUCN Red List 'Vulnerable'	<i>Nyctebus pygmaeus</i> <i>Macaca arctoides</i> <i>Macaca leonina</i> <i>Cuon alpinus</i> <i>Neofelis nebulosa</i> <i>Bes gaurus</i> <i>Hystrix brachyura</i>	<i>Gallus gallus</i> <i>Lophura diardi</i> <i>Polyplectron germaini</i> <i>Lepoptilos javanicus</i>	<i>Hieracys amandali</i> <i>Indotestudo elongata</i> <i>Amphibolites</i>		
IUCN Red List 'Near threatened'	<i>Mantis javanica</i> <i>Macaca fascicularis</i> <i>Macaca mulatta</i> <i>Trachypithecus cristatus</i> <i>Amyx cinerea</i> <i>Prionailurus viverrinus</i> <i>Catopuma temminckii</i> <i>Mivotis rosseti</i>	<i>Bubo nipalensis</i> <i>Ketupa cyclonensis</i> <i>Grus antigone</i> <i>Vandellus cinereus</i> <i>Aviceda jerdoni</i> <i>Ichthyophaga ichthyura</i> <i>Anthracoceros melanogaster</i> <i>Micreterium leucoccephala</i> <i>Ptilinopus saroni</i> <i>Ptilinopus elphidi</i> <i>Cissa hypoleuca</i> <i>Macronous kelleyi</i> <i>Plecus hypoxanthus</i>			
IUCN Red List 'Data deficient'	<i>Hylabates gabriellae</i> <i>Helarctos malayanus</i>				

Source: Number of IUCN Red Listed species shown in parentheses. Sources: Polet and Khanh (1999); Polet (2000); Polet and Khanh (2000).

occurrence in the park and highlighted the deteriorating situation these birds find themselves in (Atkins and Tentij 1998; Vy *et al.* 2000). The natural habitat of both the rhinoceros and the partridge has been severely affected by human activities such as defoliation during the American war, logging, conversion of forest into agricultural land, and hunting.

The fate of the Siamese Crocodile (*Crocodylus siamensis*) in Cat Tien National Park has been even worse. Recent surveys indicate that this critically endangered species has most likely become extinct in the park due to hunting for skins and taking of stock for crocodile farms (Bembrick and Cannon 1999). Unlike the other two critically endangered species, the Siamese crocodile is not endemic to the park and other populations are known to occur in Cambodia, Thailand and in crocodile farms. At the moment, Cat Tien National Park is collaborating with the WWF, Saigon Zoo, Queensland University and a private crocodile farmer in Ho Chi Minh City to re-introduce the crocodile in the park (Polet, Ton That *et al.* 1999).

Compared to other national parks in Vietnam (Table 2.4), Cat Tien National Park stands out as the richest in faunal biodiversity, although the high numbers of different taxa may also be attributed to more intensive studies having been conducted in Cat Tien National Park than in other national parks in Vietnam.

More important than having high numbers of different species, Cat Tien National Park's ecosystem has been widely recognized of being of significant importance for birds (Robson *et al.* 1993a and 1993b; Polet and Khanh 1999), ungulates (Ling 2000) and primates (Geismann *et al.* 2000; Nadler *et al.* in press).

From the above it is clear that Cat Tien National Park is of international importance in terms of biodiversity. The Biodiversity Action Plan for Vietnam (GSRV/GEF 1994) regards the area also as a prime example of a lowland forest ecosystem in Vietnam. The rather high number of IUCN Red Listed species and the occurrence of a number of endemic species makes Cat Tien National Park a biodiversity hotspot but also highlights the extremely difficult situation in which nature in general and wildlife in particular finds itself in Vietnam.

## HUMAN CONTEXT

### *Population history and patterns*

The area of Dong Nai, Lam Dong and Binh Phuoc provinces in which Cat Tien National Park is located was originally sparsely populated. For generations, indigenous ethnic groups residing in the area, i.e. the S'Tieng and Chau Ma, have engaged in shifting cultivation and hunting-gathering.

After the American war development of the Vietnamese economy was feeble. In an attempt to provide better opportunities for the inhabitants of the over-

populated Red River and Mekong River deltas, the government initiated the New Economic Zones policy in the mid-1980s. Under this policy large numbers of people (notably Kinh Vietnamese from the lowlands but also ethnic minorities from central and northern Vietnam) were relocated to less crowded areas. Hence, a number of New Economic Zones were established in what is now Cat Tien National Park and its vicinity. Poor co-ordination between different government bodies resulted in the creation of Cat Loc Rhino Sanctuary in 1992 while simultaneously large parts of the sanctuary were designated as a New Economic Zone.

Natural population growth, relocation of people and the following spontaneous in-migration led to a massive influx of people which in turn resulted in a rapid transformation of the area's natural vegetation into lowland rice fields and sloping agricultural lands. Since most immigrants had little experience with sloping land agriculture and with a quickly increasing pressure on the land, most hills became denuded. Erosion is a serious problem nowadays.

Table 2.3 provides an overview of the present-day human habitation of Cat Tien National Park. An estimated 9,484 people live within the park, especially within the Cat Loc and Tay Cat Tien sectors, with a concentrated presence in Talai Commune in the Nam Cat Tien sector. About a quarter of the human population (2,798 people) are indigenous minorities who have been living in the area for generations. Most people living within the park are non-indigenous people, being settled there under New Economic Zone programmes or arriving spontaneously.

**Table 2.3:** Number of people inside Cat Tien National Park, 2000

<i>Location</i>	<i>Indigenous minorities</i>	<i>Non indigenous</i>	<i>Total</i>
Dak Laa Commune	0	245	245
Ta Lai Commune	1,341	0	1,341
<i>Nam Cat Tien sector sub-total</i>	1,341	245	1,586
Dang Ha Commune	0	2,008	2,008
<i>Tay Cat Tien sector sub-total</i>	0	2,008	2,008
Tien Hoang Commune	1,178	0	1,178
Gia Vien Commune	70	2,113	2,183
Phuoc Cat II Commune	209	2,320	2,320
<i>Cat Loc sector sub-total</i>	1,457	4,133	5,681
<i>Total</i>	2,798	6,686	9,484

*Source:* San, 2000.

In terms of land titles, many different situations exist. Most among the indigenous ethnic minority have no official land titles. This seems to be because they have never felt a strong need to register their property but also because many indigenous people live on land which is officially designated as forestland. Under Vietnamese law, no land titles can be issued on land which is designated forestland (only on land designated as agricultural). Within Cat Tien National Park, most land is designated as forestland. Even so, quite large areas are designated as agricultural land, these being managed by the regular government administration (commune, district, province). In the Cat Loc sector alone, out of a total of 30,635 ha, about 4,950 ha (16 per cent) is officially designated agricultural land while additional areas are covered with illegal plantations. Even though these areas are situated within the protected area, Cat Tien National Park management does not have authority over any area designated as agricultural land.

Most people who arrived in the region under the New Economic Zone programme received land titles, but not all of them. Because provincial boundaries were not demarcated in the field, the situation could develop that people in one village have land titles from Binh Phuoc Province (which at the time of issue was not a protected area) but have actually been living in Dong Nai Province within the protected area. Hence there are people living legally within the protected area (with land title and on designated agricultural land); others live there illegally (no land title and on designated forestland); and others semi-legally (with land titles but on designated forestland). The above illustrates the legal complexities in which the authorities of Cat Tien National Park have to operate when trying to fulfil their primary mandate: conservation of the ecosystems in the protected area.

#### *Human utilization patterns*

The non-indigenous people live mainly along the edges of the park, in the fertile floodplains of the Dong Nai River and valleys of streams penetrating further into the park. The main livelihood is rice cultivation and farming a variety of crops such as black pepper, beans and maize in the lowlands. Most families have upland farms further inside the park where cashew is grown.

Most indigenous people live further inside Cat Tien National Park, depending on cashew and coffee as cash crops and a range of subsistence crops including rice. Shifting cultivation has been the traditional basis of livelihood of the ethnic minorities residing the area. The Chau Ma and S'Tieng people still practise this farming system but, instead of leaving the land fallow to regenerate the natural vegetation cover, cashew is planted. This process combined with the cashew enterprises of newcomers has resulted in large areas of forest being converted into plantations.

Hunting and gathering is part of the traditional lifestyle of the S'Tieng and Chau Ma people. The primary aim of hunting and gathering has always been to obtain food for home consumption, but surpluses have always been bartered and traded as well. The American war brought sophisticated and powerful weapons to the area and wildlife numbers seem to have declined sharply ever after. People from outside the area became active in the hunting industry and soon all but a few tigers, elephants and rhinos were wiped out from what is now Cat Tien National Park. A leader of the S'Tieng community in Cat Tien National Park explained that the rule was to 'kill only one rhino, because otherwise rhinos die out' and 'everybody in the village had to be invited to enjoy the meat – skin, bones and horn were discarded' (K'Mot personal comment, 4 May 2000). From his own memory he could list 20 rhinos killed between 1962 and 1988, including males, females and juveniles. Most of these rhinos were killed by local people. Subsistence snaring of different *Phasianidae* (including orange-necked partridge and Siamese fireback, both IUCN Red List species) is still commonly practised (Vy 2000).

It seems that during the 1970s and '80s, rhinos were also hunted for their horn and skin as Mr. K'Mot wondered at the time 'why people [Kinh Vietnamese] wanted to buy the skin of rhinos'. But since 1988 no rhinos have been lost to poachers (Polet *et al.* 1999). Wildlife traders from large towns, however, do still place orders with local communities who infiltrate the park. Quarry species are mainly birds and monkeys for the pet market (ICBP 1991). Common wild pig, lesser chevrotain, Sambar deer and common barking deer are hunted for consumption. Extreme pressure on Vietnam's wildlife has been well documented (Duckworth and Hedges 1998). Export to China and domestic use for traditional medicines have been recognized as the main factors in the decline of Vietnam's key wildlife species (Compton 1998).

Apart from converting forests into agricultural land and hunting, logging is of concern in Cat Tien National Park. The whole of present-day Cat Tien National Park has been logged commercially. Only a small percentage of primary forest remains intact (see Table 2.1). Commercial logging ceased to exist when the area received protected status. Illegal logging still does occur in the park, notably in the Tay Cat Tien and Cat Loc sectors, although tree-poaching incidents have diminished over the last few years. Both people who live inside the park as well as people who come from outside are involved in these operations.

Since large-rattan processing units are available at close range (both within the immediate vicinity of the park as well as in Ho Chi Minh City), rattan harvesting in the park is a popular business, especially during the period of low

agricultural activity. Rattan harvesting is done by the people living within the park as well as by people commuting from outside.

Resin tapping has been an important activity in Cat Tien National Park (ICBP 1991). Holes are cut in *Dipterocarpaceae* trunks to tap the resin which is used to waterproof boats. Indigenous ethnic minorities are involved in this form of gathering forest products. Over the last few years, the practice has largely diminished but because only large adult trees are targeted, resin tapping still poses a serious threat to the park's ecosystem. There are not many large trees left in the park and the cutting holes in the trunk for resin tapping will eventually kill the tree.

#### *Park management*

Being a legally protected area under Vietnam Forest Law, Cat Tien National Park is classified as a Special Use Forest. Under this classification the prime objective of maintaining the area is to maintain biodiversity values. Secondary activities permitted are scientific research and tourism. An other objective is to conserve the natural state of the vegetation in order to maintain the watershed function of the park as to avoid siltation of the downstream Tri An Reservoir which is a key site for electric power generation for southern Vietnam. Legally no other activities than the aforementioned are permitted in the park.

Current management practice of the park is very much geared towards law enforcement within the core zone. In total the park has 16 guard stations and two mobile patrol teams. People violating park rules receive a warning note. Those found violating the park rules repeatedly can be fined or ultimately be prosecuted in court.

For the Nam Cat Tien sector alone, 560 violations were recorded in 1998 (Wells 1999). Roughly 80 per cent of the violations involved people who live within the national park or just outside its borders. The others come from farther afield. About 22 per cent of the violations involved 'illegal entries', about 23 per cent fishing and about 22 per cent bamboo cutting. The other 32 per cent involved more serious offences such as hunting, logging, rattan and resin collecting and encroachment on the park (Wells 1999).

Land classification policies are not in line with land use policies in Vietnam. Large areas within Cat Tien National Park are classified as agricultural land. The management responsibility for these areas lies with line agencies of the government of Vietnam (i.e. communes and districts). Although these areas are situated within Cat Tien National Park, the park management has no management responsibility in these areas and cannot enforce its conservation objectives there. As mentioned above, 16 per cent of the Cat Loc area is thus beyond the control of the national park authorities.

Buffer zones are officially defined as a 1-km-wide strip around the park where it is bordered by logging concessions and includes the entire neighbouring commune where it is bordered by inhabited areas. The buffer zone is not demarcated in the field. Land and human activities in the buffer zone are managed either by logging concessionaires or by the Vietnam government line agencies (commune and district administration). Park officials have no legal authority in the buffer zone. As economic development has a higher priority than conservation in most districts, the so-called buffer zones tend to be entirely under cultivation. They bear little resemblance to actual buffer zones that maintain biodiversity values by restricting certain human activities in order to buffer further human impact on the core protected area.

The Cat Tien National Park authorities have been continuously seeking dialogue with different administrative levels in the buffer zones. Park management has been very active in maintaining face-to-face contacts with commune, district, provincial and central government administrators and different line agencies. Regularly, formal and less formal meetings are held in which protection and development issues are discussed with different government agencies. This approach has been followed in the Nam Cat Tien sector for a longer period of time than in the other two sectors which only became part of Cat Tien National Park in the end of 1998.

#### DISCUSSION

Table 2.4 shows that in terms of numbers of different mammal, bird, reptile and amphibian species, Cat Tien National Park is the richest of all Vietnam's national parks. A quarter of its mammal species, 6 per cent of its bird species and 12 per cent of its reptile species are IUCN Red Listed (see Table 2.2). Of global importance is the occurrence of three 'Critically Endangered' species. Cat Tien National Park's biodiversity should therefore be evaluated as being of national importance to Vietnam and in certain aspects (e.g. the Javan rhinoceros and orange-necked partridge) of global importance, signifying the need to be conserved. This is even more evident if one takes into account that there is not much room for optimism concerning Vietnam's general conservation status (Duckworth and Hedges 1998; Compton 1998).

The size of Cat Tien National Park may be rather large by Vietnamese standards but, in comparison with protected areas in countries such as Laos, Cambodia and Indonesia, it is rather small. Moreover, Cat Tien National Park's 75,000 ha is effectively split into two even smaller parts, separated by a stretch of cultivated land. Just by virtue of its size, Cat Tien National Park is not thought

Table 2.4: Comparison of faunal biodiversity in Vietnam's national parks

National park	Mammal species	Bird species	Reptile species	Amphibian species	No. of faunal species (rank)
Cat Tien	82	318	58	28	486 (1)
Cuc Phuong	64	137	36	17	254 (2)
Yok Don	62	196	-	13	271 (3)
Ba Vi	38	113	41	27	219 (4)
Bach Ma	55	158	-	-	429 (5)
Ba Be	38	111	18	6	173 (6)
Ben En	41	82	3	27	153 (7)
Con Dao	18	62	19	6	105 (8)
Cat Ba	28	37	20	-	85 (9)

Source: Trai *et al.*, 1999 (except for Cat Tien data, from this study).

to be able to maintain viable, large carnivore populations without connecting corridors between the two parts of the park as well as maintenance of other natural areas. (Ling 2000).

Furthermore, almost 9,500 people live within the national park and large stretches of its area are dedicated agricultural land over which the park management has no authority. Although Cat Tien National Park management is quite active in law enforcement activities, it can not avoid continued violations. It is obvious that the pressure on the resources occurring in Cat Tien National Park is high and only diminishing slowly.

These violations mainly involve people living within or right at the border of the park. A large number of these cases concern minor violations such as collecting bamboo, also indicating that people depend on the park for even relatively simple resources to meet their daily needs.

As pointed out above, management responsibilities within the national park are shared between the national park (i.e. within areas designated as forestland) and commune and district authorities (i.e. within areas designated agricultural land). Within the national park's buffer zones, the national park authorities have no management authority at all. Buffer zones are therefore not managed to buffer development activities which impact on the core zone's biodiversity values but rather for a one-sided economic development objective.

Gilmour and San (1999) concluded that in Vietnam:

The biodiversity values of the buffer zones have declined dramatically in recent decades due to conversion of forest to agricultural land and to heavy (unsustainable) exploitation of forest products. It is doubtful if the buffer zones make any significant contribution to the conservation value of the national parks ... [and that] [f]ew activities in the buffer zones are designed to link conservation objectives with socio-economic development.

Part of the problems seems to stem from the fact that '[t]he overlapping and sometimes conflicting lines of authority and responsibility for activities in buffer zones leads to confusion, uncertainty and frustration among the various actors.' Although Cat Tien National Park management is making a considerable effort to seek co-operation with communities in the buffer zone, the above general conclusions seem to apply here as well. In general, Vietnam's experience with buffer zone management leaves not much hope for an effective co-management approach to be applied within its national parks without compromising their biodiversity values.

## CONCLUSIONS

Cat Tien National Park's biodiversity values are internationally important and deserve to be conserved. Due to rapid deforestation taking place in Vietnam and the severe hunting pressure on wildlife, it is clear that currently conservation in Vietnam is at a crossroad. Drastic measures are required to maintain what is left of Vietnam's unique biodiversity or soon it will be gone for ever. The critical state of Cat Tien National Park's biodiversity is just an example of a general trend in Vietnam.

Park management has put much effort into restricting human interference in accordance with Vietnamese law. Management responsibility within the national park is shared between the agency responsible for conserving biodiversity values (i.e. the national park) and agencies responsible for economic development (i.e. commune and district). This arrangement is an example of co-management in which authority is shared, on a basis embedded in law, between the responsible conservation authority and local communities. The agenda for management of the agricultural lands within the national park is geared towards economic development and the national park authorities have no say in this. On the ground, realities are therefore that within the national park there are areas in which conversion of forest into agricultural land is encouraged, access roads to these areas built, power lines erected and wildlife preying on crops eradicated while the national park authorities cannot intervene and are not even consulted. The realities of this co-management arrangement are that slowly forests are



further degraded, human populations continue to grow within the national park and poaching cannot be controlled effectively. Experiencing the practical effect of this co-management arrangement does not leave much hope for the future of critically endangered biodiversity values in the national park.

Within the park's buffer zones the national park authorities have no management responsibility at all, and experience with buffer zone management in Vietnam shows that biodiversity values are ill protected in these zones (Gilmour and San 1999). Buffer zone management in this case is an illustration of a situation in which management objectives and responsibilities should be shared between those responsible for conservation and development, but in fact they are not; all management responsibility lies in the hands of communities whose only pursuit is economic development.

Regulations that apply to the national park's areas designated as forestland are clear, straightforward (i.e. resources from the national park cannot be removed), and are known to everybody in and around the park. But, as there are agricultural lands within the national park to which these regulations do not apply, it is extremely difficult to ensure that these are enforced. Forest guards encounter people with logs but cannot be sure whether those logs are taken illegally from the area designated as forestland or legally from the area designated as agricultural land. Forest guards cannot take measures against people who chase away and exterminate wildlife raiding their crops located in the national park on land designated as agricultural. In short, it is almost impossible to implement such a co-management arrangement without losing biodiversity values because controlling and checking complex co-management arrangements is understandably beyond the capacity of the park authorities.

The case of Cat Tien National Park and its buffer zones illustrates that co-management arrangements within the protected area leads to loss of biodiversity values and that there is no co-management arrangement in its buffer zones, again resulting in the loss of biodiversity values. Observing the critical state of the country's conservation achievements and the rapid growth of its human population, the way forward is to ensure that authority of the national park management within the protected area is strengthened and that civil administration in the buffer zones is shared with national park authorities. The issue here is that national park authorities should obtain a stake in the management of its buffer zones and a transfer of some responsibility has to be arranged from the civil administration (communes and districts) to the national park management. Maybe then buffer zones can make a significant contribution to the conservation of biological values of the national park.

## AUTHOR'S NOTE

The views and opinions presented here are the author's personal ones and do not necessarily reflect the views and opinions of the WWF; the Cat Tien National Park Conservation Project or those of Cat Tien National Park.

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## Pala'wan Managing Their Forest (Palawan Island, the Philippines)

MARIEKE HOBBS

*It is raining cats and dogs in the tropical rainforest in south Palawan, the Philippines. About 30 men and women are soaked to the skin and all the children are shivering with cold. To kill time, waiting for the new cargo of rattan seedlings to arrive, some guys are swinging on lianas. I am the only non-Pala'wan around and moreover crawling on all fours attempting to plant: first select a place between the old trees, then dig a hole with a knife and plant a seedling spacing plants a meter apart as taught. Or more efficiently, one person digs the holes while another follows with the seedlings. It will probably take the whole day before one of the leaders, Bernas Likos, will have transferred all the 3,000 rattan seedlings from the community nursery to the planting site with help from his carabao and before the others will have planted them on the very steep degraded slopes along the river bank of the Agas creek in sitio Saray.*

Why are these people making such a great effort to plant trees? They are not forced to plant trees, nor will they receive money for it. Taking a closer look at the tree-planting endeavour, it appears that the people are stimulated by a project. The project also aims to establish co-management between these Pala'wan indigenous people and the local government. In the context of the discussion about co-management, this chapter will explore the rationale behind the process of change towards forest management and conservation of this Pala'wan community in the uplands on southern Palawan Island in the Philippines. The outcomes of the case study will be analysed and linked with Ostrom's (1990) eight design principles for successful common property management, supplemented with some key issues that Pomeroy *et al.* (Chapter 13) identify for successful co-management, and with a behavioural approach to the rational choice theory of collective action (Ostrom 1998).

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