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Contents

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FOREST NEWS

A SURVEY OF CROP DAMAGE BY RHESUS MONKEYS (*Macaca mulatta*) AND HANUMAN LANGUR (*Semnopithecus entellus*) IN HIMACHAL PRADESH, INDIA

by Santosh Kumar Sahoo and S.M. Mohnot

Introduction

The forest area in several parts of Himachal Pradesh is highly fragmented due to human settlements, forest land encroachments, extensive agricultural/horticultural practices and enclosures. Crop damage by monkeys in the agricultural and apple orchard belts, especially in fields adjoining the forest areas, has been a matter of serious concern among farmers in rural areas of Himachal Pradesh. According to forest and horticulture department officials, rhesus monkeys and Hanuman langurs stray from the forest into adjoining agricultural fields and orchards and damage a variety of crops in several pockets in 10 out of 12 districts. The cultivators themselves reported that rhesus monkeys are the only daytime agents of crop damage throughout the year, although there is some seasonal straying of other wild animals such as wild boar in sub-tropical areas and black bear in temperate areas into the agricultural fields at night causing damage to standing crops. The type of damage to crops by the monkeys ranges from complete consumption of items to widespread stripping of apple bark, uprooting of crop seeds, and the trampling of the crop plants.

In recent years, there have been increasing demands for greater efficiency of agricultural production in Himachal. Farmers in the state are keen to promote high yielding operations. At the same time, they are concerned about protecting their crops from different damaging agents, in particular rhesus monkeys and Hanuman langurs. In rural areas langurs occur in the forest and woodlands adjoining the agricultural fields. By and large, langurs are not usually dependent on agricultural land for their survival. Rhesus distribution in rural areas, however, mostly occurs in the forest-farmland fringe areas. Farmer may suffer (or perceive) economic loss and inconvenience due to the monkeys' frequents forays into agricultural fields. As a result, man-monkey conflicts are increasing among the private farmland owners living in fringe forest areas. This study-cum-survey was designed and conducted under the auspices of the Indo-US Primate Programme (Mohnot *et al.*, 1995-2001) in Himachal Pradesh from June 1997 to February 1998, to collect baseline information on depredations to agriculture/horticulture crops by native monkeys and langurs.

Survey methods

A systematic village-to-village survey was conducted in 6 of the 12 districts in Himachal Pradesh, i.e. Shimla, Sirmor, Solan, Mandi, Chamba and Bilaspur. The survey areas were selected on the basis of the first hand reports from the district forest department officials on the extent of crop damage by monkeys in certain locations.

Three categories of respondents were selected for the survey: 1) farmers whose

farmland properties were <300m from the adjoining forest; 2) farmers whose farmland properties were 300-1,000m from the nearest forest area; and 3) farmers whose farmland properties were >1,000m from the forest and closely surrounded by clustered villages, agricultural fields and orchards. Data was collected through discussions with forest department officials and farmers. The details gathered include primate species involved in crop damage, type of crops damaged, compensation claimed by farmers and the amount sanctioned by the forest department. Data was also collected from the farmers on patterns of cultivation, animals involved in crop damage and the type of protection methods employed. Direct questionnaires were used because the mountainous topography and the land use patterns of Himachal Pradesh made alternative methods impractical. Each questionnaire included questions pertaining to land use practices, crop damage, protection methods, number of monkeys and management.

Forty-six farmland sites were randomly surveyed in six districts (Shimla: 15; Sirmor: 13; Solan: 6; Mandi: 2; Chamba: 7; and Bilaspur: 3). The survey involved a selected sample of respondents who were permanent residents owning farmland properties in the survey area.

The respondents were asked to complete two types of questionnaires. The first questionnaire asked the respondents to indicate which species of primate were frequently present on their lands; to estimate the abundance status of rhesus and langurs; and whether they had experienced crop damage by monkeys. The second questionnaire had two response categories: 1) acceptable level and 2) management needed.

Farmers that reported crop damage were asked to estimate the percentage of their losses of cultivated crops during 1997-1998. Four loss percentage interval series (i.e. 0-25%, 25-50%, 50-75% and 75-100%) were selected as the index of crop damage estimates for four season levels (i.e. summer, fall, winter and spring). The respondents were asked to indicate perceived estimates of crops damaged by monkeys within the given range of each series. Estimates of the percentage of loss for the four seasons were combined to calculate the average annual crop loss that the farmers incurred from rhesus monkeys and langurs.

Estimates of economic loss were also divided into 4 classes: <Rs.500 (an amount difficult to measure); Rs.500-2000 (measurable but not unreasonable); Rs.2000-8000 (borderline amount that could be considered for coverage in a compensation programme or fall under a "reasonable damage" rule); and >Rs.8000 (could represent unreasonable damage).

Results

Most respondents believed that there were too many monkeys living in areas closer to agricultural fields, and that the rhesus population was increasing. Few farmers considered that the monkey abundance status was acceptable; however, a majority of farmers favored some sort of management to control the monkey population. No respondents thought that the monkey population was too low.

Crop damage

The major agricultural crops targeted by the monkeys in Himachal Pradesh are: maize, wheat, potato, vegetables and pulses. In some parts of the state, monkeys also damage horticultural crops like apples, pears, cherries, plums, almonds, walnuts, apricots, etc.

The results of the survey data from the six districts indicated that the crop damage by rhesus monkeys was heavier than the damage done by langurs. The highest estimate of crop damage by rhesus monkeys was reported from Sirmor district (30%), followed by Bilaspur (25%), Mandi (18.8%), Solan (15.3%), Shimla (14.9%) and Chamba (11.4%).

Crop damage estimate reports along the farmland-forest distance parameter revealed that farmers whose farmland properties were beyond 1000 m distance from the nearest forest suffered a small percentage of crop damage (12%) by rhesus monkeys and none by langurs. Respondents whose farmlands were 300-1000 m or <300 m from the forest area estimated the average crop damage by rhesus monkeys at 21.8% and 19.7% respectively. Estimates for crop damage by langurs were 7.9% on farmlands <300 m from the forest area and 9.1% on farmlands 300-1000 m from the forest.

Compensation and control measures

Most respondents reported that their perceived economic loss (monetary losses as perceived by the farmers are the same percentage of income as crop losses) incurred from the crop damage by monkeys was in the range of Rs.2,000-8,000 during 1997-1998. In the horticultural belt, orchardists reported perceived losses of >Rs.8,000 during the same period. The respondents also reported that they had never claimed any financial compensation from the HP forest department to cover their economic losses due to crop damage by primates. According to an enquiry report from the state Chief Wildlife Conservator, the Himachal Government had not yet introduced any compensation scheme under its rural development programme for crop losses caused by free-ranging animals in the state, nor did the government have any plan to introduce one in the near future.

In most farmland areas, farmers used domesticated dogs to scare away the monkeys from their fields. In some places human guards were employed to prevent monkeys from straying into the fields by making loud threatening noises or throwing stones at the monkeys.

Our data on the farmers' choice of monkey management strategies showed that the majority of respondents in Shimla, Solan, Mandi and Bilaspur districts preferred the translocation of monkeys from their areas to other far destinations. However, a few farmers believed that the monkey population could be controlled by shooting and immuno-contraception methods.

Discussion

Monkey abundance and crop damage

Although rhesus monkey and langur distribution is widespread in Himachal Pradesh, their abundance status in certain areas is relative to the local topography, forest types, vegetation patterns and agricultural practices. As would be expected, the average group size of rhesus monkeys varied in the six districts surveyed (Shimla: 38.3±1.7; Sirmor: 29.8±2.2; Solan: 35±2.0; Mandi: 34±3.6; Chamba: 32±2.1 and Bilaspur: 62.3±3.5).

The average groups size of langurs was found to be low (23±2.7) in the survey districts. Farmers reported that they were not worried about the presence of langurs in the local forest and woodlands. However, they expressed strong dissatisfaction over the presence of the rhesus population in their localities. They believed that rhesus monkeys were fearless and frequent crop raiders. Apple orchardists in Mackrog, Dasholi, Pabas, Lahshna and Kanoth villages in Shimla

district considered rhesus and langurs equally responsible for the crop damage. However, despite the low abundance of the langur population in these villages, orchardists seemed critical of langurs.

A majority of farmers (67%) reported that they were even more apprehensive of increased crop losses in the coming years as they speculate that the rhesus population will not decrease. Despite ceaseless efforts to convince the state government agencies to come up with a concrete solution to the problem of crop damage by monkeys in village areas, they have no choice but to bear their losses.

Long-term studies in selected habitats are needed to determine the rates of population increase among rhesus monkeys and langurs in the rural agricultural and horticultural zones of Himachal. This would give a clearer picture as to what extent the perceived economic loss of the farmers is related to the rate of population changes in the rhesus monkey and langur populations in a particular region.

In the agricultural areas of Aligarh District of Uttar Pradesh, Southwick and Siddiqi (2000) found that the rhesus population has increased markedly in the past 20 years. A population of 270 rhesus monkeys comprising eight groups in July 1980 increased to 586 monkeys in nine groups by July 2000. In the 1980s, the population increased by an annual average of 6%. Since 1991, annual rates of increase have varied considerably, but the average annual increase has slowed to 2.6%. Quantitative data on the feeding behavior of two groups in Aligarh District showed that for one roadside group 10.2% of their diet was from agricultural crops, 82.9% from handouts from people passing by on the roadside, and only 6.9% from natural vegetation. The other group living in a small jungle patch along a canal bank spent 17.5% of their feeding time on agricultural crops, 29.1% on handouts from people passing along the canal bank, and 53.4% on natural vegetation. The most striking fact about these two groups is that they spent 46.6% to 93.1% of their observed feeding bouts on food from human sources, either agricultural crops or direct provisioning from people (Siddiqi and Southwick, 1988). In their research study, Boulton, Horrocks and Baulu (1996) reported that the percentage of crops damaged by vervet monkeys in Barbados increased almost 30% over a period of 14 years, although the population size of vervets remained the same during the same period. If this was repeated among the rhesus monkeys of Himachal Pradesh, the farmers would be right to worry about heavy crop losses in the future.

Economic loss and compensation

Agriculture in Himachal is dominated by extensive, rather than intensive, production and gross sales of crops like peas, cabbages, apples and a variety of dried fruits. Large farms often support more wildlife and hence more wild animals can consume more forage crops (Irby, Zidack, Johnson and Saltiel, 1996). Farmers in Shimla district owned a larger acreage of orchards and croplands compared to those in Bilaspur, Mandi, Solan and Chamba. A greater percentage of farmers in Shimla district reported perceived losses of >Rs.8000 during the 1997-98 farming season, and they are afraid of more losses of their cash crops. Moreover, the farmers are by and large in favor of some sort of new policy by either the state or central government to sponsor insurance privileges to those who incur heavy losses of their cash crops due to monkeys.

If in the future the government institutes a policy to mitigate the man-monkey conflict, there may be a problem in determining suitable economic loss crite ria.

The economic loss criterion that was used in this study does not represent the only method of determining whether perceived losses are reasonable or unreasonable. In some crop insurance programmes a threshold level of loss in gross sales is specified before any insurance or protection against damage or loss, especially in the form of financial compensation, is provided (Goodwin and Smith, 1995). For instance, if the loss in gross sales does not exceed 30% of the average based on a previously specified year, there would be no compensation for crop loss. If this approach were applied to damage to crops by free-ranging monkeys in the Himachal Pradesh region, it can be suggested that if the farmers' perceived economic loss (average perceived loss was nearly 5% of the gross annual yield of the cash crops in the previous year) is above 30% of the total income from the selling of the cash crops, they might be considered for compensation.

To substantiate this study we need to use gross annual sales of agricultural/horticultural products for individual farmers as an index to determine the threshold level for compensation. Most middle class farmers, mainly orchardists, in this sample had annual gross sales of between Rs.50,000 and Rs.300,000. Further studies are needed to determine the reliability of the farmers' reported perceived losses on the basis of a gross annual sales index. This approach could be useful in identifying the areas in Himachal Pradesh where crop damage by monkeys is heaviest and the farmers' perceived estimates of loss need indemnification.

Monkey management

Most farmers (69%) preferred translocation (mass shifting of monkeys to other locations) to other methods such as shooting the animals and attempting birth control. A smaller percentage of farmers (22%) suggested that some method of birth control, such as immuno-contraception, should be used. Only 29% of the survey respondents seemed unhappy enough with the monkeys to suggest that a punitive method such as shooting them would be the most suitable solution to the problem.

Biquand, Boug, Biquand-Guyot and Gaultier (1994) used birth control methods on an experimental basis among the hamadryan baboons to combat crop damage problems in isolated areas of Saudi Arabia. This method is highly labor-intensive and costly, and may not be practical with the rhesus monkeys in Himachal Pradesh. However, keeping in view the religious sentiments (nearly 95% of Himachal's farming community is Hindu) against the killing of monkeys, birth control measures seem to be a more socially acceptable option.

To understand the depth of the crop damage caused by monkeys in Himachal Pradesh, we need to conduct a long-term, comprehensive study with specific focus on the level of monkey abundance in different geographical and agro-climatic regions, the economic impacts of monkeys on the agricultural/horticultural crops based on perceived losses, and most importantly, on the community participation programme for the monkey management and habitat conservation programmes in the areas with high crop damage.

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Acknowledgments

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STATUS OF RED PANDA *(Ailurus fulgens)* IN KANGCHENJUNGA REGION OF NEPAL

by Naveen Kumar Mahato

Introduction

In the Kangchenjunga region, the presence of red panda has been reported by the local residents. Frequent events of observation and capture were reported to the management authorities. However, scientific evidence and documentation for the presence of this animal in the region did not exist. The few wildlife surveys, e.g. Sherpa (1994) and Carpenter *et al.* (1994a & 1994b) have not recorded the animal from this region. However, during a preliminary wildlife survey Yonzon (1996) found some local children playing with red panda pelts. Still, sufficient information regarding the presence and distribution of red panda in the region was lacking. Therefore, a study was initiated in April 2003 by the Kangchenjunga Conservation Area Project (KCAP) to assess the status and distribution of red panda in the Kangchenjunga region. This article presents part of the findings of the study by Mahato (2003).

The Kangchenjunga region lies at the north-east corner of Nepal, politically situated in Taplejung district. Biogeographically, it lies in

the Eastern Himalayas (Olson & Dinerstein, 1998). The region is characterized by the presence of Mt. Kangchenjunga – the third highest mountain of the world – beautiful landscapes and a fragile ecosystem. The glaciers, river valleys and the spectacular Mt. Kumbhakarna, along with its rich biodiversity, prompted WWF's Living Planet Campaign to declare this region "A Gift to the Earth". This area's biodiversity is characterized by the presence of more than 810 flowering plants (Shrestha & Ghimire, 1996), over 200 bird species (Baral & Inskipp, undated) and numerous mammal species including the endangered snow leopard (*Uncia uncia*), musk deer (*Moschus chrysogaster*), pika (*Ochotona* roylei), Himalayan black bear (*Selenarctos thibetanus*), Assamese monkey (*Macaca assamensis*), etc. (Yonzon, 1996).

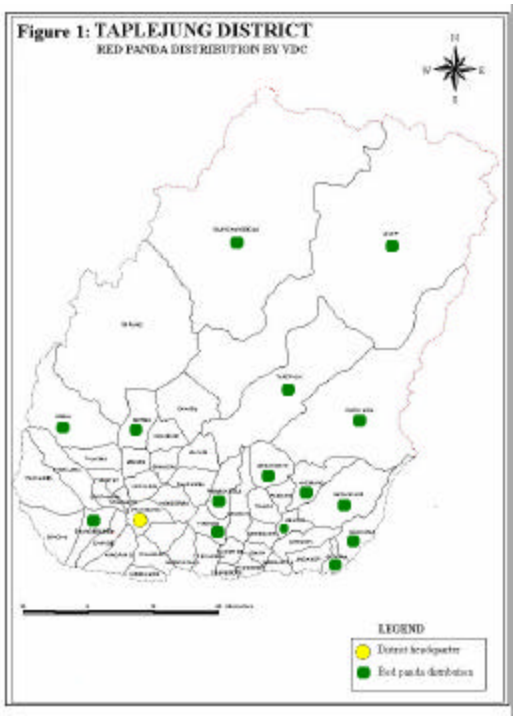
Distribution

The distribution of Red panda (*Ailurus fulgens*) was studied through interviews with local residents and herders, followed by surveys of a few sites to search for signs of the animal. In Taplejung district, red panda is found in 16 VDCs (*village development committees*, the smallest administrative unit): Dhungesanghu, Kalikhola, Lelep, Khewang, Mamankhe, Mehele, Nalbu, Papun, Phawakhola, Sadewa, Sawa, Surumkhim, Tapethok, Tiringe, Wolangchung Gola, and Yamphudin. Four of the VDCs, i.e. Lelep, Tapethok, Yamphudin and Wolangchung Gola, comprise the Kangchenjunga

Conservation Area

In the conservation area, local residents have reported the presence of red panda in the Pathivara area of Tapethok VDC, and around the Andhaphedi area between Daraudin and Tsheram in Yamphudin VDC. In Lelep VDC, red panda is found in the upper forested slopes of Hellok and Lungthung, and based on general observation, the habitat was found to be continuous through Amjilessa, Thangyam and Lhasse up to Ghunsa village. But some people believe that the red panda might have disappeared from the area around Ghunsa village owing to no sightings for the past 10-12 years in the area. Red panda was sighted near the Phalay village, an area approximately one hour's walking distance from Ghunsa village. In the Wolangchung Gola VDC, red panda habitat begins right from the Sukepani area along the Tamur River, but the animal has been sighted only in the Jongim area and above up to Jaritar along the Yangma River and to Jaddak along the Tamur River.

Sign surveys were confined to two VDCs (Lelep and Wolangchung Gola) in the conservation area. Red panda droppings, considered as evidence of presence of red panda, were found in area around Gyabla village in Lelep VDC, and in Jongim area in W. Gola VDC. Surveys in the area around Ghunsa village and the area between Ghunsa and Phalay village did not yield any evidence of red panda, hence, there it is possible that the animal has disappeared from that area due to heavy human pressure on its habitat.



Habitat

Based on the information provided by the local people and field staff, and based on the existing vegetation types, the red panda is

found in areas totalling 265 km^2 which, when connected based on habitat availability and altitude, means a maximum of 600 km^2 of potential habitat for red panda available inside the Kangchenjunga Conservation Area. (DNPWC, 2003) Assuming that red panda habitat consists of *Abies spectabilis* forest between 2500 m and 4000 m in altitude, approximately 170 km^2 of suitable habitat is available for red panda in Taplejung district.

Abies spectabilis, rhododendrons, *Acer* spp., and *Viburnum* spp., with a dense understorey of ringal bamboo, comprised the dominant vegetation in the red panda habitat in this region. The bamboo reached a maximum height of 7.5 m, with an average height of 4 m., and clumps were as thick as 4.5 m in diameter with an average of 1.2 m diameter. Red panda shared its habitat with a number of wild species. The author found evidence of Himalayan black bear (*Selenarctos thibetanus*), Barking deer (*Muntiacus muntjak*), goral (*Nemorhaedus goral*), serow (*Nemorhaedus sumatraensis*) and Himalayan musk deer (*Moschus chrysogaster*). Barking deer was common at the lower altitudes whereas goral and serow were usually present at higher altitudes.

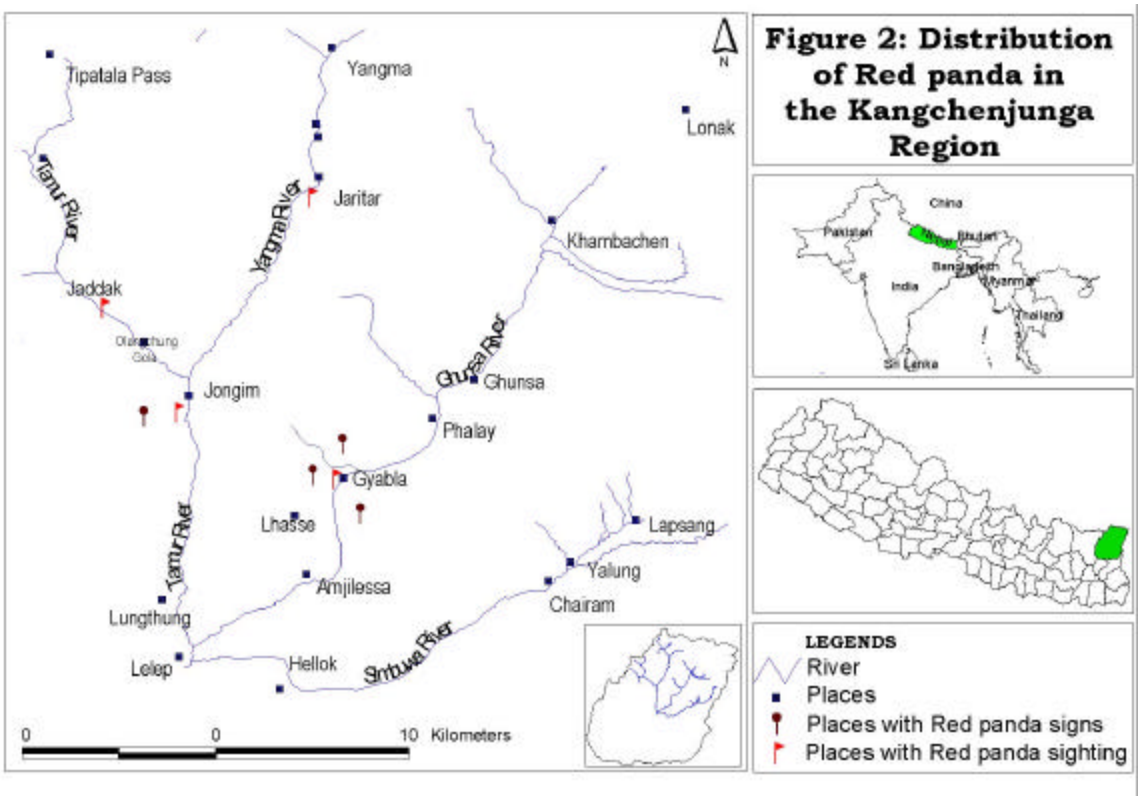


Figure 2: Distribution of Red panda in the Kangchenjunga Region

Conservation

Red panda habitat in the Kangchenjunga region is under threat due to heavy human dependence on the forest for livestock grazing and the collection of forest products. Seasonal grazing is prevalent in the red panda habitats in this region. The highest dung density was recorded between 3200 m and 3400 m altitude, showing that grazing was concentrated at that altitude. The grazing concentration decreased with increasing altitude and there was no grazing above 3800 m. People set fire to the

forest and bamboos to make space for grazing and for potato cultivation (the only crop in the area). They also depend on the forest for the collection of firewood and ringal bamboo for domestic use. Timber is harvested to construct houses and other infrastructure (e.g. bridges, etc.). Though there was no human-red panda conflicts, people sometimes killed red pandas out of ignorance.

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BIODIVERSITY CONSERVATION IN THE PROPOSED AMARKANTAK BIOSPHERE RESERVE – CENTRAL INDIA

by Abhishek Bhatnagar and R.J. Rao

Introduction

In 1983, UNESCO and UNEP jointly convened the First International Biosphere Reserve Congress in Minsk (Balarus) in cooperation with FAO and IUCN (UNESCO, 1995). The Congress' activities gave rise in 1984 to an Action Plan for Biosphere Reserves, which was formally endorsed by the UNESCO General Conference and by the Governing Council of UNEP. While much of this Action Plan remains valid today, the context in which biosphere reserves operate has changed considerably, as was shown by the United Nations Conference on Environment and Development (UNCED) process and, in particular, the Convention on Biological Diversity. The Convention was signed at the Earth Summit in Rio de Janeiro in June 1992, entered into force in December 1993, and has now been ratified by more than 100 countries.

In India, there is a vast protected area network, which also includes the Biosphere Reserves. These Biosphere Reserves have been set up by expanding/merging the isolated, pre-existing national parks/sanctuaries under the control of Forest and Wildlife Departments, to meet the objectives of biodiversity conservation and management (Envis, 2000). In view of the importance of the scientific management of the Biosphere Reserves, a large number of scientists have taken up research and monitoring works in the designated Biosphere Reserves. It is considered appropriate to carry out detailed scientif ic studies on the potential sites for additional Biosphere Reserves for evaluation and to prepare management action plans (Sharma, *et al.*, 2002).

The proposed Amarkantak Biosphere Reserve (ABR) covers parts of Shahdol, Dindori and Bilaspur Districts of Madhya Pradesh and Chattisgarh, falling in the 6th Biogeographic Zone and province 6A – the "Deccan Peninsula-Central Highlands." The study area is in the geographical coordinates of 22º15' to 22º58' N latitude and 81º25' to 82º5' E longitude. It covers a total area of 3,834.68 km^2.

The status, distribution, population trends and exploitation of wildlife in wilderness areas of Amarkantak Biosphere Reserve and its adjoining forest areas are discussed in this paper. An action plan for the conservation and management of wildlife in ABR has been proposed.

Amarkantak Biosphere Reserve (ABR)

The major part of ABR lies in Chattisgarh (Bilaspur District) and the remaining part of the area extends into the Dindori and Shahdol Districts of Madhya Pradesh. The proposed area falls into four forest divisions, i.e. Dindori (Karanjiya Range), Bilaspur (Lamni, Achanakmar, Lormi, Kota, Khudia, Khoddri and Gaurela Ranges), North Bilaspur (Pendra and Kenda Ranges), and south Shahdol (Rajendragram and Amarkantak Ranges). Studies were conducted in all twelve forest ranges. According to the availability of animals, areas were selected in each range to study particular animals. Rapid surveys were conducted in different localities and information was recorded. Detailed descriptions of the study area and methods are given elsewhere (Rao and Bhatnagar, 2002).

The Amarkantak area is economically backward and poor. The economy of the local villages is based on bauxite mining. Besides this, the local inhabitants thrive on forest and agriculture products only. People of nearby villages are generally engaged in mining and forest work, while the people of villages located in the valley are mainly engaged in

agriculture. Hence, the bauxite mining in Amarkantak region is raising the socio-economic condition of the area.

Geology

The major geological formations of the area are the Archaean formation, followed by the Gondwana formation, lametas, deccan traps and laterite with bauxite. The geological succession of the area is given in the working plan of the area (Patil, 1975). The soil of the area is predominantly lateritic, alluvial and black cotton type, derived from granite, gneisses and basalts. Black cotton-type soil occurs in Dindori-Pendra and also along the Narmada River. In parts of Amarkantak, laterite occurs mainly as cappings above the Deccan trap. Red soil is also found on hilltops, which is murramy or loosely packed and gritty, generally shallow and incapable of supporting good forest growth. Alluvial soils are found along the nalas and rivers. The soil cover on the plateau generally varies between 1 to 5m in thickness.

Climate

The temperature begins to rise rapidly from March. May and June are the hottest months, while December and January are the coolest, when temperatures go down to -2ºC. Cold waves can occur for a few days in winter when the maximum temperature drops below 0ºC. Rainfall largely occurs during the southwest monsoon, with the maximum amount falling from July to September. In addition, winter rains occur in December and January. The total annual rainfall is over 1,900mm. Frost occurs mainly in February and can cause great injury to crops, even to the extent that sal trees can be badly affected. Occasional thunder-showers can also give relief from the heat in summer.

Land use

The geographical area of the proposed Amarkantak Biosphere Reserve is 3,834.68 km^2. The major landuse/land cover categories identified in the Reserve are: built-up land; agricultural land; forest; wasteland; water bodies; and mining. Of the total area, 68.1% lies in Bilaspur District, followed by Shahdol (16.2%) and Dindori (15.7%). The forest area comprises 63.19% of the total area, while 34.03% is under agriculture. Other types of landuses include built up land (0.28%), wasteland (1.3%), water bodies (1.03%) and mining (0.1%).

Water resources

The Amarkantak area is one of the major watersheds of peninsular India. The rivers drain separately into the Arabian Sea and the Bay of Bengal. Its uniqueness lies in the fact that it is the source of three major rivers, namely the Narmada (Narmada basin), the Son (Ganga basin) and the Amanala stream that joins the Arpa River (Mahanadi basin) near Pendra.

Faunal diversity

Amarkantak and the adjoining forests, particularly the Achanakmar Wildlife Sanctuary in Bilaspur District, Chhattisgarh, are very rich in wildlife. The forests in different ranges in the proposed Amarkantak Biosphere Reserve provide suitable habitats for wild animals.

There are 27 species of mammals belonging to 14 families in the proposed ABR. These mammals are widely distributed in all 12 ranges of the Reserve. Out of the 27 species, 7 species are carnivores, 19 species are herbivores and 1 species (i.e. sloth bear) is omnivorous. The dry, deciduous forest of Amarkantak Biosphere Reserve also provides an important habitat for birds, with 176 species of forest and water birds belonging to 53 families reported during the study. These forest ranges have mixed forest and sal forest plus many sacred groves, which provide good habitats for breeding as well as feeding for the birds.

Reptiles that inhabit the forest floor are also widely distributed and the authors observed 26 species of reptiles belonging to 13 families and 23 genera, including crocodile, turtle, geckos, lizards, chameleon, skinks and snakes. Eleven amphibian species belonging to 4 families and 5 genera are also found in the Reserve.

A total of 31 species of fishes belonging to 9 families have been collected from the ABR, with the largest number belonging to Family Ciprinidae (18 species), followed by Family Bagridae (3 species), Family Natopteridae (3 species), Family Chanidae (2 species) and the Mastacembelitae, Serranidae, Cobitidae, Siluridae Families (1 species from each).

Nineteen species of butterflies belonging to 6 families were identified. They included species belonging to Family Mymphalidae (10 species), Family Papilionidae (3 species), Family Pieridae (2 species), Family Danaidae (2 species), Family Lycaenidae (1 species) and Family Satyridae (1 species).

Floral diversity

The main forest cover identified in the proposed reserve is closed forest, open forest, degraded forest and forest blank. Out of the total forest cover, the biggest area (79.8%) lies in Bilaspur, followed by Dindori (12.1%), and Shahdol (8.1%). About 95% of the total forest cover falls under notified forest and the remaining 5% belongs to other forests. Agriculture land is also present in these forest areas, with the highest availability in Bilasper District. Most of the hilly areas are covered with forests.

The forest represents tropical moist deciduous vegetation, classified by Champion & Seth (1968) as northern moist decisuous and southern dry mixed deciduous forests. The former type predominates in the Biosphere Reserve.

The northern moist deciduous forest can be sub-classified into the following sub-types:

i) Moist peninsular high level sal – occurring on the lateritic trap and crystalline rocks of moist hilly parts covering the southern, central, as well as south-western parts in the Lamni and Achanakmar ranges in Bilaspur Forest Division, Karanjiya range in Dindori Forest Division and Pendra Range in North Bilaspur Forest Division.
ii) Moist peninsular low level sal – occurring in hilly tracts of Karanjiya, Kota, Khudia, Kenda and Rajendragram ranges of Dindori, Bilaspur and South Shahdol Forest divisions.
iii) Moist peninsular valley sal – occurring in some parts of Karanjiya range in Dindori Forest Division, Kota and Khudia ranges of Bilaspur Division, Kenda range of North Bilaspur Division, Amarkantak and Rajendragram ranges of South Shahdol Forest Division.

The southern dry mixed deciduous forest occupies a peripheral part of the proposed biosphere reserve and serves to enrich the biodiversity of the area.

Tribes

Shadol, Sidhi, Bastar and Dindori districts constitute the main tribal belt of Madhya Pradesh. Amarkantak is densely inhabited by tribals. The Baiga, Korku, Muria, Pinka, Kotwar, and the Goar are the most backward tribes of the area. Each tribe has more or less similar ecological conditions, habitation patterns and economic activities. They exhibit much in common in matters of speech, dress, ornamentation, social customs, and religious beliefs and practices.

Human activities

Unlike most natural changes, human impacts are often directed at selected species and habitats. The role of biodiversity and of the mechanisms that originate and maintain biodiversity are, therefore, no longer of purely academic interest. Human-induced change characteristically reduces biodiversity, but increases the complexity of human societies. People affect biodiversity in both direct and indirect ways. Agriculture and animal husbandry damage biological diversity by destroying or modifying the native biota. It is estimated that since 1950, the area of forest and woodland worldwide has decreased by 15%, primarily in Africa, Asia and Latin America.

The main human activities observed in the proposed Amarkantak Biosphere Reserve are: mining, grazing, agriculture, collection of non-timber forest produce, collection of medicinal plants, deforestation and tourism.

Mining

There are two bauxite mines in the proposed Amarkantak Biosphere Reserve, viz. Hindalco and Balco. Hindalco comes under Shahdol District and Balco is in Dindori District. Both of these mines extract bauxite (aluminum ore) from selected areas and supply bauxite to their respective industries for processing. Large areas of forests were cleared for mining purposes. Due to clear felling of natural trees, the animals that depend on the forests have been disturbed. Animals are not found in the mining areas. In addition there is the practice of establishing monoculture plantations (e.g. Eucalyptus) on the back-filled old quarries. Such single species plantations have an adverse impact on the animal distribution.

Grazing

The livestock population in Madhya Pradesh is very high, consisting of cows (43.18%), buffalos (17.48%), and goats (17.87%). In Dindori, cows account for 75.11% of the livestock, while in Bilaspur and Shahdol districts cows account for 48.79% and 62.80% respectively. The percentage of buffalos is 13.22 in Dindori, 29.84 in Bilaspur and 20.02 in Shahdol. In all three districts, the percentage of goats ranges between 8-18.57.

Deforestation

Excessive exploitation of forests has seriously decimated our forest resources. Deforestation has led to soil erosion, which has adversely affected the river water quality, apart from the rapid siltation of dams and reservoirs. Deforestation leads to the destriction of wildlife habitats. Over one hundred species of wild animals need immediate protection as their populations have dwindled to dangerously low levels. Deforestation also creates a crushing workload for rural communities, particularly for women and children who share the major responsibility for collecting fuel, water and food. In the Amarkantak Biosphere Reserve, deforestation is seen in all forest ranges. The forests are cut for mining activities (Amarkantak and Karanjiya ranges), agriculture, timber, fuelwood, human settlements and extra demands for fuelwood during the pilgrimage season.

Non-timber forest produce (NTFP)

NTFPs are a special category of biological resources that deserve special mention because of their wide commercial use and high exchange values. At the national level, over 50% of forest revenues and 70% of export income from forest produce comes from NTFPs. They provide 50% of the income to 20-30% of India's rural population. In addition, the collection of NTFPs is a skill-intensive activity accessible to low income and socially disadvantaged groups, and is the traditional occupation of several tribal communities. The unsustainable harvesting of NTFPs leads to degradation of the forest. This results in loss to the livelihoods of rural people dependent on NTFPs and ultimately leading to further impoverishment.

NTFPs are divided into two categories. In the first category would fall wild fruits, fodder grasses fiber, and several oil seeds. In the second category we may include high value medicinal plants, herbs, gums and tendu leaves.

Rural dwellers in Amarkantak depend on NTFPs for their livelihood and to meet their income needs. Local markets play an important role in enabling forest-dependent households to realize a significant part of their cash income through the sale of NTFPs. Increased urbanization (as a result of rural to urban migration) is a significant factor that expands the size of local NTFP markets. A study has been conducted on local markets and on market intermediaries who facilitate the coordination (or the matching) of supply and demand of NTFPs by providing market outlets to farmers and guaranteeing a source of domestic supply of NTFPs for consumers. The study found that the quantity of NTFPs marketed is significant. More than 200 traders, mainly women, are engaged in the distribution of NTFPs. Thus, the study confirms the role of NTFPs as a source of employment and income not only for gatherers, but also for traders, and suggests the need and potential for developing these markets.

Medicinal plants

The proposed Amarkantak Biosphere Reserve is an ideal habitat for approximately 126 species of medicinal plants, which are used in the treatment of different diseases. Tribals living inside and outside the forests of the region possess knowledge to some extent about these medicinal plants and how they are used in treatments. They sell the medicinal plants and information about their use as a source of income. Their knowledge is ancient and is passed on from generation to generation. Since the exploitation of these valuable resources is increasing rapidly, many species of medicinal plants are becoming rare and are included in the endangered list.

Tourism

Tourism is one of the major activities in the proposed Amarkantak Biosphere Reserve. One reason is that Amarkantak is the origin of three rivers – the Narmada, Son and Johila – and its uniqueness lies in the fact that these three rivers flow into different river basins, i.e. Narmada Basin, Ganga Basin and Mahadadi Basin respectively. In addition, Amarkantak is a religious place for Hindus and many Shiva temples are present here. Thousands of tourists visit the area during auspicious days to take a holy dip in the Narmada River. There are also many waterfalls in Amarkantak and other tourist attractions. A detailed study on the impact of tourism on the biosphere reserve is needed.

Discussion

In India, there is increasing interest and concern for biodiversity conservation in biosphere reserves. A national conservation strategy has been prepared. Taxonomic collections and texts on plant and animal distribution and their geographical ranges from Amarkantak and neighboring forests are available in different museums in Madhya Pradesh. However, a central database with full networking capabilities is needed. A logical place for this to be located would be in the Forest Research Institute, Jabalpur, Madhya Pradesh. Maps of vegetation based on phytogeographical area in the context of the biosphere reserve should be prepared in order to produce a computerized ABR database. All geographical and climatic data would be included, together with the distribution of taxa (animal and plant), socio-economic values and potential threats. Universities in Madhya Pradesh and Chattisgarh, which have active research programs on natural resources, have the potential to produce significant quantities of data. As the data is amassed, it can be verified and centrally fed into the database. Clearly, a high priority for research to describe and classify forest types and their vegetation patterns, dynamics and structures is paramount. Taxonomic research and the preparation of identification keys are needed to complement ecological studies.

Research in the field of natural resources in the proposed ABR must be multi-faceted, cross-sectoral and multi-disciplinary, involving ecologists, geologists, anthropologists and sociologists. With the realization that integrated natural resource management is critical for sustainable development, it is logical to focus research in this field and call upon the expertise of the various disciplines.

Many rivers and streams that provide the main source of drinking water for villages are also considered sacred. The Narmada River and Son River, which originate from the Amarkantak forests, are sacred rivers. The surrounding forestlands have always been protected. Although protecting the forests along the riverbanks was based on religious and cultural beliefs, it also served as river corridor management. While many forest groves are too small to be of biological significance, a number have potential for biodiversity conservation. The sacred groves have survived so far because of the strong traditional beliefs upheld by the local people and the spiritual, religious and cultural attachments to the groves. The major virtue of this strong culture-based practice is that it encourages community participation in natural resource conservation and sustains positive awareness of nature and the linkages between man and nature.

Biosphere Reserve Management Planning

Biosphere Reserve management is regarded as an appropriate approach to tackle the biodiversity crisis. Knowledge of the biogeographical characteristics (i.e. size, shape, integrity/quality, topography, quality of resources, etc.), conservation values (i.e. ecosystems, species, intraspecific genetic variation, environmental services, natural processes, etc.), and social issues (i.e. land use patterns, livelihood requirements of local peoples, the role of people in biodiversity conservation and management, cultural aspects of human populations, equity issues, likely threats to the protected area and the surrounding landscape) are essential for declaring a Biosphere Reserve. Participation of all stakeholders in biosphere reserves that extend across different states is an important factor. There is a demand for an ecosystem approach in biosphere reserve management. The geographical and biological area is the point of reference for Amarkantak Biosphere Reserve Management (ABRM), which has emerged in response to conventional resource management.

Three features are considered essential for ABRM:

- ABRM is resource-based and management of natural resources relates to their socio-economic environment.
- ABRM relies on cooperation, partnership and negotiated conflict resolution between different states, agencies, stakeholders and the public at large.
- ABRM intends to generate a common understanding of problems and a consensus for action in order to find ecologically, economically and socially sustainable development options.

The main advantages are that interrelated issues such as forests and wildlife, habitat availability and quality, or activities and impacts of land and water uses can be addressed in a more holistic, systematic and integrated manner. The success of ABRM depends to a large extent on whether land use policy and other relevant policy areas (e.g. agricultural policy, regional policy, forest and wildlife policy) between and within states are made compatible and focus on sustainable development.

The Interstate Biosphere Reserves, in particular, face the challenge of how to organize a meaningful dialogue and how to set up organizational arrangements that harmonize planning, management and reporting between and within states. Biosphere reserves may extend over extensive areas and comprise societies that differ in their political, administrative and cultural systems. In addition, stable regional or local administrative systems have evolved over time, and have proven to be effective in decision making or planning. The diversity, and possible incompatibility, of administrative patterns may be great, and changing established regional practices and different traditions even within one state involves costs (UNESCO, 1995).

One key to the successful development and implementation of programs and projects in Amarkantak Biosphere Reserve is the participation of both Madhya Pradesh and Chhattishgarh States, which is required in Biosphere Reserve Management, and recommended in all MAB programs. For example, both states are required to initiate early consultations on timetables and work programs, and plans must eventually include documentation of public consultation procedures.

Problems are particularly acute with the intergovernmental administration. A major administrative problem contributing to this is the lack of communication. When Chhattisgarh State was formed, the new government had no priority for establishing the Biosphere Reserve. In this situation, the task of declaring the Biosphere Reserve for the Government of India is complex and difficult. To move towards a system of management that supports the objectives of Interstate Biosphere Reserves, two associated changes are required. First, the status of the Biosphere Reserve should be recognized by all central and state government departments and district administrations. This can only be agreed on through high level acceptance in the central government. Second, Site Management

Committees (SMCs) should be set up to provide practical management of the ABR. The Committees must be given greater executive responsibility. The SMCs could take the lead in preparing strategic plans for each site, setting out broad development objectives and priority activities. As part of this process, indicative land-use zoning plans, the mapping of natural resources and indic ating permitted activities could be developed. It is vital that the local people are fully represented in the planning process and not just the traditional authorities and influential individuals.

In order to involve the local people, developmental activities should be people-oriented. The advantages for this are to ensure the wise use of the sites by those who live there and depend on the resources for their livelihoods. Since small activities are likely to be less damaging to the environment than large ones, artisan techniques, which are more labor intensive (creating more jobs) and are more environmentally sensitive, should be encouraged. Carefully prepared small-scale private enterprises can be both commercially viable and sustainable.

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RECOVERY OF THE MAMMALIAN FAUNA IN ABANDONED HUMAN SETTLEMENT AREAS IN THUNG YAI NARESUAN WILDLIFE SANCTUARY, THAILAND

by Prateep Duengkae, Sompoch Maneerat, Permsak Kanidthachad, and Sunate Karapan

Introduction

Similar to the situation in other tropical developing countries, Thailand has suffered from the unbalanced sharing of benefits gained from natural resources. The root of the problem lies in the rapid growth of the human population in the last few decades. In response, the Wildlife Preservation and Protection Act of 1960 and the National Park Act of 1961 were created to better protect the habitats and wildlife in Thailand. According to these laws, protected areas in Thailand are divided into two main types: 1) "Wildlife Sanctuary" for wildlife habitat conservation; and 2) "National Park" for outdoor-recreation activities.

Currently, Thailand has approximately 140 protected areas, 90 national parks and 50 wildlife sanctuaries that account for approximately 15% of the total land area of the country (Pattanaviboon, 1999). However, only 6 wildlife sanctuaries are free from human settlement (Chompoochan *et al.*, 1996). Many conflicts over land-use have occurred between the government and the local communities who live in the protected areas, especially in wildlife sanctuaries.

There are widely divergent views on how to handle this problem – one being to allow people to live inside protected areas and another is relocate them to new sites outside the protected areas. However, protected area managers still lack credible data on how an ecosystem will respond to post-human settlement abandonment. It was the goal of this research to provide some guidelines to answer the question of how an ecosystem responds to abandoned land in a protected area.

Study site

Thung Yai Naresuan Wildlife Sanctuary is located between longitudes 14° 55′ to 15° 45′ north, and latitudes 98° 25′ to 99° 05′ east. Before this forest area was gazetted as a wildlife sanctuary in 1957, indigenous hill tribes were settled in the area and converting forest area into agriculture land. Thung Yai Naresuan was declared as a wildlife sanctuary in 1974 and was identified as a Natural World Heritage site by UNESCO in 1991. The Hmong hill tribe villagers were removed from Thung Yai Naresuan by the Royal Forest Department and the Royal Thai Army in 1987 and resettled in Prop Phra District of Tak Province. However, Karen villagers still remained in the area. This research focuses on the 6-12 years following the abandonment of settlements of the Hmong hill tribe.

The climate conditions range from tropical to semi-tropical monsoonal, with a dry season from November to May and a hot, wet season from May to October. Mean annual rainfall in the west was 2,000-2,400 mm, declining to 1,600-2,000 mm in the east with more than 80% of the rain produced by the southwest monsoons. Mean minimum and maximum temperatures ranged from 15°C to 35°C during the hot season, 20°C to 33°C during the wet season, and 10°C to 29°C during the cool season. Minimum and maximum night and day temperatures ranged from 7°C to 40°C (Faculty of Forestry, 1989).

Materials and methods

Site selection

Data was collected in the dry evergreen forests and abandoned Hmong hill tribe settlement areas in Thung Yai Naresuan

Wildlife Sanctuary. The hill tribe village areas were: Ka Ngae Kee (K), Ta Su Kee (T), Thung Na Noi (N) and Huay Num Khew (H). These four sites had different ages of abandonment and village area sizes. Their elevations varied between 700–900 MSL (Table 1).

Table 1. Characteristics of the abandoned settlement area study sites

Sites	Time since abandonment (years)	Area (km^2)	Elevation (m)
Ka Ngae Kee	~6	~16	~700
Ta Su Kee	~8	~8	~700
Thung Na Noi	~10	~16	~800
Huay Num Khew	~12	~2	~900

Surveys

The study areas were surveyed using 6 Camtrakker® (Winder, GA, USA) camera-traps. Two camera-traps were placed at each site in the abandoned settlement area, at the edge and in the dry evergreen forest. Subsequent photographs allowed identification of mammal species. Surveys were conducted from June in 2000 to October 2001.

Results

Twenty-three mammal species were recorded during this study (Table 2). Six species (26%) are listed as threatened by IUCN (2003), i.e. tiger, Asian elephant, Asiatic black bear, Malayan sun bear, marbled cat, and serow. Two of these species, the marbled cat and serow, are reserved Thai species, and seventeen species (73%) are protected by the Thai Wildlife Reservation and Conservation Act of 1992.

Discussion

Abandoned WWEP HQWHDSOD P SRUWQW UROsDHHLQJ and cover WW IZ LOOLH . This study suggests that mammal communities showed a clear recovery pattern after the abandonment of a human settlement. The number and density of large mammal species during human settlement was less than the number and density observed after recovery. For ecological restoration in protected areas, it is important to limit human disturbances as much as possible to allow an ecosystem to fully recover. However, in order to speed up the recovery process, wildlife poaching must be stopped and habitat protection ensured in the protected areas.

Table 2. List of mammal species and their status in Thung Yai Naresuan Wildlife Sanctury.

No.	Common name	Scientific name	IUCN 2003[1]	Thai Act[2]
1	Asiatic Black Bear	*Ursus thibetanus* (Cuvier, 1823)	VU	P
2	Malayan Sun Bear	*Ursus malayanus* (Raffles, 1821)	DD	P
3	Hog-badger	*Arctonyx collaris* (Cuvier, 1825)	_	P
4	Yellow-throated Marten	*Martes flavigula* (Boddaert, 1785)	_	P
5	Large Indian Civet	*Viverra zibetha* (Linnaeus, 1758)	_	P
6	Large-spotted Civet	*Viverra megaspila* (Blyth, 1862)	_	P
7	Small Indian Civet	*Viverricula indica* (Desmarest, 1817)	_	P

8	Common Palm Civet,	*Paradoxurus hermaphroditus* (Pallas, 1777)	_	_
9	Masked Palm Civet	*Paguma larvata* (Smith, 1827)	_	_
10	Small-toothed Palm Civet	*Arctogalidia trivirgata* (Gray, 1832)	_	_
11	Crab-eating Mongoose	*Herpestes urva* (Hodgson, 1836)	_	P
12	Leopard Cat	*Prionailurus bengalensis* (Kerr, 1792)	_	P
13	Marbled Cat	*Pardofelis marmorata* (Martin, 1837)	VU	R
14	Leopard	*Panthera pardus* (Linnaeus, 1758)	_	P
15	Tiger	*Panthera tigris* (Linnaeus, 1758)	EN	P
16	Asian Elephant	*Elephas maximus* (Linnaeus, 1758)	EN	P
17	Wild Boar	*Sus scrofa* (Linnaeus, 1758)	_	-
18	Sambar deer	*Cervus unicolor* (Kerr, 1792)	_	P
19	Barking Deer	*Muntiacus muntjak* (Zimmermann, 1780)	_	P
20	Gaur	*Bos gaurus* (Smith, 1827)	_	P
21	Serow	*Naemorhedus sumatraensis* (Bechstein, 1799)	VU	R
22	Malayan Porcupine	*Hystrix brachyura* (Linnaeus, 1758)	_	P
23	Brush-tailed Porcupine	*Atherurus macrourus* (Linnaeus, 1758)		P

[1]*International threatened species of mammal as pertains to IUCN (2003); VU=Vulnerable, EN= Endangered, DD=Data Deficient*

[2]*Protected species of mammal as pertains to Wildlife Reservation and Conservation Act A.D.199; P= Protected and R =Reserved Species*

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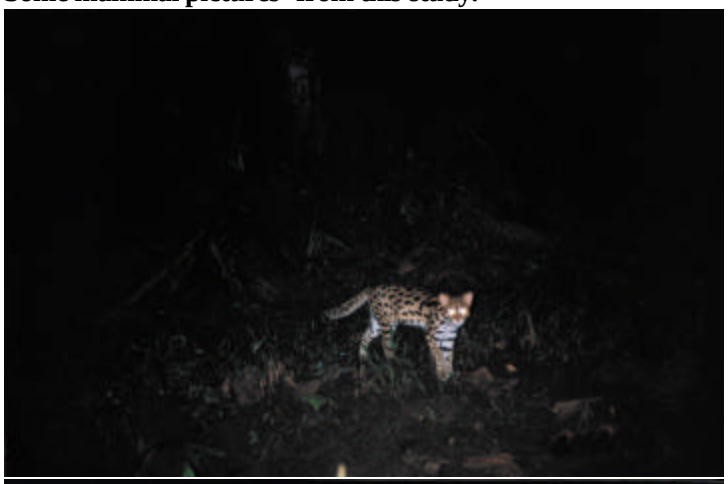
Some mammal pictures from this study.



Leopard Cat
Prionailurus bengalensis (Kerr, 1792)

Leopard
Panthera pardus (Linnaeus, 1758)

Tiger
Panthera tigris (Linnaeus, 1758)

A NOTE ON MOUSE-DEER

by S. Mohammad Ali

The mouse deer, or chevrotain, belongs to the infra-order Tragulina of Ruminantia, and its family Tragulidae is represented by only four species. The different species of mouse-deer are small creatures having more or less the same shoulder height of 30-33 cm, but differing slightly in their body length. They lack antlers, but are furnished with tusks like those of the musk deer, which are better developed in the males. The body coat is brown, speckled with yellow, and the sides bear elongated white and buff spots forming longitudinal bands. The undersurface is white. They are solitary animals and reclusive and crepuscular in habit.

All species of chevrotain were once hunted for their flesh, particularly in Malaysia (Ahmad, 1981). Now they are protected under national or international laws. However, the animals have not yet received adequate attention from conservationists and little is known of their ecology or the areas of their distribution.

The Indian Chevrotain or mouse-deer (*Tragulus meminna*) (Erxleben) is about 45-56 cm long from head to the root of the tail, and weighs about 2.70 kg (Russell, 1900). It has three white strips on the throat. June to July is the rutting period, when males and females may be seen together. The female delivers a litter of two fawns in early winter in 'hides.' The animal is shy in habit and keeps to the grass-covered rocky hillsides or in the forests. If alarmed or pursued, it will bolt to safety and conceal itself in the crevices of rocks or among large boulders. It even has the ability to climb up the inside of hollow standing trees for protection, and often such hides are used to raise the young ones (Prater, 1998).

Mouse-deer is distributed in southern India and throughout the eastern part of Madhya Pradesh and Orissa to the Choota Nagpur area in Jharkhand (old South Bihar). The northern limit of the species' distribution is up to 24° latitude. Its occurrence in different states of India are as follows: Kerala (Periyar, district Idukki); Tamil Nadu (Mudumalai, district Nilgiris, Mundanthurai, district Tirunelveli); Goa (Bhagvan Mahavir, Bondia and Cotigoa, district Goa); Karnataka (Bandipur district, Mysore, Brahmagri, district Coorg); Andhra Pradesh (Eturnnagram and Pakhal, both in district Wrangle, Nagarjuna Sagar-Srisailam, district Mahbubnagar); Maharashtra (Borivli district, Bombay, Nagzira, district Bhandora); Madhya Pradesh (Kanha, district Mandla, Achanak, district Bilaspur, Barnawa-pura, district Raipur); Chhatissgarh (Indravati, district Baster (formerly a part of Madhya Pradesh), Orissa (North Simlipal, district Mayurbhanj Baisipalli, district Puri, Kotgarsh, district Phulbani and Kuldiha, district Balasore); Jharkand (Dalma, district Singhbhum, formerly in South Bihar); West Bengal (Parmadam, distict 24-Parganas vide Saharia, 1981); and also reported from Bangladesh (vide Sarker *et al.*, 1984) and Sri Lanka (vide Tikader, 1983).

The two other species of mouse deer that occur in Southeast Asia are also common in the Tenasserim forest (in Thailand, vide Prater, 1998) and Kalimantan, Sarawak and Sabah in the Bornean reserves of Indonesia (Mackinnon, 1991).

The Larger Malay Chevrotain (*Tragulus napu* (F. Cuvier) is approximately 70 cm long in body length, with five white strips on its throat. It is absent from Java. Mainly nocturnal in habit.

The Lesser Malay Chevrotain (*Tragulus javanicus* (Osbeck) is about 45 cm long, with three white strips on the throat. It is well distributed in Indonesian reserves and mostly occurs near water sources in lowland forests and mangroves.

The fourth species, Water Chevrotain (*Hyemoschus aquaticus*), is about 75-85 cm long in body length. It inhabits the forest near water sources and is nocturnal in habit. The animal is well distributed in Africa from Guinea to Cameroon, Central African Republic, Zaire, Gabon, etc. (Nilsson, 1983).

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Captive mouse-deer (Photo: S. Mohammad Ali)

WILD TIGER ECOLOGY & CONSERVATION IN THE INDIAN SUBCONTINENT ECO-REGION

by Mohammed Ashraf

The tiger is a breathtakingly charismatic species. It is the largest terrestrial carnivorous mammal on earth and sits on top of the food chain in tropical, grassland and boreal ecosystems ranging from South Asia to Central Asia and Siberia in the former USSR. In these eco-regions, the tiger has served as a flagship mammal and hence acted as an umbrella species for overall biodiversity conservation management. It is an ecological indicator species from which wildlife biologists can detect various ecological changes in terms of species richness, size, equitability, biomass, etc. Some wildlife biologists refer to the tiger as an ecological litmus paper because of its role in helping to indicate the overall health of tropical ecosystems in South and South-East Asia.

Despite its important role in ecosystem sustainability and services, tiger populations are declining at an alarming rate all over its ranges. The tiger is an internationally recognized, critically endangered species and has been on the World Conservation Union (IUCN) Red List species category for over a quarter of a century now. There used to be 100,000 wild tigers comprising eight subspecies in Asia in 1900, but now there are less than 7,000 tigers comprising five subspecies remaining in the wild. Colonial wildlife hunting regimes in Asia during the late 1800s to the early 1900s managed to drive the tiger population to the brink of extinction. The effects of this hunting regime were so intense that despite protection and conservation measures, three subspecies of tigers have been lost from the wild over the last 60 years. The table below lists all eight subspecies of tigers and their major habitat eco-regions. It also shows the approximate population size in these eco-regions/bio-regions.

Common Name	**Latin Name**	**Population Size**	**Eco-regions**
Bengal Tiger	*Panthera tigris tigris*	4000	Indian Subcontinent
Indochinese Tiger	*Panthera tigris corbetti*	1700	Indochina
Sumatran Tiger	*Panthera tigris sumatrae*	400	South-East Asia
Amur Tiger	*Panthera tigris altaica*	360	Russian Far East
South China Tiger	*Panthera tigris amoyensis*	20	South China
Javan Tiger	*Panthera tigris sondaica*	Extinct since 1980s	South East Asia
Bali Tiger	*Panthera tigris balica*	Extinct since 1940s	South East Asia
Caspian Tiger	*Panthera tigris virgata*	Extinct since 1970s	Caspian Bio-region

Current threats to tiger populations

Conservation efforts during the post-colonial era managed to curb the tiger population decline, but it is still declining at a dramatic rate even today. Ecologically speaking, the major threat to the tiger population is the depletion of its prey base across its bio-regions. Tigers heavily rely on a large ungulate prey base for meeting their energy budget that they use essentially for establishing their home range, hunting, breeding and raising cubs. The cub mortality rate can be correlated with the depletion in the numbers of large ungulate prey, as female tigers struggle to find potential prey to feed her cubs. This has implications on the decline in the tiger population in various habitats across Asia. Habitat fragmentation and habitat shrinkage are also major problems that are driving the tigers to the verge of extinction. However, this problem can be resolved by

ensuring that an adequate prey base is available for tigers, especially in small, fragmented potential breeding habitats, and to find ways and means to establish ecological corridors for tigers to disperse along – which is essential for maintaining genetic diversity.

Poaching tigers for their body parts is another human-related problem contributing to the tiger's population decline in many parts of Asia. This problem is particularly widespread in the South China and Indo-China eco-regions where tiger body parts are used in making some traditional Chinese medicines (TCMs). The solution to halting the population decline in these bio-regions largely lies in working with TCM industries to adopt a tiger conservation and management approach, rather than trying to ban the TCMs.

Human-tiger conflicts are a serious problem in the western part of the Sundarbans ecosystem in Bangladesh. Although there is some data on human fatalites caused by tigers in Bangladesh, the reliability of the data from a scientific point of view is weak. Tiger attacks on humans may in fact be less common than snake bites or automobile accidents. More research in this direction is necessary to break the misconception of the tiger as a fearsome man-eater.

The priority species

Among the five tiger sub-species still struggling to survive in the wild, the Bengal tiger population has the highest probability of survival in the long term. It comprises approximately 60% of the total population of tigers in the wild, hence ecological and conservation management priorities to giver greater protection to these species are needed. For example, India alone holds over 3,000 Bengal tigers, comprising over 50% of the total population of the tiger in the wild. It's amazing that a country with over 20% of the world's human population but only 3% of the world's land area, can still manage to boast such a significant number of tigers, considering the ongoing acute threats by human activities to the tiger populations. We have to respect and appreciate the resiliency of the tiger as a species along with its healthy breeding and genetic characteristics.

The way forward to secure the future for wild tigers

The long term survival of tigers largely depends on maintaining the ecological balance and conservation management measures across the tiger range countries. This needs an understanding of the core of tiger ecology, its population/meta-population dynamics and its distribution patterns, which can enable us to pinpoint and establish large blocks of protected areas for wildlife. Considering the limited financial and manpower skills available, prioritising the conservation efforts is the way forward to help save the tiger across its many bio-regions. The Indian subcontinent still holds the most suitable habitat patches, blocks and protected areas for tigers, along with a potential prey base. The population range figures of the Bengal Tiger in the Indian subcontinent eco-region are tabulated below:

Country	Minimum # of tigers	Maximum # of tigers
India	2500	3750
Bangladesh	362	450
Nepal	93	97
Myanmar (western)	124	231
Bhutan	67	81
Total population	**3146**	**4609**

Source: 1999 WWF Report, Elizabeth Kemf et al.

The accuracy and reliability of these numbers vary from country to country depending on the extent of the scientific population studies undertaken so far. For example, scientific benchmark estimates of tigers in India and Nepal are well established and hence, the reliability of the numbers in these countries is acceptable. On the other hand, tiger population

census techniques in Bangladesh, Myanmar and Bhutan are often not standardized, hence the estimates can be misleading due to the lack of adequate and correct sampling methodologies. Long term ecological studies of tigers and their prey bases in these countries are essential in order to establish reliable benchmark estimates of populations.

Countries with a secure future for tigers

Scientific studies of tigers and other wildlife are indispensable for a country like Bangladesh which is blessed with the largest deltaic formation in the mouth of the Ganges and Brahmaputra river basin. The intermingling of these two mighty rivers and their numerous tributaries in the tropical humid climate of this deltaic basin gives rise to a unique ecosystem both in terms of a rich biodiversity and the habitat characteristics and patterns. Bangladesh also shares a geo-political boundary with the Indian state of West Bengal that contains the rainforest by the sea is known as Sundarbans Forest, which is a mangrove forest ecosystem or tropical estuarine ecosystem. An area approximately 10,000 km^2 in area, the Sundarbans mangrove forest is a Level I High Priority Tiger Conservation Unit (TCU). Level I TCUs are the only TCUs across the tiger range countries that hold the highest probability of long term survival of breeding tigers. So far, 11 Level I TCUs have been identified, geo-referenced, scored and ranked in the Indian Subcontinent Bio-region and the Sundarbans ecosystem scored highest (65 points out of 70) both in the merits of long term persistence rate of tigers and of high priority protected area systems. All the level I TCUs in the Indian Subcontinent are tabulated to appreciate the relative areas (km^2) of large potential blocks of forest and grassland ecosystem that still hold the best chance for the future survival of wild tigers.

Name of TCU	Habitat Type	Country	TCU Level	Rank Score	TCU Area sq. km.
Chitwan-Parsa-Valmiki	Grassland & Deciduous	Nepal	I	57	3549
Bardia-Banke	Grassland & Deciduous	Nepal	I	54	2231
Rajaji-Corbett	Grassland & Deciduous	India & Nepal	I	48	4357
Sundarbans	Mangrove	Bangladesh & India	I	65	6624
Manas-Namdapha	Subtropical Upland Forest	Bhutan & India	I	55	59901
Bagdara-Hazaribagh	Tropical Dry Forest	India	I	55	61172
Nagarajunasagar	Tropical Dry Forest	India	I	51	13127
Kanha-Pench	Tropical Moist Deciduous	India	I	54	13223
Simlipal-Kotgarh	Tropical Moist Deciduous	India	I	46	7709
Kalakad-Mudanthurai	Tropical Moist Forest	India	I	55	5440
Dandeli-Bandipur	Tropical Moist	India	I	55	23881

Source: 'Riding the Tiger' by John Seidensticker et al.

Ecological study of tigers in Bangladesh

The first ecological study of tigers and their prey base in Bangladesh Sundarbans was undertaken by German Biologist Dr. Hubert Hendrichs in 1971. In 1975, he published his work on Sundarbans in a scientific journal that recorded a count of 350 tigers with a density of 0.1 tigers/km^2 in this region. This classic publication still serves as a benchmark ecological estimation of tigers in the Bangladesh Sundarbans. Over the last 34 years since Dr. Hendrichs' ecological census on tigers was carried out, significant advancements have been made in the scientific studies and monitoring techniques of large

vertebrate mammal populations, and especially estimates of the felidae population, with the advances in computer and information technology. The conceptual and methodological changes in mammal population monitoring techniques have become so advanced and refined that traditional tiger population census techniques such as foot print (pug mark) counts, water hole counts, etc. are no longer considered to be scientifically valid techniques to provide statistically correct estimates of tigers and other mammals. Tiger population estimation techniques have now entered into the realm of rigorous statistical sampling designs and data collection, conceptually parallel statistical modelling and geo-referencing techniques on a spatial and temporal scale. Sundarbans is undoubtedly a potential tiger reserve with a high probability of a long term survival rate for tigers, but do we know the answers to the following key ecological questions?

1. What are the distributional ranges of tigers in the Sundarbans?
2. Where are these distributional ranges increasing and where are they decreasing?
3. Where do the breeding tigers live and where are they increasing their ranges?
4. What proportion of the area of Sundarbans holds the breeding female tigers?
5. What is the relative density of tigers and their prey in the core protected areas of the Sundarbans?
6. Are these Protected Areas large enough to sustain a viable population of breeding females?
7. What is the density and abundance of tigers and their ungulate prey in the Sundarbans buffer zone?
8. What is the biomass contribution of tigers and what is the tigers favourite prey base in the Sundarbans?

Should we consider addressing these questions by embracing the cutting edge scientific advancement of mammal population monitoring techniques, or shall we stick with the traditional foot print count survey in the Sundarbans, which is the best place for tigers to survive in the long run?

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A COMPARATIVE STUDY OF THE DIVERSITY OF BIRDS IN THREE RESERVOIRS IN VAVUNIYA, SRI LANKA

by T. M. Sajithiran, S. Wijeyamohan1 and Charles Santiapillai

Introduction

Despite its small size (65,610 km^2) and high human population density (290 people/km^2), Sri Lanka supports a rich and diverse avifauna. Of the 426 species and subspecies that Harrison & Worfolk (1999) have recorded from Sri Lanka, 216 (or 50.7%) are residents, 123 (or 28.9%) are regular winter visitors, and 87 (or 20.47%) are vagrants. They also recognize 23 species as being endemic to the island, although according to Wijeyeratne *et al.* (2000) the number of endemic species could be as high as 26. The remarkable diversity of birds in Sri Lanka is a reflection of the variety of habitats and climatic conditions available to both resident and migrant species. On the basis of climate and rainfall, Sri Lanka can be broadly divided into the following three main zones: a) low country dry zone; b) low country wet zone; and c) hill zone.

Vavuniya is in the southern half of the region known as Vanni, situated in the low country dry zone, 95m above sea level. The dry zone comprises about 60% of the land area of Sri Lanka, and includes the whole of the northern half of the island and also the east and south-east. The Aruvi aru forms the south-west boundary between Vavuniya District and the North-Central Province. Given the seasonality and unreliability of the monsoons, water shortages are inevitable during certain parts of the year.

It was to meet this challenge that the early colonists developed a system of irrigation reservoirs or tanks in the dry zone (Seneviratna, 2002). The term "tank" is applied to the immense reservoirs built by the ancient kings for impounding rainwater for irrigation (Henry, 1955). Vavuniya District in particular is studded with such ancient irrigation reservoirs, "in the vicinity of which the bird life congregates during periods of drought" (Phillips, 1978). According to Lewis (1895), these are not natural fresh water lakes, all tanks being artificial, and they, for the most part, form a connected series, one above the other, those lower down receiving the surplus water of the higher tanks.

There were 533 tanks in the Vavuniya District in 1890, of which 390 were more or less in some state of repair (Lewis, 1895). The tanks are bordered by large tracts of paddy fields. The villus, on the other hand, are natural formations, and are filled mostly with fresh water. They are especially numerous in the northern part of the flat country, where for much of the year the climate is hot and dry, with heavy rainfall only during the north-east monsoon from December to the end of February, a period that corresponds to the winter in more temperate countries (Phillips, 1978). According to Lewis (1895) the wet season begins with the arrival of the north-east monsoon in October, and generally lasts until the end of December. In some years it may begin some weeks earlier and end rather later. The annual rainfall varies from under 760 to over 1,770mm in the low country dry zone. The average rainfall for Vavuniya is about 1,397mm (or 55 inches) per year. The south-west monsoon sets in May or June, when there is sometimes heavy rain for a short time. February and March are the driest months in the year, while November and December are the wettest. The two periods of March-April and October-November fall neither in the south-west monsoon nor in the north-east monsoon. Each of these periods forms a transition stage from one monsoon period to the other (Jayamaha, 1955).

As Lewis (1895) describes, the forest in places is composed almost entirely of one or two species of somber-looking trees, such as

Manilkara hexandra (palai) and *Drypetes sepiaria* (virai) intermixed with *Salvadora persica*, and *Eleodendron glaucum*. Along the course of the rivers and streams, and along the bunds of the tanks, large trees such as *Terminalia arjuna* (marutu) predominate. Tamarind *(Tamarindus indica)*, though not indigenous, is the most conspicuous tree in every village in Vanni (Lewis, 1895). The surface of many tanks is covered with lotuses, sometimes of the red and sometimes of the white variety. But when the water level goes down, the tanks in Vavuniya are distinguished for their large tracts of the beautiful pink lotus.

With the exception of the study by Wijeyamohan *et al.* (2002) on the birds of the Giant's Tank (in Mannar District), no other studies have been carried out in the north in general and in the Vavuniya District in particular. It was to determine the diversity of birds associated with man-made reservoirs that the present study was undertaken in Vavuniya. Our aim was to try and discover what species occur in the tanks and document the species richness associated with them.

Methods

According to Bibby *et al.* (2000), counting the number of birds in an area may be quite a crude method of study, but nonetheless valuable, especially if it is feasible to count the whole population over a wide area. Bird diversity was studied in three man-made reservoirs or tanks, namely, Vavuniyakulam (known in J.P. Lewis' time as Vavuniyan-Vilankulam, with an area of 142 ha, capable of irrigating from 160-200 ha during a season of average rainfall; Vayiravar-puliyankulam; and Nelukkulam, of which the Vavuniyakulam is the largest, located in the heart of Vavuniya town. Vayiravar-puliyankulam is situated south-west of Vavuniyakulam, while Nelukkulam lies west of the town along the A30 highway to Mannar. These three tanks are species-rich, and therefore, in the initial stages, much effort was directed towards identifying the species present. Species were identified with reference to the Field Guide by Harrsion & Worfolk (1999). Birds were counted from visual observations, and with the use of binoculars (10 x 50 power). The method involved walking along the bunds of the tanks at a slow pace and counting all the birds seen in the water as well on the vegetation along the periphery. This method is feasible in Vavuniya, since almost all the aquatic birds are large and can be seen easily. A number of species such as herons, egrets, storks, spoonbills, cormorants, etc. breed colonially in trees, and their populations can be counted accurately during the breeding season. A total of 43 days was spent in the field, of which 16 were at Vavuniyakulam, 15 at Vayiravar-puliyankulam, and 12 at Nelukkulam. Bird counts were made from September 2002 to February 2003, between 0900 and 1800 hrs. The number seen per hour was then used to compare the diversity of birds in the three reservoirs.

Results and discussion

Species diversity

During the six-month study period, a total of 944 birds belonging to 78 species was recorded from the three man-made irrigation reservoirs or tanks in Vavuniya, of which 32 species were water birds, while the rest were associated with the wetlands. Interestingly, the largest of number of species (63) was found in the smallest reservoir, Nelukkulam (tank #3), while Vavuniyakulam (Tank #1) and Vayiravarpuliyankulam (Tank #2) recorded 58 and 55 species .respectively. Of the 78 species, 13 were migrants, 3 were vagrants, and the remaining 62 were residents. Thus, the resident species recorded in Vavuniya represent 28.7% of the national total. The 13 species of migrants recorded in the study represent 10.6% of the total species that winter in Sri Lanka annually. Of the 609 individuals of the species of resident birds counted in the three tanks, the Red-wattled Lapwing, Intermediate Egret, Indian Pond Heron, and Little Cormorant were among the species that were numerically abundant. Despite intense sampling, Cattle Egret, which is one of the most abundant birds in agricultural areas in the dry zone, was recorded only once, and only from the Vayiravarpuliyankulam. Species diversity of the resident birds associated with the tanks varies little, despite the size of the tanks. Of the 32 species of resident aquatic birds recorded, species diversity was highest (30 species) in the

smallest tank – Nelukkulam, compared to the largest tank – Vavuniyakulam , with 29 species. The intermediate tank Vayiravarpuliyankulam recorded only 23 species, the lowest of the three. The rich bird life associated with Nelukkulam is largely due to the diversity of the habitat, with numerous water plants and bund vegetation that provide cover. As Shankar Raman (2001) points out, opinions vary on the factors influencing the composition or assembly of species communities in an area and their pattern of spatio-temporal variation. According to Terborgh *et al.* (1996), local communities at equilibrial levels are integrated, repeatable units whose composition is regulated by deterministic factors such as the varying environmental tolerances of species and competition. Thus, areas with similar environmental conditions would be expected to have similar communities (Hubbel & Foster, 1986). This has been the case in Vavuniya, where the three tanks are remarkably similar in the composition of the resident species they support.

Table 1: Species diversity and numerical abundance of the resident water birds associated with the three tanks in Vavuniya

	Common Name	Scientific Name	Tank 1	Tank 2	Tank 3	Total	%
1	Little Grebe	*Tachybaptus ruficollis*	13	9	5	27	4.4
2	Spot-billed Pelican	*Pelicanus philippensis*	3	2	5	10	1.7
3	Great Cormorant	*Phalacrocorax carbo*	1	0	1	2	0.3
4	Indian Cormorant	*Phalacrocorax fuscicollis*	2	0	0	2	0.3
5	Little Cormorant	*Phalacrocorax niger*	16	10	11	37	6.1
6	Oriental Darter	*Anhinga melanogaster*	6	0	3	9	1.5
7	Grey Heron	*Ardea cinera*	8	0	3	11	1.8
8	Purple Heron	*Ardea purpurea*	14	5	12	31	5.1
9	Great Egret	*Casemerodius albus*	14	9	9	32	5.3
10	Intermediate Egret	*Mesophoyx intermedia*	16	13	12	41	6.7
11	Little Egret	*Egretta garzetta*	14	9	11	34	5.6
12	Cattle Egret	*Bubulcus ibis*	0	1	0	1	0.2
13	Indian Pond Heron	*Ardeola grayii*	16	13	11	40	6.6
14	Night Heron	*Nycticorax nycticorax*	3	0	1	4	0.7
15	Painted Stork	*Mycteria leucocephala*	1	0	1	2	0.3
16	Asian Openbill	*Anastomas oscitans*	5	1	1	7	1.1
17	Black-headed Ibis	*Threskiornis melanocephalus*	5	0	1	6	1.0
18	Lesser Whistling Duck	*Dendrocygna javanica*	11	13	10	34	5.6
19	Cotton Pygmy Goose	*Nettapus coromandelianus*	1	4	3	8	1.3
20	White-breasted Waterhen	*Amaurornis phoenicurus*	8	8	6	22	3.6
21	Common Moorhen	*Gallinula chloropus*	6	4	4	14	2.3
22	Purple Swamphen	*Porphyrio porphyrio*	12	10	13	35	5.7
23	Common Coot	*Fulica atra*	14	10	10	34	5.6
24	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	15	10	10	35	5.7
25	Black-winged Stilt	*Himantopus himantopus*	13	9	7	29	4.8
26	Yellow-wattled Lapwing	*Vanellus malabaricus*	0	0	4	4	0.7
27	Red-wattled Lapwing	*Vanellus indicus*	16	14	12	42	6.9
28	Common Kingfisher	*Alcedo athis*	8	7	9	24	3.9
29	Blue-eared Kingfisher	*Alcedo meninting*	3	2	4	9	1.5
30	Stork-billed Kingfisher	*Halcyon capensis*	0	0	4	4	0.7
31	White-throated Kingfisher	*Halcyon smyrnensis*	2	8	9	19	3.1
Total			246	171	192	609	100

Fluctuations in bird species

When the number of birds (both resident and migrant) is plotted against time, the pattern of fluctuation in bird species at the three sites is, although broadly similar, more pronounced in the two smaller tanks of Vayiravar-puliyankulam and Nelukkulam than in the large one, Vavuniyakulam. When the north-east monsoon arrived in October bringing rain, the three tanks registered a slight peak in the number of species, but the highest peak was observed in January at the tail-end of the monsoon, at which time, all the waterholes were full. The highest number of species recorded in both Vavuniyakulam and Vayiravarpullyankulam was 32, and 44 in Nelukkulam. This is similar to the pattern observed by Nilsson (1986) that in a set of lakes where all bird species were counted, there was a higher total bird density in the smaller than in the larger lakes. The richness of birdlife in the small tank – Nelukkulam – is largely a reflection of the diversity of habitats available here. A combination of aquatic plants such as lotuses, water hyacinth, and the reed vegetation along the bund provides refuges to more birds in the smaller tank than in the other two. As Simberloff & Abele (1982) pointed out, several small areas may contain as many species as one large area, and the small tanks in Vavuniya play an important role in conserving aquatic birds.

Conclusion

Henry (1955) pointed out that it is in the semi-arid regions of the north and east of Sri Lanka, where the vegetation takes on "a more or less desert-flora character," that the greatest abundance and variety of birds usually associated with water is seen. Vavuniya, with its hundreds of tanks, is therefore a crucial area for aquatic birds such as duck and waders, which are poorly represented in the high rainfall areas of the wet zone. Understanding the habitat associations or usage by birds is fundamental to an understanding of their conservation status (Bibby *et al.*, 1998). Wading birds have been proposed for use as ecological indicators of habitat quality (Custer & Osborn, 1977). The value of birds can therefore be easily exploited for maintaining clean or healthy environments. Protecting species means conserving their habitats where they occur. As far as the birds in the Vavuniya District are concerned, there is a need to identify and prioritize conservation areas to ensure the survival of a high proportion of them (ICBP, 1992). The tanks in Vavuniya represent areas with the greatest diversity of bird species. These tanks can therefore be regarded as "species richness hotspots" (after Tardiff & DesGranges, 1998) for conserving birds in the dry zone. Nevertheless, aquatic pollution in the form of raw sewage and other domestic and agricultural wastes pose a serious long-term threat to the ecosystem, especially in the tanks close to urban areas. Increased application of chemical fertilizers and insecticides in the surrounding agricultural landscape to boost productivity could have a negative impact on the ability of the plant and animal communities in the tanks to support a rich and diverse avifauna. Much work needs to be done to identify threatened species of birds in the north, where two decades of civil war have had a profound impact on the environment, natural resources and biodiversity.

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List of the birds recorded from the three tanks at Vavuniya

Order	Family	Common Name	Scientific Name	Status
Podicipediformes	Podicipedidae	Little Grebe	*Tachybaptus ruficollis*	R
Pelecaniformes	Pelecanidae	Sport-billed Pelican	*Pelecanus philippensis*	R
	Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	R
		Indian Cormorant	*Phalacrocorax fuscicollis*	R
		Little Cormorant	*Phalacrocorax niger*	R
	Anhingidae	Oriental darter	*Anhinga melanogaster*	R
Ciconiformes	Ardeidae	Grey Heron	*Ardea cinerea*	R
		Goliath Heron	*Ardea goliath*	R
		Purple Heron	*Ardea purpurea*	R
		Great Egret	*Casmerodius albus*	R
		Intermediate Egret	*Mesophoyx intermedia*	R
		Little Egret	*Egretta garzetta*	R
		Cattle Egret	*Bulbulcus ibis*	R
		Indian Pond Heron	*Ardeola grayii*	R
		Black-crowned Night Heron	*Nycticorax nycticorax*	R
	Ciconiidae	Painted Stork	*Mycteria leucocephala*	R
		Asian Openbill	*Anastomus oscitans*	R
	Threskiornithidae	Black-headed Ibis	*Threskiornis melanocephalus*	R
Anseriformes	Anatidae	Fulvous Whistling Duck	*Dendrocygna bicolor*	M
		Lesser Whistling Duck	*Dendrocygna javanica*	R
		Cotton Pygmy-Goose	*Nettapus coromandelianus*	R
		Eurasian Wigeon	*Anas penelope*	M
		Garganey	*Anas querquedula*	M
	Accipitridae	Black Kite	*Milvus migrans*	R
		Brahminy Kite	*Haliastur Indus*	R
		Crested Serpent Eagle	*Spilornis cheela spilogaster*	R

Falconiformes	Phasianidae	Indian Peafowl	*Pavo cristatus*	R
Galliformes	Rallidae	White-breasted Waterhen	*Amaurornis phoenicurus*	R
Gruiformes		Common Moorhen	*Gallinula chloropus*	R
		Purple Swamphen	*Porphyrio porphyrio*	R
		Common Coot	*Fulica atra*	R
	Jacanidae	Pheasant-tailed Jacana	*Hydrophasianus chirurgus*	R
	Recurvirostridae	Black-winged Stilt	*Himantopus himantopus*	R
Charadriiformes	Charadriidae	Yellow-wattled Lapwing	*Vanellus malabaricus*	R
		Red-wattled Lapwing	*Vanellus indicus*	R
		Common Ringed Plover	*Charadrius hiaticula*	M
	Scolopacidae	Marsh Sandpiper	*Tringa stagnatilis*	M
		Green Sandpiper	*Tringa ochropus*	M
		Wood Sandpiper	*Tringa glareola*	M
		Common Sandpiper	*Tringa hypoleucos*	R
		Sanderling	*Calidris alba*	M
	Laridae	Whiskered Tern	*Chlidonias hybridus*	R
		Gull-billed Tern	*Gelochlidon nilotica*	R
		Black-naped Tern	*Sterna sumatrana*	M
Columbiformes	Columbidae	Rock Pigeon	*Columba livia*	R
		Eurasian Collared Dove	*Streptopelia decaocto*	R
		Pompadour Green Pigeon	*Treron ponpadora pompadora*	R
Psittaciformes	Psittacidae	Rose-ringed Parakeet	*Psittacula krameri*	R
Cuculiformes	Cuculidae	Pied Cuckoo	*Oxylophus jacobinus*	R
		Asian Koel	*Eudynamys scolopacea*	R
		Greater Cocual	*Centropus sinensis*	R
Apodiformes	Apodidae	Asian Palm Swift	*Cypsiurus balasiensis*	R
Coraciiformes	Alcedinidae	Pied Kingfisher	*Ceryle rudis*	R
		Common Kingfisher	*Alcedo atthis*	R
		Blue-eared Kingfisher	*Alcedo meninting*	R
		Stork-billed Kingfisher	*Halcyon capensis*	R
		White-throated Kingfisher	*Halcyon smyrnensis*	R
	Meropidae	Little Green Bee-eater	*Merops orientalis ceyonicus*	R
		Chestnut-headed Bee-eater	*Merops leschenaultia*	R
	Coraciidae	Indian Roller	*Coracias benghalensis*	R
Piciformes	Capitonidae	Coppersmith Barbet	*Megalaima haemacephala*	R
Passeriformes	Pittidae	Oriental Skylark	*Alauda gulgula*	R
	Hirundinidae	Barn Swallow	*Hirundo rustica*	M
	Motacillidae	Richard's Pipit	*Anthus richardi*	M
		Paddyfield Pipit	*Anthus rufulus*	R
	Pycnonotidae	Red-vented Bulbul	*Pycnonotus cafer cafer*	R
	Lanidae	Brown Shrike	*Lanius cristatus cristatus*	M
	Turdidae	Oriental Magpie Robin	*Copsychus saularis*	R
	Sylviidae	Plain Prinia	*Prinia subflava insularis*	R
	Monarchidae	Asian Paradise flycatcher	*Terpsiphone paradisi*	R
	Dicaeidae	Pale-billed Flowerpecker	*Dicaeum erythrorhynchos caylonense*	R
	Ploceidae	House Sparrow	*Passer domesticus*	R
	Sturnidae	Rosy Starling	*Sturnus roseus*	M
		Common Myna	*Acridotheres tristis melanosturnus*	R
	Oriolidae	Black-hooded Oriole	*Oriolus xanthornus ceylonensis*	R
	Dicruridae	Black Drongo	*Dicrurus macrocercus minor*	R
	Artamidae	Ashy Woodswallow	*Artamus fuscus*	R
	Corvidae	House Crow	*Corvus splendens*	R

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MODEL FORESTS IN ASIA-PACIFIC CONTINUE TO ADVANCE

In 2004, one of the focuses of the International Model Forest Network was to organize regional model forest workshops on institutional capacity building for model forest development in the Asia-Pacific region.

In January, a "Regional Consultation on Developing Monitoring and Evaluation (M&E) Systems for Model Forests" was held in Lampang, Thailand. The workshop provided the participants with the knowledge and tools to enable them to implement an impact monitoring and evaluation framework for their model forest.

In September 2004, a regional workshop on "Strategic and Annual Work Planning for Model Forests" was held in Lin'an, China.

The final regional workshop for 2004 – "Towards Financial Sustainability: Skills for Resource Mobilization" – took place in Madiun, Indonesia, 6-10 December, within the Margowitan Model Forest. Over 40 participants from China, India, Indonesia, Malaysia, Myanmar, Philippines, and Thailand attended, making it one of the largest regional model forest workshops to date. This included four self-funded guest organizations including CIFOR's Malinau forest research project, Centre for Agriculture and Rural Development (CARD) Philippines, the Asia Pacific Association of Forestry Research Institutions (APAFRI) based in Malaysia, and the GEF-sponsored Samar Island Biodiveristy Project in the Philippines.

The workshop continued the focus on model forest capacity building. Sponsored by the International Model Forest Network Secretariat (IMFNS), IDRC (partnership and Business Development Division) and FAO, the workshop provided an opportunity for model forests to:

- recognize the need to develop a variety of funding sources for their programs and operational costs;
- assess their capability and readiness to implement a variety of fund raising activities that are suited to their local contexts and communities;
- enhance their skills in planning appropriate and effective fund raising strategies;
- identify their constituencies and learn how to cultivate donor relationships;
- identify local resources and opportunities for fund raising; and
- develop a mindset for successful and systematic fund raising.

The course was facilitated by Venture for Fund Raising, a Manila-based NGO, and was designed to expose the participants to broader thinking on the different resource mobilization vehicles that could be used, e.g. gifts, special events, earned income and grants. In addition, each model forest was requested to prepare and present a "spotlight" on their model forest with respect to a resource mobilization activity or issue. This provided the model forests with an opportunity to share their knowledge and experiences in resource mobilization.

The IDRC-sponsored project does not end with the workshop. A series of follow-up activities with the model forests will be conducted over the coming months. In addition, plans are underway to hold a similar workshop next year with the Regional Model Forest Network for Latin America and the Caribbean.

LAUNCHING FORUM FOR MODEL FORESTS IN INDONESIA

A Launching Forum for Model Forests in Indonesia was organized on 2 December 2004, at the Ministry of Forestry, Manggala Wanabakti, Jakarta. The half-day event was organized by the Ministry of Forestry, the International Model Forest Network Secretariat, and FAO to highlight the acceptance of the Berau and Margowitan Model Forests into the International Model Forest Network.

Approximately 100 people participated in the forum, which featured presentations from the following:

- Dr. Boen M. Purnamathe, Director-General of Planning, Indonesian Ministry of Forestry;
- Dr. Hadi Satyawati, Coordinator of Indonesia's Social Forestry Programme;
- Patrick Durst, Senior Forestry Officer, FAO;
- Brian Bonnell, Asia Coordinator, International Model Forest Network Secretariat;
- Dr. Silver Hutarabarat, Indonesian Model Forest Coordinator;
- Dr. Achmad Delmy, Representative of the Berau Model Forest, East Kalimantan; and
- John Novarly, Representative of the Margowitan Model Forest, East Java.

His Excellency, Minister of Forestry, M.S. Kaban officially launched the two Indonesian model forests following an address in which he lauded the participatory approaches of the model forest concept and reaffirmed Indonesia's commitment to the principles of decentralized forest management and the effective involvement of stakeholders in forest management decision making.

IMFNS AND FAO SIGN COLLABORATION AGREEMENT ON SUSTAINABLE FOREST MANAGEMENT

The International Model Forest Secretariat (IMFNS) and FAO recently signed a Memorandum of Understanding to strengthen links and collaboration in a number of technical fields, including sustainable forest management practices, watershed management, national forest programmes and participatory forestry.

FAO's collaboration with the IMFNS dates back to 1997 when a Task Group, that included FAO, was formed during the World Forestry Congress in Turkey, to look at options for further developing the international network.

FAO has led the development of model forests in the Asia-Pacific region from 1999-2003, through project funding from the Governments of Japan and Canada, and with FAO Regular Programme resources.

FAO REGIONAL OFFICE FOR ASIA AND THE PACIFIC ADOPTS REGIONAL STRATEGIC FRAMEWORK

The Strategic Framework for FAO 2000-2015 was adopted in 1999 to help member countries reach the World Food Summit (WFS) target of halving the world's undernourished by 2015. Guided by the Global Strategic Framework (GSF), the Organization's rolling medium-term plans and successive biennial programmes of work transform the agenda into action.

Four years into the GSF, it was felt that member countries of Asia and the Pacific could be even better guided by a Regional Strategic Framework (RSF). Such an RSF would not be separate from the GSF, but would translate the GSF into regional actions, emphasizing the character, needs and trends of the region. It is therefore an integral part of the GSF.

With this in mind, the FAO Regional Office for Asia and the Pacific (RAP) embarked on a participatory process in April 2003 to forge an RSF for the Asia-Pacific region. In carrying out the work, an interdisciplinary, broad-based participatory approach was stressed, as well as the need to broaden partnerships and alliances, and leverage resources.

RAP sounded out national counterparts, informed regional partners and held extensive, in-depth discussions within RAP to: assess major issues and trends; recognize challenges; identify priority areas; analyze strengths, weaknesses, opportunities and threats; formulate an implementation strategy; and prepare for monitoring and evaluation.

On the basis of this work, six thematic programme areas were identified to guide the Asia-Pacific region in national and collective actions towards achieving the WFS target as given below:

- restructuring of the agricultural sector;
- decentralizing governance in support of sustainable development;
- reducing vulnerability to disasters;
- promoting effective and equitable management, conservation and sustainable use of natural resources;
- strengthening biosecurity; and
- alleviating poverty in rice-based livelihood systems.

Within each thematic area, the general rationale, goal, objectives, strategic elements, outcomes and impact indicators were constituted on the basis of the most pressing common challenges facing the Asia-Pacific region and our collective capacities to meet them.

The RSF provides a set of priority areas for interdisciplinary action over and above RAP's comprehensive regular and field programme activities. It purports to give a guide for RAP to work with partners and regional member countries on some or all of the priority areas in pursuance of their own national agricultural development strategies. The RSF is not a prescribed strategy for Asia and the Pacific. Nor are its six thematic areas the only ones that RAP will be collaborating on with member countries and regional and international partners, now or in the foreseeable future. But it does provide focus and guidance for priority support in the coming years.

A copy of the *FAO/RAP Regional Strategic Framework* can be obtained from:
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or download it from the following website:
ftp://ftp.fao.org/docrep/fao/007/ad501e/ad501e00.pdf

FAO ANNOUNCES MAJOR REVIEW TO BOOST SUPPORT FOR MILLENNIUM DEVELOPMENT GOALS

The Food and Agriculture Organization is to carry out a major review of its activities to ensure that the Organization gives maximum support to achievement of the Millennium Development Goals (MDGs).

Director-General Jacques Diouf told the opening session of the FAO Governing Council meeting in Rome, in November, that the Organization had to face the same challenges as the United Nations itself with regard to the MDGs.

"We need to be sure that the different activities of FAO, spread across the Organization, are fully integrated and that member countries are able to see what FAO's role is and understand its contribution to realization of each of the eight Millennium Development Goals," he said.

"We are in the process of reviewing, with external support, the whole range of our programmes and our structures, including our mechanisms for internal and external monitoring and review, in order to integrate them into the framework of the MDGs," he continued.

The Director-General said the changes to be made were aimed at ensuring FAO's full involvement in the reforms taking place across the UN system, as well as within multilateral development banks and bilateral organizations. They would help to make FAO stronger, more effective, and more efficient within a relevant UN system through a greater harmonization and integration of activities and resources at headquarters and in the field.

MILLENNIUM DEVELOPMENT GOALS

1) Eradicate extreme poverty and hunger
2) 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

United Nations Millennium Declaration – September 2000

From*: FAONEWSRELEASE 04150e*

NWFPs REVISITED: NWFP MARKETING SYSTEM DEVELOPMENT IN LAO PDR

Contributed by Miyuki Ishikawa,
Associate Professional Officer, FAO Regional Office for Asia and the Pacific

Until the past decade or so, non-wood forest products (NWFPs), or non-timber forest products as they are also known, have been considered as "minor" forest products in many countries, reflecting their minor contribution to the national economy compared to commercial timber. Produced and consumed largely outside the monetary economy, NWFPs have never appeared as resources of great economic importance at the macro level. At the micro level, however, NWFPs have been recognized as important forest resources by people living in and around forests for centuries. NWFPs have also attracted interest from the forestry community for decades. The focus of interest, however, has shifted throughout the past decade, reflecting changes in development policy and strategy.

Evolution of NWFPs discourse

The surge of interest in NWFPs in the late 1980s was driven largely by concern over the unsustainable exploitation of natural resources in the previous two decades, particularly commercial logging and forest clearing. In Asia, where strong demand for tropical timber and rapid economic and population brought about extensive clearance of forests in many countries, NWFP development began to capture the attention of the conservation proponents in the late 1980s as a possible alternative to logging and forest clearance. Responding to the increasing interest in NWFPs in the region, the FAO Regional Office for Asia and the Pacific organized a major expert consultation on NWFPs in 1991, generating considerable information on the biological and production aspects of NWFPs in 11 countries of the region.

With the steady deepening of knowledge about NWFPs, consideration in the early 1990s began to look beyond their contribution to biological conservation of forests and attempted to address the links between rural development and conservation of forest resources. This shift reflected the growing appreciation for integrated rural development. The underlying assumption of this strategy was that NWFP development and marketing could be used to improve rural economies and expand livelihood opportunities in an environmentally friendly way. The hope was that if rural people could benefit from NWFPs, they would make greater efforts to conserve forests and forest resources.

The experience with NWFP development throughout the 1990s indicates that the integration of rural development and forest conservation through NWFP marketing has achieved only modest success. There are some cases where NWFPs have contributed to preventing the poor from falling deeper into poverty by providing opportunities for local employment and income, but empirical studies indicate that the assumptions underpinning integrated rural development were not always valid. In practice, the poor are not always able to benefit from intensified NWFP management because intensification sometimes requires additional labor or competes with subsistence agriculture. In other instances, market opportunities are limited or prices of NWFPs are very low. Thus, NWFP development has seldom succeeded in fully lifting rural farmers out of poverty. Furthermore, people do not necessarily consider the long-term availability of NWFPs and do not always have the knowledge required to change practices in a way that sustains the resources.

To respond to such difficulties in integrating rural development and forest conservation, FAO organized a second major regional expert consultation on NWFPs in 1994. With the hindsight that NWFP development alone would not solve the problem of resource degradation, the consultation broadened the context and discussed biological, socio-economic and cultural dimensions of NWFPs (the proceedings "*Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific*," are available online at http://www.fao.org/docrep/X5336E/X5336E00.htm or in hardcopy from FAO/RAP).

Emerging approach to NWFP development

With greater understanding of the actual potential of NWFPs in recent years, interest has shifted yet again towards improving rural livelihoods through participatory activities on the one hand, and devolving forest management to local communities on the other. With the increasing devolution of forest management, recent NWFP approaches increasingly look at how local people's involvement in NWFP development contributes to improving their livelihoods (including food security) and sustainable forest management. Moreover, recent NWFP development programs attempt to cope with the entire systems of NWFP development (e.g. policies/strategies, regulations, information systems, infrastructure, etc.) throughout the entire process of NWFP development (production to marketing), and including all the actors involved (e.g. rural people, government, traders, private sector, etc.).

NWFPs marketing development project in Lao PDR

A new project in Lao PDR, *Marketing system development for non-wood forest products*, is an example of such efforts. By applying the Market Analysis and Development (MA&D) approach, the two-year project aims to develop a model approach for marketing of promising NWFPs. It also aims to improve rural farmers' livelihood systems by strengthening their capacity for NWFP marketing and sustainable management of NWFP resources. The Inception Workshop was organized on 4 November 2004, and attended by more than 90 participants from the government, international organizations, NGOs and the private sector. The objectives of the workshop were to bring together key stakeholders working in the NWFPs sub-sector for information exchange and to strengthen their capacities in key issues of NWFP marketing and the MA&D, a methodology co-developed by FAO and the Regional Community Forestry Training Center (RECOFTC).

One of the project's unique features is its broad definition of marketing system development; it not only promotes local-level MA&D activities, but also attempts to improve market information services and the government's NWFP-related regulations with a view to facilitating the entire marketing process. Multi-stakeholder approaches are another important feature of the project. By establishing a forum for governmental organizations, the private sector (e.g. Lao National Chamber of Commerce), investors and potential donors to exchange information, the project seeks to strengthen linkages among them and bring about synergies. Also, the Netherlands Development Organization (SNV) is providing training under a partnership with the project, based on SNV's extensive experience with NWFP development in the country.

The project is expected to develop NWFP marketing systems that provide greater benefits to rural farmers and lead to conservation of forests and forest resources, thus addressing one of the Lao Government's priorities in the forestry sector. The project will further test and validate the growing body of knowledge and experiences related to NWFP development, in consonance with the trends toward devolution of forest management to local communities and increasing emphasis on sustainable livelihoods.

SOUTHEAST ASIAN COORDINATORS PLOT STRATEGIES FOR FOREST GENETIC RESOURCES

The Southeast Asian National Coordinators' Meeting on the "Asia Pacific Forest Genetic Resources Programme (APFORGEN) was organized by International Plant Genetic Resources Institute (IPGRI) and the Asia Pacific Association of Forestry Research Institutions (APAFRI) at the Forest Research Institute (FRIM) in Kuala Lumpur, 29-30 November 2004. National coordinators from six countries, together with representatives from IPGRI, APAFRI and FAO participated in the meeting.

The objectives of the meeting were to: i) discuss the regional status of forest genetic resources (FGR) conservation and management and recent updates; ii) discuss the status and development of national FGR Task Forces and national FGR programmes in the participating APFORGEN countries; iii) to draft an APFORGEN Action Plan for activities for Southeast Asia; iv) to establish ways of more effective information dissemination between the participating countries and organizations; and v) to discuss other matters related to the APFORGEN programme.

Following welcome remarks by IPGRI, APAFRI and FRIM, the Meeting reviewed the past activities of APFORGEN, which included the inception workshop of 2003, and the setting up of the website (www.apforgen.org). One of the remaining activities from the recommendations included the formation of the Steering Committee. Following this, some of the common issues in FGR conservation in Southeast Asia were reviewed by Mr. T. Luoma. The erosion is still persisting despite international efforts such as the Global Strategy for Plant Conservation, and several other regional conservation programmes. Improvements, however, have been made in the institutional framework for FGR conservation and management in several countries. In addition, a number of guidelines are being developed for conservation actions by different agencies and individual countries. Finally, the status of national FGR programmes was discussed – their status appears to be highly variable across the region. The role of APFORGEN in supporting the national and regional initiatives was further touched on.

The national priorities and recent updates of the countries in the region (Cambodia, Indonesia, Malaysia, Myanmar, Thailand, and Viet Nam) were given much attention. Countries are beginning to reform national forest policies and legislation to accommodate FGR conservation. In almost all cases, the most pressing challenges for increasing FGR conservation and management include: a) lack of funds, facilities and qualified human resources; b) low awareness of the importance of FGR; c) inability to mobilize other resources; and d) almost no coordination among the relevant agencies.

Additional presentations were made on:

- Update on FGR networking in Europe (J. Koskela, IPGRI-Rome);
- IPGRI's New Forest Genetic Resources Programme (B. Vinceti, IPGRI-Rome);
- FAO's FGR Programme and Tree Species Networks (M. Kashio, FAO-RAP); and
- Linking national forest programmes and the conservation and management of FGRs (S. Appanah, FAO-RAP).

The meeting discussed a draft action plan for APFORGEN Southeast Asia for the next three years. The following themes were proposed:

- national capacity building and training needs;
- regional and national mechanisms for communication, information sharing and raising awareness of the importance of FGR;
- policy analysis and support;

- resource generation; and
- development of regional FGR projects/initiatives for priority themes/ species.

The national coordinators and other partners in the programme have been requested to provide feedback on the plan, including project proposals for seeking additional funding. FAO-RAP would pay particular attention to the policy issues in the conservation and management of FGRs.

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REDUCING GREENHOUSE GAS EMISSIONS BY PROMOTING BIOENERGY TECHNOLOGIES FOR HEAT APPLICATIONS

A Global Environment Facility (GEF) "Project Development Facility (PDF) Activity" to formulate a GEF project proposal entitled "Reducing Greenhouse Gas Emissions by Promoting Bioenergy Technologies for Heat Applications" is now being implemented by the FAO Regional Office for Asia and the Pacific, in cooperation with UNEP-ROAP (Regional Office for Asia & the Pacific).

The overall objective of the proposed GEF project is to enhance energy efficiency and reduce greenhouse gas emissions by promoting the adoption of improved bioenergy technologies for productive heat applications in the domestic and small-scale enterprise sector in the South Asian countries of Bangladesh, Bhutan, Nepal, and Sri Lanka. In particular, the project aims to remove barriers to the adoption of the technologies through technology assessments, technology demonstrations, policy development, financing mechanisms, capacity building, education, and replication activities. The project concept fits the GEF strategic priority for productive uses of renewable energy, and represents one of the first major GEF forays into supporting these types of biomass applications.

During the implementation of the PDF activity, the following activities will be undertaken: collection of baseline data on greenhouse gas emissions of the target sectors; collection of data on suitable technologies and selection of technologies to be demonstrated in the full project; assessment of market potential for improved bioenergy applications; analysis of policy and other barriers and capacity-building needs; design of regional collaborative mechanisms, coordination arrangements; and mobilization of co-financing for the full project. It is anticipated that with these inputs, the proposed project will get approval by GEF.

For more detailed information about the PDF activity and the proposed GEF project proposal, please visit the following webpage: http://www.gefonline.org/projectDetails.cfm?projID=1891.

GEF grants support projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. This proposed project relates to climate change and in particular, is under the GEF Operational Programme *"Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs."* The GEF implementing agency will be UNEP, while FAO will be the executing agency.

REDUCING POVERTY IN UPLAND COMMUNITIES IN THE MEKONG REGION THROUGH IMPROVED COMMUNITY AND INDUSTRIAL FORESTRY

The regional consultation workshop "ADB RETA 6115: Poverty Reduction in Upland Communities in the Mekong Region through Improved Community and Industrial Forestry," held 1-2 September 2004 in Bangkok, was jointly organized by the Asian Development Bank (ADB), the Center for International Forestry Research (CIFOR) and the FAO Regional Office for Asia and the Pacific (FAO/RAP). The workshop was attended by 70 participants, including executing agencies and regional stakeholders from the private sector, NGOs and international agencies. The purpose of the regional consultation was to engage stakeholders and seek guidance on the Regional Technical Assistance (RETA project) implementation.

The main purpose of the RETA project is to enhance the poverty reduction potential and performance of community and industrial forestry in the Mekong region. The RETA project is also assessing the likely impact of changes in forest products trade and of investment patterns on the poverty reduction potential of forestry. The RETA project mainly covers three countries: Cambodia, Lao PDR and Viet Nam. Current implementation partners include CIFOR, FAO, ADB and the three countries.

The main finding of the RETA workshop was that poverty and forestry are strongly linked geographically, with much of the poverty centered in the more remote and mountainous areas within the region where a high proportion of the remaining forest resources also exist. There is, therefore, a strong expectation that investment in the forestry sector could have a significant impact on poverty alleviation, although solid data and information from within the region to support this view are lacking.

The workshop compiled the following guidelines for the implementation of the RETA project:

- Experiences from both community and industrial forest management have shown that the establishment of clear property rights is essential to good forest management. Therefore, it was suggested that steps be taken to ensure that the poorest stakeholders receive a relatively larger share of the resource allocation.
- It was agreed that the RETA project should review the potential markets for non-timber forest products (NTFPs), since improving access to, and efficient production of, a wide range of NTFPs will be important for poverty reduction.
- It was recommended that the RETA project investigate the market chain and identify means for removing distortions that deprive the primary producers in the region of potential income, both for NTFPs and timber products.
- It was noted that the establishment and management of industrial plantations has potential for poverty alleviation, both directly through employment and indirectly through enabling the expansion of small and medium enterprises (SMEs) and large enterprises for processing a wide range of products. The expansion of industrial plantations is also crucial for reducing illegal logging.
- Efforts to restrict the harvesting of natural forests when there are not sufficient plantations to meet the growing demand, contribute to illegal logging. The impact of illegal logging on poverty, however, is still unknown.

Hence, it was suggested that the RETA project also investigate the impact of illegal logging on poverty in order to make recommendations to the governments in the region on ways to tackle the problem.

- It was agreed that the RETA project should also investigate the effectiveness of existing institutional arrangements in the project countries, including the role of NGOs, in supporting poverty reduction measures and then make appropriate recommendations for human resource development and institutional capacity building.

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RUST NEVER SLEEPS

A workshop on Development of an Asia-Pacific regional strategy for Eucalyptus rust was convened in Bangkok, Thailand, 19-21 October 2004. The workshop was arranged as an Asia-Pacific Forest Invasive Species Network (APFISN) activity, with support from the Australian Centre for International Agricultural Research (ACIAR), the Asia-Pacific Forestry Commission (APFC) and the Food and Agriculture Organization of the United Nations (FAO).

The objectives of the workshop were:

- to raise awareness of the process of biodiversity planning and the need and utility of developing a regional approach to forest pests through the APFISN; and
- to raise awareness of the threat of Eucalyptus rust to the region and share information on developing appropriate preparedness and response capacity in the region and individual countries and begin a strategy to develop both.

There has been no confirmed report of Eucalyptus rust (*Puccinia psidii*) in Asia and the Pacific; however, the disease has shown a capacity to spread throughout South and Central America. Key recommendations from the workshop included the following:

- countries should carry out basic risk assessments to identify potential hosts of *P. psidii*;
- countries should raise awareness of Eucalyptus rust among quarantine services and the forestry sector;
- in the long term, efforts should be directed towards breeding rust-resistant genotypes and species;
- small-scale surveys scanning for any visible evidence of Eucalyptus rust could be implemented by countries; and
- forest health surveillance training and diagnostic training should be targeted as two generic capacity building areas, not only for Eucalyptus rust, but all forest pests.

Whether man is disposed to yield to nature or to oppose her, he cannot do without a correct understanding of her language.

-- Blaise Pascal --

MONGOLIA: MAKING MORE STAKEHOLDER INVOLVEMENT IN FORESTRY A REALITY

During 2004, FAO and the National Forest Programme Facility supported activities that will contribute to making Mongolia's forestry sector more accessible to a variety of stakeholders. While a Technical Cooperation Project assists in the development of participatory forest management (PFM), the Facility provides funds to enable a bottom-up approach to institutional improvements. Recognizing the importance of awareness raising and capacity building, initial activities have centered on training and spreading the news through various channels.

The objective of the TCP is to help create an enabling environment for the active participation of stakeholders, specifically the rural population, in forest management to improve their livelihoods through sustainable forest utilization. To achieve the above, the Government of Mongolia has requested assistance in participatory forestry, forest mapping, forest legislation and a public awareness campaign.

PFM will be introduced in three phases. During the start-up phase, awareness raising activities and consultations will be conducted to clarify the objective of PFM. At the end of this phase, forest user groups (FUG) will sign a preliminary forest management agreement. During the preliminary phase, which will last for about three years, FUGs will take over management activities, and strengthen their managerial, technical and financial capacities. The third and last phase will provide FUGs with comprehensive ownership (for 60 years with the right to renew) and utilization rights.

The Participatory Forestry Working Group (PFWG) views a step-wise approach as most appropriate for gradually transferring rights and responsibilities. It allows time for confidence building among the main partners, i.e. the forest administration, the local governments and the FUGs. Since January 2004, a draft of the participatory forestry concept (PFC) has been prepared with the support of the PFWG. Thirty people were trained in participatory approaches and two persons attended a four-month training course in remote sensing. A study on the legal framework has been completed and the remote sensing equipment has been delivered to the Nature, Forest and Water Resources Agency.

During 2003–2004, the financial support provided by National Forest Programme Facility has been earmarked to assist with a bottom-up approach to institutional improvements such as a nation-wide national forest programme seminar, a study tour in China to review afforestation efforts to combat desertification, and training of a Ministry of Nature and Environment officer in community-based natural resources management. Furthermore, three officers were trained in decentralized forest planning and governance and institutions, and a training seminar was organized for community group leaders.

The power of the media is recognized and news-paper articles and radio and TV spots are an integral part of efforts to disseminate information on improving institutions in Mongolia. In addition, reports of the various workshops have been prepared and distributed widely.

The second phase (2004–2005) will build on previous achievements. It also has been agreed that the support provided by the Facility should lead to the formulation of a forest policy during the third phase. The activities will include: i) a review of afforestation and desertification control strategies; ii) a training needs assessment; iii) the development of a monitoring and assessment system for forestry activities at Aimag level; and iv) a study tour for high-level policy makers to the Philippines to develop a better understanding of the potential of participatory forestry for Mongolia. It is expected to complete these activities by April 2005. Recommendations developed during the second phase are to form the basis for the formulation of the new forest policy that will make wider stakeholder involvement in forestry in Mongolia a reality.

SECOND ROUND TABLE MEETING ON THE REGIONAL ALLIANCE AGAINST HUNGER: NETWORKING OF NETWORKS

On the occasion of the World Food Day 2004, representatives of the regional technical commissions, bodies and networks from the Asia-Pacific region sponsored by or collaborating with FAO (including the Asia-Pacific Forestry Commission, Asia Pacific Association of Forestry Research Institutions, and Asia-Pacific Forest Invasive Species Network) participated in the second round table discussion on a Regional Alliance Against Hunger (RAAH). The theme of the round table meeting, which was held 18-19 October, in Bangkok, was *networking of networks*.

The meeting noted with concern that despite significant economic development and growth in food and agricultural production, poverty and food insecurity still remained a serious problem in the region. Successes of the Green Revolution also brought challenges of environmental sustainability. Loss of biodiversity is a major problem along with land degradation, depletion of rangeland, growing scarcity of water, declining forest cover, over-exploitation of fishery resources, overuse of pesticides and deterioration of the ecosystem. Addressing these issues in totality requires a holistic view integrating inter-disciplinary contributions focusing on different dimensions within a broader framework emphasizing growth, equity and sustainability as the core components of a strategy for agricultural development.

Participants noted that although the problems are inter-related, they were being addressed in a fragmented manner both nationally and regionally. There is considerable synergy in activities being carried out by different parties which remains largely unexploited under the generally piece-meal approach. Lessons from this experience point to the possibility that networking of networks can help address this issue at the regional level and contribute to the promotion of this approach at the country level. However, the networking should be based on clear identification of the value added from such efforts and focus on a common theme. The meeting strongly supported the idea of building a regional alliance of networks through networking and committed to actively participate in the related follow up activities.

Several possible areas of inter-disciplinary collaboration were suggested:

- conservation of critical fishery habitats, such as wetlands, coral reefs and mangroves for biodiversity;
- combatting threats from alien invasive species;
- development of methodologies for assessing risks of biodiversity depletion;
- formulation of policies for biodiversity conservation based on assessment of the incidence of costs and benefits to different stakeholders;
- empowerment of women and consideration of gender issues in natural resource management;
- trade facilitation, especially capacity building in WTO compliance, harmonization and upgrading of quality standards and safety of products;
- information sharing; and
- sharing of statistical database.

The meeting participants presented various ideas with respect to the objectives and functions of the network of networks including:

- sharing of information on activities of different networks and experiences from the network's activities;
- sharing of results of studies and assessments on globalization, emerging trends and traditional knowledge;
- establishing an information clearing-house; and
- providing a forum for regular meetings and reporting.

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

RAMPANT ILLEGAL TIMBER HARVESTING ALLEGED IN EASTERN PAKISTAN

Large-scale illegal felling of live trees has been reported in Pakistan's eastern Punjab province. According to a citizen watch-dog group, more than 75,000 live trees, valued at 2 billion rupees (US$33 million), have been cut in the past year and a half, in violation of a provincial ban on the harvest of live trees. Powerful "timber mafia" working in connivance with corrupt officials are being accused of the illegal harvests.
– The News (Pakistan) –

INDONESIA RELAXES STANCE ON MINING IN PROTECTED FORESTS

Faced with staggering government revenue and foreign exchange shortages, Indonesia has recently passed legislation allowing 13 mining firms to resume open pit operations in protected forests. The move, which has been widely criticized by environmental groups, has subsequently been tempered by a new decree from the Ministry of Forestry requiring mining firms to mitigate the adverse impacts of their operations.
– The Jakarta Post –

BHUTAN TO ESTABLISH FORESTRY STUDIES INSTITUTE

A US$1.5 million grant from the MacArthur Foundation will help support the establishment of the Ugyen Wangchuck Institute of Forestry and Environmental Studies, in Bumthang, Bhutan, to train forest guards, technicians and professionals. The new institute will absorb and expand the training functions currently provided by the Bhutan Forestry Institute in Taba, which will be closed over a two-year transition period.
– Kuensel Online –

STORA ENSO SELLS STAKE IN INDONESIAN PLANTATIONS

The Finland-based paper company Stora Enso Oyj recently divested its majority shareholding in PT Finnantara Intiga in West Kalimantan, Indonesia, to Global Forest Ltd. The company had developed about 35,000 hectares of plantations within a concession area of nearly 300,000 hectares.
– The Jakarta Post –

SUBSIDIZED COOKING GAS TO CURTAIL WOODFUEL USE

The state Government of Madhya Pradesh, in India, plans to provide 17,000 families living in 925 villages close to forest areas with subsidized cooking gas in an attempt to curb the use of woodfuels for cooking.
– Indo-Asian News Service –

INDONESIA BANS THE EXPORT OF SAWN TIMBER

In an effort to stamp out the burgeoning illegal trade of forest products, the Indonesian Ministry of Forestry has issued a joint decree with the Ministry of Trade and Industry banning the export of sawn timber.
– Jakarta Post –

JAPAN CONSIDERS NEW ENVIRONMENT TAX

The Japanese Ministry of Agriculture, Forestry and Fisheries is proposing a new environmental tax to promote measures to prevent global warming. The tax revenue would be used for forest protection, in a bid to contribute to Japan's commitments under the Kyoto Protocol.
– ITTO Tropical Timber Market Report –

NEW RAP FORESTRY PUBLICATIONS

WHAT DOES IT TAKE? THE ROLE OF INCENTIVES IN FOREST PLANTATION DEVELOPMENT IN ASIA AND THE PACIFIC

RAP Publication 2004/27

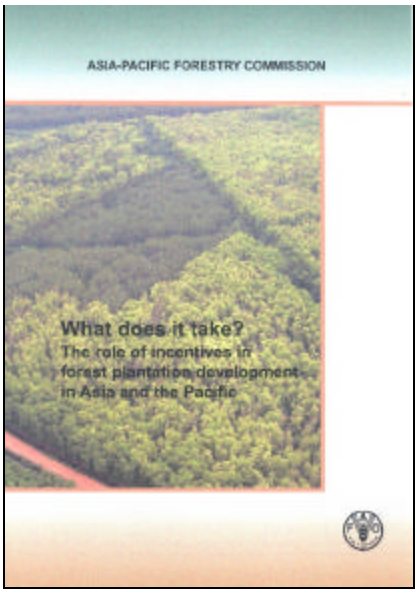
EXECUTIVE SUMMARY

RAP Publication 2004/28

Historically, public-sector agencies have dominated forest plantation development in most countries in Asia and the Pacific. In the more recent past and for a variety of reasons, it has been widely accepted that private small- and large-scale producers offer considerable comparative advantages over government departments when it comes to growing trees and producing industrial wood in plantations. Consequently, there is a growing interest in involving the private sector directly in the development of forest plantations, and governments and their respective forestry agencies are increasingly asking what it takes to encourage non-government entities to grow trees and whether one incentive is more effective than another one.

Little is known about the role that incentives have played in the past and can play in the future in plantation development. To address this knowledge gap, the Asia–Pacific Forestry Commission (APFC) conducted a regional study to assess the impact of incentives on tree growing. The findings of the study *What does it take? Incentives and their impact on plantation development* clearly indicate that the role that incentives can play in plantation development depends on numerous issues.

There are considerable differences among the nine countries that were part of the regional study. What works in one country does not necessarily achieve the same outcome in another country, even if situations appear to be similar. Notwithstanding the diversity and the different paths taken to expanding plantation areas, a common theme emerges: clear, consistent and stable policies and a favourable investment climate are essential ingredients to promote the development of forest plantations by small- and large-scale producers.



Those readers expecting clear guidance may be disappointed. A blueprint for stimulating investors to put their money and/or labour into trees does not exist. However, the picture that does surface is sufficiently coherent to outline some guiding principles that will contribute to achieving a viable forest plantation sector. The principles should help policy-makers and foresters to better understand the key issues, challenges and opportunities concerning the involvement of the private sector in forest plantation development. Another key message is that if you want to be effective you need to be choosy. Being selective can save a lot of money, which continues to be a scarce resource.

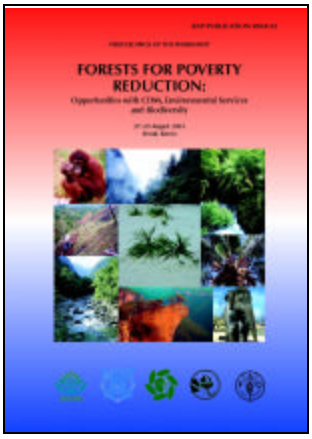
DOCUMENT CD FOR THE 20TH SESSION OF THE ASIA-PACIFIC FORESTRY COMMISSION

Created in 1949, the Asia-Pacific Forestry Commission (APFC) is one of six FAO Regional Forestry Commissions that cover the world's major geographic regions. The APFC, a forum for advising and taking action on key forestry issues, focuses on aspects pertinent to Asia-Pacific, a region characterized by its diversity and rapid changes. Its activities are also shaped by shifts in international forestry paradigms, priorities and practices. The APFC meets every two years in general session to review progress, discuss problems of mutual concern and set new agendas.

At the invitation of the Government of Fiji, the twentieth session of the Asia-Pacific Forestry Commission was held in Nadi, Fiji, 19-23 April 2004. Representatives from 29 member countries, along with observers and representatives from 7 international organizations and 5 international non-governmental organizations, considered possible actions to deal with critical issues facing the forestry sector in the region. This CD-ROM contains the final report of the session, as well as presentations and documents prepared for the session.

PROCEEDINGS OF THE WORKSHOP "FORESTS FOR POVERTY REDUCTION: OPPORTUNITIES WITH CDM, ENVIRONMENTAL SERVICES AND BIODIVERSITY"

RAP Publication 2004/22



This volume, the second in the series on "Forests for Poverty Reduction," looks into the potential of the clean development mechanism (CDM), environmental services and biodiversity to improve the welfare of rural communities. Besides covering the traditional work, the proceedings touch on several related topics such as corruption, education, governance, policies and tenure needed to strengthen the development efforts. The varieties of mechanisms that can be used to capture additional wealth for the rural community are dealt with in great detail. Within the framework of ecological services, the discussions touch on market-based instruments for watershed protection, environmental services for the upland poor, urban-rural partnerships for providing drinking water, and ploughing back the revenue earned from hydropower generation to rural communities. The potential for forestry to tap CDM receives further attention, and likewise that of the highly intractable issue of biodiversity as a source of income for the rural communities.

FAO ASIA-PACIFIC FORESTRY CALENDAR

31 January – 4 February 2005. Lao PDR. ***Regional Project Advisory Committee Meeting and Tri-Partite Review Meeting for the Enhancing Sustainable Forest Harvesting in Asia Project.*** Contact: P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org

22-25 February 2005. ***Coconut Beetle Workshop.*** Contact: P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org

28 February – 5 March 2005. Colombo, Sri Lanka. ***17th Commonwealth Forestry Conference: Forestry's contribution for poverty reduction***. Contact: The Conference Organizer, 17th Commonwealth Forestry Conference, 315 Vauxhall Street, Colombo 2, Sri Lanka; E-mail: atc@aitkenspence.lk; Fax: +94 11 2331816.

14-18 March 2005. Rome, Italy. ***17th Session of the Committee on Forestry and Ministerial Meeting.*** Contact: Doug Kneeland, Programme Coordinator, Programme Coordination Unit, FAO Headquarters, Viale delle Terme di Caracalla, 00100 Rome, Italy; E-mail: Douglas.Kneeland@fao.org

May 2005 (tentative). Bangkok. ***APFC Executive Committee Meeting***. Contact: P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org

26-28 July 2005. Kota Kinabalu, Sabah, Malaysia. ***Symposium on Tropical Rainforest Rehabilitation & Restoration – Existing Knowledge and Future Directions.*** Co-organized by: FAO RAP, World Wide Fund for Nature (WWF), Yayasan Sabah and the Sabah Forestry Department. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org

8-13 August 2005. Brisbane, Australia. ***XXII IUFRO World Congress***. Contact: The Congress Manager, PO Box 104, RBH Post Office QLD 4029, Australia; Tel: +61(0) 7 3854 1611; Fax: +61(0) 7 3854 1507; E-mail: iufro2005@ozaccom.com.au

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- APANews