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Featuring

FOREST NEWS

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Contents

TIGERPAPER

Biodiversity Richness and Rare and Endangered Species in Deh Akro-II Wildlife Sanctuary, Sindh-Pakistan.....	1
Population Status and Distribution of Lesser Adjutant (<i>Leptoptilos javanicus</i>) in Far-Western Lowland Nepal... 9	9
Conserving a Compact Evergreen Elephant Habitat in Kalakad-Mundanthurai Tiger Reserve, Southern India.....	12
<i>Martes flavigula</i> : In Search of Conservation.....	20
Giant Squirrel (<i>Ratufa indica</i>) in Similipal Tiger Reserve.....	24
Study on the Status and Various Uses of Invasive Alien Plant Species in and around Satchari National Park, Sylhet, Bangladesh.....	28

FOREST NEWS

Capturing Opportunities for the Poor in Forest Harvesting and Wood Processing.....	1
Rehabilitation of Coastal Forests After the Tsunami.....	6
FAO Forestry Staff Movement.....	7
Experts Jump Start Asia-Pacific Forestry Outlook Study.....	8
Are Forest Governance and Decentralization Heading in the Right Direction?.....	9
Asia-Pacific Forestry Chips and Clips.....	10
New Forestry Publications.....	14
Committee on Forestry - COFO 2007.....	15
FAO Asia-Pacific Forestry Calendar.....	16



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Cover: Black-shouldered kite (*Elanus caeruleus*) feeding behavior
Photo: Hussain Bux Bhaagat

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Marbled teal (Marmaronetta angustirostris) – globally threatened duck species now breeding in Sindh (Pakistan) during summer. (Photo: Hussain Bux Bhaagat)

BIODIVERSITY RICHNESS AND RARE AND ENDANGERED SPECIES IN DEH AKRO-II WILDLIFE SANCTUARY (NAWABSHAH) SINDH-PAKISTAN

by Hussain Bux Bhaagat

Introduction

Deh Akro-II Wildlife Sanctuary is located in the tropical thorn forest sand dune-type vegetation zone in Nawab Shah administrative district of Sindh Province. The Sanctuary is 46 km northeast of Nawab Shah city and 330 km from the provincial headquarters of Karachi. This area of mixed desert and wetland habitat was declared a wildlife sanctuary in 1988, under Section 14 of the Sindh Wildlife Protection Ordinance-1972, and is provided full legal cover under this ordinance. It supports a diverse flora and fauna in the mainly desert and wetland habitats. Many rare and endangered wildlife species also breed in this area.

Deh Akro-II Wildlife Sanctuary is considered to be internationally important because it represents an example of a natural inland ecosystem comprising a complex of 32 wetlands and unique desert habitats, which support a large variety of fauna and flora species. The Sanctuary area (approximately 20,500 ha) is typical stable sand desert, stabilized by desert vegetation and well developed dune formations with elevations of 5-10 m in an east-west orientation. There are also flat-bottomed valleys between the dunes, which contain perennial lakes. These lakes are formed from the seepage from Nara Canal, a mini-river flowing along the southeastern boundary line, the Jamrau Canal and rainwater.

The soil texture of the area is of two types: 1) sandy in the desert; and 2) sandy clay-mixed soil in the low-lying areas. Salinity and water logging are common problems in the area. The area is devoid of any perennial surface fresh water resources and the main water sources are surface water lakes. These lakes cover an area of 5,000 ha and are formed, one after the other, in valleys between the dunes. The size, shape, water quality and depth differ among the lakes. The largest lake is about 750 ha. Out of 32 lakes, 5 are fresh water and the rest are brackish. Another surface water source is the irrigation water system of Jamrau Canal, which emerges from Nara Canal in the southeast of the sanctuary. The depth of the sanctuary lakes ranges from 4-5 m to 15 m, while the ground water table depends on the location and elevation of the extracting source. However, generally the fresh water aquifer depth is 15-20 m.

Summers in the area are very hot and humid, with mean temperatures of 48-52°C from May to August. Winters are short, dry and mild with temperatures dropping to 14°C in January. The mean rainfall ranges from 80-135 mm with most falling during the monsoon (mid-July-August). Winter rains fall from December to March and are of low intensity. There has been a prevailing drought in the area for the past 8-10 years causing a severe water shortage. The water levels in the lakes have decreased by up to 25-30% and the water quality has deteriorated.

Habitat

Four major habitat types are recognized in the sanctuary as given below.

Desert habitat

Sand dunes are the characteristic feature of this habitat. Well-developed herbs/shrubs including *Calligonum polygonoides*, *Aerva javanica* and trees such as *Tamarix aphylla*, *Prosopis cineraria*, *Salvadora oleoides* and *Capparis decidua* manifest the permanent landscape over the dunes and inter-dunal gaps in this area. *Farsetia hamiltonii*, *Limeton indicum*, *Tribulus longipetalus*, *Cynodon dactylon* and *Stipagrostis plumose* are common herbs. Due to long dry spells in the area, the herbaceous communities and

ephemeral species have not been emerging every year. Such species respond quickly to rainfall and emerge with the first shower, grow fast, produce seeds and complete their lifecycles in a span of 7-8 weeks. The seeds remain dormant throughout the dry period. Other plant species found in the sanctuary include *Prosopis cineraria*, *Prosopis juliflora*, *Acacia jacquemontii*, *Acacia nilotica*, *Aerva javanica*, *Salvadora oleoides*, *Capparis decidua*, *Cassia* sp, *Calligonum polygonoides*, *Euphorbia prostrata*, *Saccharum spontaneum*, *Saccharum bengalensis*, *Tamarix aphylla*, *Zizyphus mauritiana*, *Zizyphus nummularia*, *Alhagi maurorum*, *Indigofera* sp., *Phyla nodiflora*, *Typha domingensis*, *Typha elephantina*, *Achyranthes aspera*, *Calotropis procera*, and *Tamarix indica*.

Wetland habitat

Deh Akro-II is a complex of 32 lakes of different sizes, shapes and depths. Basically, these wetlands are formed by the seepages from Jamrau and Nara canals, flowing along the southeast boundary of the sanctuary. Reed vegetation and *Tamarix* spp can be observed at the margins of these lakes. The lakes support a good population of waterfowl, marsh crocodiles, otters and fishes. About 1% of the global population of the threatened Marbled teal breeds in these lakes in May to July. The water levels of these lakes increase and decrease due to the fluctuations in the water levels of Jamrau and Nara canals. Low rainfall has a significant impact on these wetlands. Some of the wetland flora species are *Farsetia hamiltonii*, *Limeton indicum*, *Tribulus longipetalus*, *Cynodon dactylon* and *Stipagrostis plumose*.

Agriculture habitat

This habitat comprises patches of irrigated agriculture fields lying adjacent (southeast) to the desert habitat. It houses a good population of Black and Grey partridges, reptiles and small mammals. Some of the common birds also perch in these fields. The use of pesticides and clearing of lands for agriculture practices are threats to the wildlife in this area. Plant species include: *Achyranthes aspera*, *Alhagi maurorum*,

Amaranthus viridis, *Aristida adscensionis*, *Brachiaria eruciformis*, and *Celosia argentea*.

Marshy habitat

This habitat is concentrated along the length of the Nara and Jamrau canals and is formed as a result of the seepage from these canals. The most common reed vegetation species are *Saccharum* spp., *Pluchea lanceolata*, *Prosopis cineraria* and *Limeton indicum*. This habitat also supports hog deer, crocodiles, Indian monitor lizard, jungle cats and a large variety of birds. Clearing and burning of vegetation in the marshy area are the main threats to this habitat. Some of the marshy habitat species are: *Aehuropus lagopoides*, *Alhagi maurorum*, *Bacopa monniera*, *Boerhavia procumbense*, *Caparis decidua* and *Cenchrus ciliaris*.

Noteworthy fauna

Important wildlife species in the sanctuary area can be classified as follows:

Rare: Desert cat (*Felis lybica*), Fishing cat (*Felis viverrina*), Darter or Snake bird (*Anhinga melanogaster pennant*), Garganey (*Anas querquedula*), Spoonbill (*Platalea leucorodia*), Black ibis (*Pseudibis papillosa*).

Endangered: Hog deer (*Axis porcinus*), Marsh crocodile (*Crocodylus palustris*), Houbara bustard (*Chlamydotis undulata*), Marbled teal (*Marmaronetta angustirostris*), White-eyed pochard (*Anthya nyroca*).

Abundant: Grey partridge (*Francolinus pondicerianus*), Black partridge (*Francolinus francolinus*), Mallard (*Anas platyrhynchos*), Pintail (*Anas acuta*), Gadwall (*Anas strepera*), Common coot (*Fulica atra*), Indian moorhen (*Gallinula chloropus*), Black-winged stilt (*Himantopus himantopus*), Shoveler (*Anas clypeata*), Little egret (*Egretta garzetta*), Intermediate egret (*Egretta intermedia*), Indian pond heron (*Ardeola grayii*), Grey heron (*Ardea cinera*), Redshank (*Tringa totanus*), Indian roller (*Coracias benghalensis*), Glossy ibis (*Plegadis falcinellus*), Common pochard (*Aythya ferina*), Common teal (*Anas crecca*).

Marsh crocodile

Marsh (or Mugger) crocodile has been declared an endangered species under Sindh Wildlife Protection Ordinance-1972 and is also included in IUCN's **Red Data Book**. Previously, Muggers and Gavials inhabited Nara canal (Old Hakra river) and its tributaries, but after the emerging of these wetlands through seepage from Nara canal during the early 1950s, crocodiles have taken refuge in these lakes and are now breeding successfully. Gaviel is now extant from Nara canal and from the wild in Pakistan since 1976. Nara canal has a crocodile population of about 200-250, while the estimated population of crocodiles in the wetland complex of Deh Akro-II Wildlife Sanctuary is believed to be between 550-600 animals. These crocodiles permanently inhabit these lakes year round. April-May is the nesting season and one female will lay a clutch of 30-40 eggs at one time and bury them in a 1x1.5 ft wide and 1.5-2 ft deep nest dug outside the water along the bank side of the wetland. After laying the eggs, the female continuously guards the nest for the next 55-65 days and when the hatchlings emerge, the mother immediately escorts them to the water and keeps them along the lake side in shallow water for a few weeks. During this period, the mother protects her babies from natural predators – particularly male crocodiles. But when hatchlings become 4-6 weeks old, they independently swim and feed in the lake water; however, 90-95% of the young ones fall prey to predators such as male crocodiles. In the wild, it is believed that only 4-5% of crocodile hatchlings survive and attain maturity.

Marbled teal

The Marbled teal is a globally threatened duck species that also visits and breeds in the sanctuary area. This oriental species is found in Southeast Asia from Pakistan to Indonesia, West Borneo, South China and South India. This bird is a passer migrant and a summer visitor to the Sindh wetlands. It migrates to Pakistan from south India, Iran and Afghanistan from February to August. After breeding, they migrate back to their habitats during August and September. Marbled teals were previously breeding only on Zangi Nawar and Khushdal Khan lakes of Baloachistan, but after

these places dried up during the late 1980s, the birds began to inhabit the wetlands of Sindh – mainly the Deh Akro-II wetlands. During 1990, the birds were seen at Deh Akro-II in breeding plumage. According to a recent ecological survey in 2004, about 50 pairs of Marbled teal were found breeding in the Akro-II wetlands.

Fish

Deh Akro-II also supports many indigenous fish species, such as Dambhro/Rahu (*Labeo rohita*), Thalia (*Catla catla*), Morakha (*Cirrhinus mrigala*), Singhara (*Mystus seenghala*), Malli/Jerki (*Wallago attu*), Gandan (*Notopterus notopterus*) and Dimmon (*Ompok bimaculatus*). Commercial fishing is banned by law in wildlife sanctuaries, but local communities do catch fish for themselves as a food source.

Threats

Major threats to the ecological character of the area are as follows:

- water scarcity due to long dry spells;
- Left Bank Outfall Drain (LBOD) of the National Drainage Programme of the Government of Pakistan;
- land grant policy of the Government of Sindh;
- hunting, fishing, grazing and fuelwood collection;
- agricultural practices and use of pesticides and agro-chemicals
- increase in human settlement and encroachment over sanctuary lands; and
- oil and gas exploration activities.

Conservation initiatives of Sindh Wildlife Department

1. Declared Deh Akro-II a Wildlife Sanctuary under Section-14 of the Sindh Wildlife Protection Ordinance-1972 in 1988.
2. Deh Akro-II declared a “Ramsar site” by

the Ramsar Bureau, Switzerland, in November 2002.

3. Boundary demarcation of the wildlife sanctuary in the year 2002.
4. Ban on commercial fishing in the wildlife sanctuary to ensure that the feeding requirements of the crocodile population are met.
5. Minimizing hunting and fishing practices in the wildlife sanctuary through enforcement of Sindh Wildlife Protection Ordinance-1972.
6. On-going annual development programme 2003-04 to 2005-06 includes development of the infrastructure (e.g. vehicular tracks, checkpoints, watching canopies), wildlife surveys, development of information material and establishment of an information center, purchase of necessary equipment and machinery, development of eco-tourism activities and preparation of signboards having information about the area, etc.
7. Annual waterfowl and crocodile surveys.
8. Coordination among line/sister departments for better management.
9. Convincing the Revenue Department to exclude the sanctuary area from the land grant schedule of the Government of Sindh.
10. Environmental Impact Assessment (EIA) surveys prior to oil and gas exploration initiatives.
11. Interaction with local communities and formation of CBO.
12. Education and awareness of local communities regarding the protection and conservation of natural resources of the area.

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White pelican (*Pelecanus onocrotalus*) – visitor to the wetlands of Sindh (Pakistan) (Photo: Hussain Bux Bhaagat)

Table 1 – List of Mammals in the Deh Akro-II Wildlife Sanctuary

Common Name	Scientific Name
Hog deer	<i>Axis porcinus</i>
Asiatic jackal	<i>Canis aureus</i>
Desert cat	<i>Felis silvestris ornata</i>
Desert fox	<i>Vulpes vulpes pusilla</i>
Fishing cat	<i>Prionailurus viverrinus</i>
Indian crested porcupine	<i>Hystrix indica</i>
Indian hare/Desert hare	<i>Lepus nigricollis</i>
Small Indian mongoose	<i>Herpestes auropunctata</i>
Indian wild boar	<i>Sus scrofa</i>
Jungle cat	<i>Felis chaus</i>
Long-eared hedgehog	<i>Hemiechinus auritus</i>
Five-striped palm squirrel	<i>Funambulus pennanti</i>
Indian desert gerbil	<i>Meriones hurricane</i>
Indian gerbil	<i>Tetra indica</i>
House mouse	<i>Mus musculus</i>
Short-tailed mole rat	<i>Nesokia indica</i>

Table 2 – List of Reptiles in the Deh Akro-II Wildlife Sanctuary

Common Name	Scientific Name
Marsh (Mugger) crocodile	<i>Crocodylus palustris</i>
Indian desert monitor	<i>Varanus griseus koniecznyi</i>
Indian monitor	<i>Varanus bengalensis</i>
Brown-roofed turtle	<i>Kachuga smithii</i>
Spotted pond turtle	<i>Geoclemys hamiltonii</i>
Indian fringe-toed sand lizard	<i>Acanthodactylus cantoris cantoris</i>
Brilliant agama	<i>Agama agilis</i>
Indian spiny-tailed lizard	<i>Uromastyx hardwickii</i>
Sindh sand gecko	<i>Crossobamon orientalis</i>
Indian sand swimmer	<i>Ophiomorus tridactylus</i>
Cobra	<i>Naja naja</i>
Saw-scaled viper	<i>Echis carinatus</i>
Indian sand boa	<i>Eryx johnii</i>

Table 3 – List of Birds in the Deh Akro-II Wildlife Sanctuary

Common Name	Scientific Name
Avocet	<i>Recurvirostra avosetta</i>
Black partridge	<i>Francolinus francolinus</i>
Bank myna	<i>Acridotheres ginginianus</i>
Bay-backed shrike	<i>Lanius vittatus</i>
Black drongo/King crow	<i>Dicrurus macrocercus</i>
Black-crowned finch lark	<i>Eremopterix nigriceps</i>
Black ibis	<i>Plegadis falcinellus</i>
Black-shouldered kite	<i>Elanus caeruleus/E. leucurus</i>
Black-winged stilt	<i>Himantopus himantopus</i>
Blue-checked bee-eater	<i>Merops supercilliosus</i>
Blue rock pigeon	<i>Columba livia</i>
Brahminy kite	<i>Haliastur Indus</i>
Kentish plover	<i>Charadrius alexandrinus</i>
Cattle egret	<i>Bubulcus ibis</i>
Chestnut-shouldered rock sparrow	<i>Petronia xanthocollis</i>
Collared dove	<i>Streptopelia decaocto</i>
Common babbler	<i>Turdoides caudatus</i>
Common crane	<i>Grus grus</i>
Common kestrel/Eurasian kestrel	<i>Falco tinnunculus</i>
Common myna	<i>Acridotheres tristis</i>
Common ringed plover	<i>Charadrius hiaticula</i>
Common sandpiper	<i>Actitis hypoleucos</i>
Common snipe	<i>Gallinago gallinago</i>
Rose-coloured starling	<i>Sturnus roseus</i>
Common teal	<i>Anas crecca</i>
Common coot	<i>Fulica atra</i>
Crested lark	<i>Galerida cristata</i>
Crow pheasant	<i>Centropus sinensis</i>
Curlew	<i>Numenius arquata</i>

Darter or Snake Bird	<i>Anhinga melanogaster</i>
Desert wheatear	<i>Oenanthe deserti</i>
Egyptian vulture	<i>Neophron percnopterus</i>
Gadwall	<i>Anas strepera</i>
Garganey	<i>Anas querquedula</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Great black-headed gull	<i>Larus ichthyaetus</i>
Great cormorant	<i>Phalacrocorax carbo</i>
Great grey shrike	<i>Lanius excubitor</i>
Greenshank	<i>Tringa nebularia</i>
Greenish warbler	<i>Phylloscopus trochiloides</i>
Grey Heron	<i>Ardea cinerea</i>
Grey partridge	<i>Francolinus pondicerianus</i>
Grey wagtail	<i>Motacilla cinerea</i>
Hoopoe	<i>Upupa epops</i>
Houbara bustard	<i>Chlamydotis undulata</i>
House crow	<i>Corvus splendens</i>
House sparrow	<i>Passer domesticus</i>
Hume's wheatear	<i>Oenanthe alboniger</i>
Indian/Common moorhen	<i>Gallinula chloropus</i>
Indian myna/Common myna	<i>Acridotheres tristis</i>
Indian robin	<i>Saxicoloides fulicata</i>
Indian roller	<i>Coracias benghalensis</i>
Indian treepie	<i>Dendrocitta vagabunda</i>
Intermediate egret	<i>Egretta intermedia</i>
Jungle babbler	<i>Turdoides striatus</i>
Kentish/Snowy plover	<i>Charadrius alexandrinus</i>
Laggar falcon	<i>Falco jugger</i>
Large egret/Great egret	<i>Egretta alba</i>
Lesser whitethroat	<i>Sylvia curruca</i>
Little brown dove	<i>Streptopelia senegalensis</i>
Little cormorant	<i>Phalacrocorax pygmeus</i>
Little egret	<i>Egretta garzetta</i>
Little grebe	<i>Tachybaptus ruficollis</i>
Little green bee-eater	<i>Merops orientalis</i>
Little owl	<i>Athene noctua</i>
Little ringed plover	<i>Charadrius dubius</i>
Little stint	<i>Calidris minuta</i>
Little tern	<i>Sterna albifrons</i>
Long-tailed grass bush warbler	<i>Prinia burnesii</i>
Marbled teal	<i>Marmaronetta angustirostris</i>
Marsh harrier	<i>Circus aeruginosus</i>
Marsh sandpiper	<i>Tringa stagnatilis</i>
Osprey	<i>Pandion haliaetus</i>
Paddy bird/Indian pond heron	<i>Ardeola grayii</i>
Petronia/Yellow-throated sparrow	<i>Petronia xanthocollis</i>
Pied bushchat	<i>Saxicola caprata</i>
Pied kingfisher	<i>Ceryle rudis</i>
Purple heron	<i>Ardea purpurea</i>
Purple moorhen	<i>Porphyrio porphyrio</i>
Purple sunbird	<i>Nectarinia asiatica</i>

Redshank	<i>Tringa totanus</i>
Red turtle dove	<i>Streptopelia tranquebarica</i>
Red rump swallow	<i>Hirundo daurica</i>
Red-vented bulbul	<i>Pycnonotus cafer</i>
Red-wattled lapwing	<i>Hoplopterus indicus</i>
Rose-ringed parakeet	<i>Psittacula krameri</i>
Ruff	<i>Philomachus pugnax</i>
Rufus-tailed shrike	<i>Lanius isabellinus</i>
Rufus-tailed scrub robin	<i>Cercotrichas galactotes</i>
Sanderling	<i>Calidris alba</i>
Short-toed eagle	<i>Circaetus gallicus</i>
Shoveler	<i>Anas clypeata</i>
Sindh pied woodpecker	<i>Dendrocopos assimilis</i>
Small/Wandering minivet	<i>Pericrocotus cinnamomeus</i>
Stonechat	<i>Saxicola torquata</i>
Temminck's stint	<i>Calidris temminckii</i>
Terek sandpiper	<i>Xenus cinereus</i>
White/Pied wagtail	<i>Motacilla alba</i>
White-breasted waterhen	<i>Amaurornis phoenicurus</i>
White-cheeked bulbul	<i>Pycnonotus leucogenys</i>
White-eyed buzzard	<i>Butastur teesa</i>
White-tailed lapwing/White-tailed plover	<i>Vanellus leucurus /Chettusia leucura</i>
Yellow wagtail	<i>Motacilla flava</i>



Sindh ibex (*Capra aegagrus*) in Khirthar National Park, Sindh, Pakistan (Photo: Hussain Bux Bhaagat)

POPULATION STATUS AND DISTRIBUTION OF LESSER ADJUTANT (*Leptoptilos javanicus*) IN FAR-WESTERN LOWLAND NEPAL

by Suman Sharma

Introduction

The Lesser Adjutant *Leptoptilos javanicus* ranges from India, south through Myanmar and Thailand to Laos, Cambodia, Vietnam and Peninsular Malaysia to the Greater Sundas, including Sumatra, Kalimantan, Java and Bali (Indonesia), Sabah and Sarawak (Malaysia) and Brunei. There are unconfirmed records from Bhutan, and it occurs as a vagrant east of Bali in the Lesser Sunda Islands (Nusa Tenggara), Indonesia (Birdlife International, 2001).

Nepal has many different types of wetlands that range from areas of permanently flowing rivers to seasonal streams, lowland oxbow lakes, high altitude glacial lakes, swamp and marshes, paddy fields, reservoir and ponds (Scott, 1989). These areas are rich in biodiversity and known to regularly support more than 20,000 waterfowl during December-February (IUCN, 2004). Out of 861 bird species of Nepal, 193 species are dependent on wetlands. And out of these, 180 species are dependent on the wetlands of Terai (IUCN, 2004).

The Lesser adjutant (*Leptoptilos javanicus*) is a wetland-dependent bird that is listed in IUCN's **Red Data Book**. There are a number of other wetland birds in Nepal that are also globally threatened. The Lesser adjutant and Greater adjutant (*Leptoptilos dubius*) are listed as globally threatened species (Birdlife International, 2001) among the 8 species of storks found in Nepal (Grimmett *et al.*, 2000).

The Lesser adjutant was once found throughout the southern part of Nepal but, due to habitat loss and alteration and human disturbances, this species is now mainly restricted to some isolated pockets of lowland Nepal (Birdlife International, 2001). It is mostly recorded in Koshi Tappu Wildlife

Reserve and its surrounding areas, Royal Chitwan National Park and its surroundings areas, Beeshazari Lake, Kapilvastu, Nawalparasi, Rupandehi districts, Royal Bardia National Park, Ghodaghodi Lake and Royal Suklaphata Wildlife Reserve and its surrounding areas.

At the present time there is concern about the species both internationally and in Nepal, as there is evidence that its numbers are declining. Some studies have been carried out in Koshi Tappu Wildlife Reserve (Fleming *et al.*, 1984; Pokharel, 1998; Baral, 2004), Royal Chitwan National Park (Gyawali 2003a&b; Hungden and Clarkson, 2003; Tamang, 2003; Choudhary, 2004) Royal Bardia National Park and Suklaphata Wildlife Reserve (Schaaf, 1978), but this is the first systematic study carried out in western Nepal to determine its population status and distribution. Studying the current population status and distribution of Lesser Adjutant would be helpful in developing management plans to conserve this threatened species in its natural habitat. The Oriental Bird Club (OBC), UK, gave assistance to conserve this species through three small grants to study the Lesser adjutant in eastern (Baral, 2004), central (Gyawali, 2003) and far western Nepal. This paper presents part of findings of studies by Sharma (2004) in the far-western lowlands of Nepal.

Population

Most of the areas in the districts where Lesser adjutant is thought to be found were visited. Since the study was conducted in the dry season, no nesting sites were found except for two deserted nests in Jhilmila area of Royal Suklaphata Wildlife Reserve. No Lesser adjutants were recorded in paddy fields,

pasturelands or other agricultural lands. Twenty-one Lesser adjutants were counted in the study area – 14 in Kanchanpur District (Royal Suklaphata Wildlife Reserve), 5 in the Bardia district (Royal Bardia National Park), and 2 in Kailali district (Ghodaghodi Lake). The largest flocks (i.e. 8) were counted in Baba Lake (Royal Suklaphata Wildlife Reserve). Populations were found to be greater inside the reserve than outside the reserve. This may be because the buffer zone area is subject to more disturbances by local people and grazing by domestic animals and the bird is very sensitive to disturbance. More populations were found in Royal Suklaphata Wildlife Reserve than in Royal Bardia National Park. Thus, it was concluded that Royal Suklaphata Wildlife Reserve has more wetlands and concentrated areas than Royal Bardia National Park. Another factor may be the close proximity of India's Dudwa National Park.

Estimate of total population in Nepal

A recent study carried out in eastern Nepal by Baral (2004) estimated about 231 individuals (109 young with 61 pair of adults attending the nests). Another study carried out by Gyawali (2003) in central Nepal estimated 51 individuals. Therefore, the total recent estimates of this species in eastern, central and the far-western region totals 303 individuals. According to Wetland International (2002), the estimated global population of this bird is only 5,000. So Nepal holds 6.06% of the total global population. This estimate falls within the predicted 100 to 500 (Baral, 1998 in litt. to Birdlife International) and the population indeed appears to be slowly declining.

Distribution

Lesser adjutants were found to be distributed in wetlands inside and outside protected areas. Out of the total population, 8 were found in Baba Lake (Royal Suklaphata Wildlife Reserve), 2 were found in Salgaudi Lake (Royal Suklaphata Wildlife Reserve), 2 in Kalikich Lake (Royal Suklaphata Wildlife Reserve), 2 in between 26 and 27 number pillar of the Indo-Nepal Border of Jhilmila area (Royal Suklaphata Wildlife Reserve), 2 in Ghodaghodi Lake, 1 in Khoda Lake (Royal Bardia National Park), 2 in Hatti Lake (Royal Bardia

National Park) and 2 west of Hatti Lake (Royal Bardia National Park). Observations were also made in Badhaiya Lake (100 ha) of Bardia district, which is supposed to have good habitat for the Lesser Adjutant, but none were found there during this study.

Observations were also made south of Dhangarhi at Mohana River, as birds were previously observed there by Birdlife International (2001), but no sightings were made there. Surveys were also carried out in Patero Lake, Rani Lake and Suklaphanta Lake of Royal Suklaphata Wildlife Reserve, and Betkot Lake outside Royal Suklaphata Wildlife Reserve. In Kailali district, observations were also made at Narcrodi Lake (100 ha.) and Deukhuria Lake (22 ha.). In Bardia district observations were made in Laguna Machan, the floodplain of Karnali River, Manau Ghat and Nilgai Lake inside Royal Bardia National Park and Badhaiya Lake outside the Royal Bardia National Park.

Threats

Changes in agricultural practices are taking place throughout the country. Farmers have shifted to cash crops from traditionally grown crops such as paddy and wheat. Since Lesser adjutants depend on paddy fields for part of the year to feed in, the change in agricultural practices may bring serious consequences for these birds.

Many lakes inside Royal Suklaphata Wildlife Reserve and Royal Bardia National Park become dry during summer, so it is necessary to pump artificial water to help ensure the survival of this bird. During the survey, 4 lakes of Royal Suklaphata Wildlife Reserve had dried up. In Royal Bardia National Park, most of the lakes are also dry in the summer. This drying out of wetlands directly affects the survival of these birds, as they are confined to protected areas in the dry season since there is no water in paddy fields.

The Bahunia River in Royal Suklaphata Wildlife Reserve, which used to have plenty of fish, is now being destroyed by the poisoning of the river water to capture fish. This is also a problem in Royal Bardia National Park at the Khauraha River.

The greatest danger faced by the wetlands in the study area is the dense and rapid growth of water-hyacinth. This obstructs the penetration of the light into the water, preventing the necessary light-stimulated reaction and thereby leading to the decline in bird populations.

Conservation

Although increased efforts are underway to raise public awareness about birds, mainly initiated by Bird Conservation Nepal (BCN), the local people still do not appreciate the value of birds (Baral, 2004). To date, the Department of National Parks and Wildlife Conservation (HMG/N) has not included Lesser adjutant in its list of protected birds. Inadequate avifauna conservation awareness among the communities residing adjacent to the park has become one of the most serious challenges among conservation agencies. Extensive conservation awareness programs targeted at the stakeholders are of prime importance.

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CONSERVING A COMPACT EVERGREEN ELEPHANT HABITAT: A SURVEY OF THE POPULATION STATUS AND CONSERVATION OF ASIAN ELEPHANT IN KALAKAD-MUNDANTHURAI TIGER RESERVE, SOUTHERN INDIA

by Surendra Varma

Introduction

The Agasthyamalai sub-region, located in the Western Ghats of southern India, is known for its large contiguous habitat with tropical evergreen, semi-evergreen, mixed deciduous, grasslands and dry forests (Sukumar, 1989). This large, contiguous forest tract, starting from south of Ariankavu Pass, to the southern-most tip of Western Ghats, Mahendragiri (covering an area of 2,000 km²) is one of the crucial habitats for elephants and the Kalakadu-Mundanthurai Tiger Reserve (KMTR) is a part of this contiguous forest complex (Kant, 1994). The vegetation type is dominated by evergreen forest and it is the last remaining compact evergreen forest elephant habitat in southern India. This compact evergreen elephant habitat, and the little explored KMTR, are known to support 100 to 150 elephants (Dutt, 2001; Melkani, 2001). The current survey was carried out to document the elephant distribution pattern, human-elephant conflicts and other conservation issues of the Asian elephant in KMTR.

Survey area

KMTR lies between 8°25' and 8°53' north latitude and 77°10' and 77°35' east longitude and has an area of 895 km². The elevation ranges from 40 to 1,867 m above sea level. The hill slopes are steep with rugged and undulating terrain, interspersed with deep gorges and ravines. The climate is hot at the lower levels, but cooler at elevations of 500 m and above. KMTR receives rainfall from both the southwest (May-August) and northeast monsoons (October-December), but more from the northeast. The amount of rainfall varies from

750 to 3,000 mm (Kant, 1994; Parthasarathy, 2001). The reserve is called a River Sanctuary because of the presence of many streams and rivers. The major river is the Tambarabarani and its tributaries flow eastward through the reserve. Twelve rivers flow within the reserve and are also perennial water sources for irrigation, hydroelectric projects and 4 taluks in Tirunelveli district, southern India. West coast tropical evergreen forest, subtropical montane forests, Tirunelveli semi-evergreen forest, southern moist-mixed deciduous forest, dry teak and deciduous forests and scrub forest are the major vegetation types in the reserve (Parthasarathy, 2001). KMTR has a wealth of wildlife, including the endangered Nilgiri tahr (*Hemitragus hylocrius*) which is endemic to Western Ghats, and is home to 5 other primate species (Sunderraj & Johnsingh, 2001). Kani tribes are the major inhabitants of the region, with about 120 Kani families living here in 5 settlements. There are about 150 villages (with 30,000 households and a population of 0.1 million) located in a belt within 5 km of the edge of the reserve that stretches for 200 km (Kant, 1994; Melkani, 2001).

Methodology

In addition to field surveys by foot and vehicle, experienced forest staff and local people were interviewed. Villages, enclosures and other human establishments along the boundary and within the reserve were visited for information on past and current elephant sightings, elephant visits to villages to raid crops and other elephant-related information. A review of earlier studies or surveys on elephants and habitat was done through literature searches and through interviewing

researchers. Forest Department records provided very useful information of many aspects of elephant management.

Results

Elephant status and habitat usage pattern

The census carried out during 1991 estimated 107 elephants, and the one in 1997 counted 138 elephants in the reserve. The increase in the number of elephants between the two estimates could be due to an actual increase in the number of elephants, or possibly due to differences in the census methods. Another possibility is that as the reserve is a part of a contiguous forest complex, the movement of elephants across the reserves could also have increased the number. The group sizes of elephants sighted ranged from 1 to 23, with an average group size of 8 elephants; the most frequently seen group sizes were 1, 2, 5, 7 and 8. Groups of more than 15 elephants were seen only once, indicating that the group size of elephants in this reserve is relatively small. There were frequent sightings of adult males and calves, indicating scope for a growing population. Using both direct and indirect methods the elephants and/or their signs were seen in January, February, May and August to December. Signs were sighted more in August, September and October. Combining the information of both direct sightings and indirect evidence, it is possible to conclude that elephants use the reserve throughout the year.

Main elephant areas in KMTR:

The survey identified the following main areas and routes used by elephants to move within, across or outside the regions of the reserve.

- Kannikatti-Enjikuli-Pambar-Kuduravatti-Mailar-Kandamparai-Manimuthar-Mulakasam-Sengeltheri-Kakachi-Nalumukku-Kuduravatti.
- Valayar-Kandamparai-Kannikatti-Enjikuli-Pambar-Varataiyar Kuduravatti.
- Sengeltheri-Thalaianai-Karunkalkasam-Sengeltheri or Kandamparai to Mundanthurai.
- Sambulimukku (on the mailar road)-Pulianjolai, Perappannaoothu-Gundar-Sorimuthanarkoil-Kullanodai-Manalthurai-Mundal.

- Sorimuthanarkoil, Banatheertham to Enchikuli, Kannikatti Kalivarpul (Kerala-Tamilnadu border)-Bonacara estate.
- Kannikatti-14 beat-Kandamparai-Valayar to Kerala (Kulathu pulza).
- Sengaltheri-Kularatti estate-Multalar-Mullakasam-Manimuthar.
- Kerala-Kultrilam-Noondi Mangadu estate-Kadeyam range-14 beat- Kanikatti-Agastyamalai-Kalivarpullu-Aduppukalmottai.
- Keripari-Nadukanithoundu upto Akilandampillai estate.
- Kakachi-Nallumukku-ottu-Police repeater station-Kodayar reservoir-Muthukulaivayal-Keripari.

Elephant and habitat conservation problems in KMTR

The survey provided information on the number of elephants and habitat-related conservation problems. It was also observed that elephant conservation problems such as human-elephant conflicts and elephant deaths due to poaching or to conflict are not great. However, the habitat-related problems are severe and need to be addressed effectively. The number of civil activities undertaken in the past have affected the quality of the reserve. Forest exploitation for irrigation and power projects, severe cattle grazing pressure, frequent fires, road construction and uncontrolled encroachments along the foothills have caused severe damage to the reserve. A large number of people reside within the reserve at the work sites, in staff colonies of the State Electricity Board, and on private estates. This brings a moderate to very high biotic interference; in particular, the fuel and other forest resource needs of the villages in the fringes are very high (Melkani, 2001; Dutt, 2001).

Human-elephant conflicts

The major aspect of conflict arises from the fact that the elephants are moving towards the foothills and the conflict caused is relatively severe. The movement towards the foothills is due to changes in the weather conditions, food and other resources, or to man-made disturbances. Over the past 25 years, only recently (since 1995) have the elephants started visiting the villages. This is partly

due to the villagers having removed most of the palm trees for fuel. In these villages elephants are reported during the crop harvesting seasons and an average of 20 cases of crop raiding/year are reported. There are settlements within the reserve, but the human-elephant conflict appeared to be low. Only villages located on the foothills have elephant problems. Elephants use mostly the upper reaches and come down to the foothills during December to May. The conflict seems to be more in areas under the Ambai range. Since 1995, three human deaths have occurred due to elephant attacks in the reserve.

Elephants are reported to visit the settlements for 2-3 months, especially during the northeast monsoon season. According to the local villagers, elephants in groups of 10, 5, 2, 3, and sometimes single animals have been reported. They come for crops such as banana (*Musa paradisiaca*), jackfruit (*Artocarpus heterophyllus*), areca nut (*Areca catechu*), tapioca (*Manihot esculentm*), pineapple (*Ananas cosmosus*) and coconut (*Cocos nucifera*). Elephants cause the most damage to banana, tapioca and coconut crops. No effective control methods have been taken so far, except chasing the elephants away by using firecrackers. It was observed that these settlements have primitive wooden fences to prevent animal entry. Crop damage is relatively low and no human deaths due to elephants have been reported in the settlements located within the reserve. This may be due to the low density of elephants within the reserve or due to the habitat contiguity with enough food, water and other resources available within the forest itself.

Elephant deaths

Information on the number of elephants inhabiting or using the reserve helps to understand the status of elephants in the reserve, their growth and death rates. No specific or scientific information on the number and status of elephants is available for the reserve because earlier scientific studies or surveys on elephants recorded only basic information on elephant numbers and the deaths (whether due to natural or man-made causes). It is also unclear as to how accurate this information is. However, based on this information, from 1993 to 1998, 4 elephants died (all males), two due to

natural causes, one after capture by tranquilizing and the other due to poaching in Singampatti Beat 11. No arrest of culprits or detection of tusks was made.

Pressures on the forest

Cattle grazing

The major problem associated with the settlements within and outside the reserve is the livestock. This mainly arises from villages located close to Papanasam RF, Singampatti ex-jamin and Kalakad RF of the reserve. From these villages, it is estimated that nearly 5,000 cattle units are dependent on the forest. Due to heavy grazing, the lower hills in the forest have been denuded and are devoid of any grass for grazing. Tender seedlings are destroyed by trampling and damage is caused to the roots by the heavy hooves of the cattle. Grazing has caused soil compaction resulting in the reduction of water percolation and loss of topsoil and runoff (Melkani, 2001; Dutt, 2001).

Forest fires

Along with grazing, frequent forest fires set by the cattle grazers have also reduced the quality of the habitat. Nearly 4-5% of the habitat is burnt every year. If we take into account the actual fire-prone areas of the reserve, and then the proportion of habitat burnt in these regions would be very high. It is felt that the external damage caused by man, due to cattle grazing and fire, keeps the forest from reaching a stable stage. From the entrance of Mundanthurai right up to the lower dam camp, the terrain is rough with huge rocky outcrops and therefore unsuitable for animals (Kant, 1994; Melkani, 2001; Dutt, 2001). The combination of forest fires, cattle grazing and other human activities is responsible for this state.

Timber extraction

The reserve has a long history of timber extraction and from 1891, some parts of the reserve were worked on a regular basis. The Kannikatti zone was subjected to light selection felling with the trees being used as sleepers, especially *Mesua* sp., in 1927. The Kodamadi area was subjected

to selective felling to preserve the catchment areas of Tambaraparni, Servalar and Manimuthar. A timber-cum-fuel working coupe worked on contract till 1975 in the Mundanthurai plateau and Sivasailam forest. The extracted areas were planted with teak and softwood. The failure of the plantation increased the demand for fuel and cattle grazing here. The whole of Singampatti forest was under the control of jamindars (traditional feudal landowners, who were appointed administrators of the area) and up to the upper reaches of the Tambaraparni River. With the abolition of the jamin in 1952, the ex-jamin forest was taken over. These forests were badly damaged due to repeated cutting, felling and over-grazing by the jamin cattle. After being declared as a Tiger Reserve, no coupe was allowed to operate, but forty years later the area has still not recovered completely (Kant, 1995, Melkani, 2001, Dutt, 2001).

Non-timber forest products (NTFP) collection

Up to 1980, NTFP collection was allowed in the reserve; later, only the local tribes were involved in the collection. Before 1981, the Forest Department collected honey which was sent to the lac factory in Madurai in Tamil Nadu. Currently, the collection of NTFPs is not permitted; however, there is seasonal illegal collection of mango (*Mangifera indica*), cane (*Calamus* sp.), kundrikam (*Canarium strictum*), wild tubers and other NTFPs by people who live within and outside the reserve. This illegal collection has severe negative impacts on the biomass of the reserve (Melkani, 2001, Dutt, 2001).

Tourists and pilgrims

The area attracts local visitors as it has many rivers, waterfalls and temples. The temple festivals bring several thousands of pilgrims into the reserve, particularly during the Adi Amavasi and Matu Pongal festivals, to visit Sorimuttaiyan Kovil and Bana tirtam in the Mundanthurai range and Karumariamman temple at Sengeltheri and Nambi Kovil in the Kalakadu range. The Adi Amavasi festival brings about 0.5 million people over a short period of time. Littering the places with food and other material, fuelwood collection, biomass depletion, accidental forest fires,

transporting domestic animals for slaughter, are all activities that have significant negative effects causing considerable damage and disturbance to the habitat (Kant, 1994, Melkani, 2001).

Enclaves, hydroelectric projects, tea, coffee and cardamom estates and enclosures

There are a number of enclaves located within the reserve, including 4 electricity camps (for 2 hydroelectric projects, 9 irrigation projects and 7 reservoirs), the Bombay Burmah Trading Corporation (BBTC), 4 temple complexes, 19 patta lands and 5 tribal settlements within the limits of the reserve. BBTC covers an area of 3,391 ha with tea, coffee, cardamom and eucalyptus plantations. The estate employs some 5,000 people. There are 200 families with 1,000 people living in the fringes of evergreen forests, causing notable damage to the rainforest. Kattalaimalai is the second largest estate with an area of 1,271 ha of prime moist deciduous forest located within the reserve. Due to its commercial timber logging activities, the prime lowland and moist deciduous forests of the region have been severely affected. The estate activities not only disturb the forest, but also fragment the corridors of many species.

Cardamom leases were granted in 1941 and a total of 40 cardamom blocks with an extent of 490 acres came into being with a lease period of 25 years. During 1979, the Government banned the renewal of all cardamom blocks within the sanctuary. So far, 35 cardamom blocks have been resumed by the Forest Department and five more are under operation on lease. All these estates, cardamom blocks and patta enclosures are located inside the reserve (most of the area is inaccessible) and it is very difficult to monitor their movement and the disturbance they cause to the forest (Kant, 1994; Melkani, 2001; Dutt, 2001).

Other disturbances

The Tamil Nadu Electricity Board (TNEB) is contemplating a number of power projects in the evergreen segment in the higher altitudes (Core zone). The road to Triruvanthapuram, via Mundanthurai-Kannikatti goes through the core zone. Attempts to kill elephants for tusks have been taking place at the border of Kanniyakumari

and Kerala State. Due to inadequate supervision and staff, ganja (*Cannabis sativa*) cultivation, woodcutting and smuggling, and other illegal activities are taking place. Nearly 400 such cases have been reported for the years 1996 and 1997 (Kant, 1994, Melkani, 2001, Dutt, 2001).

Conservation goals

Elephant food mapping

Elephant presence and movement is monitored throughout the year in some parts of the reserve. However, how many elephants are there, what attracts them and how they use the habitat is not clearly known. Elephant food species distribution and mapping (along with identifying the stage of the dung piles) of the paths regularly used by elephants would give an indication as to how elephants use the habitat.

Monitoring of elephant sightings

Wherever elephants are sighted, their numbers, age and sex classification, microhabitat and other behavioral observations have to be noted. Getting the cooperation of the tea estate people is also necessary to fulfill the objectives. Places like Kakachchi, Nalumukku, Kudiravetti and Manjulai have regular elephant movement. Estate people, or the staff of the Tamil Nadu Electricity Board (TNEB), who visit rainfall stations (located within the reserve) could give more information on elephant numbers, movement and other related details.

Patrolling

The park management has to concentrate more on policing and it should be treated as a significant component of habitat management (Dutt, 2001). Patrolling of elephant habitats is very important as illegal activities like ganja cultivation and collection of forest products, which are regularly reported, are disturbing the movement of elephants, directly or indirectly. For example, three ganja plots visited near Valaiar had reed belts and prime water resources and had the maximum number of dung piles of all the places visited from Kodamadi to Valaiyar. The clearing of reed belts (a favorite food of elephants) and diversion of

water for ganja cultivation would severely affect the elephant movement. The Department needs to take measures to control, patrol and monitor these areas.

Monitoring or acquiring private estates and settlements

Allowing estates and settlements to operate deep inside the forests and not monitoring their activities could lead to illegal activities being undertaken by the estate people or supported by them. Documenting the current internal and external pressures from settlements located within and outside the reserve is a major concern. Predicting biomass resource demand and use of local communities and developing strategies to counter the degradation of elephant habitat should be given high priority. Ali & Pai (2001) suggest that if the current land use of these settlements does not benefit the surrounding forest, then acquisition must be considered as an option. If estates and some settlements are ranked as sites for endemic/rare species, damage to the ecosystem, watershed functions and other criteria (Ali & Pai, 2001), then the Kattalaimalai estate located within the reserve would have a high-ranking value and should be acquired. However, allowing the estate people to remain inside the forest has some advantages as they provide information on the movement of people from outside. If the estate people are not causing major disturbance to the forest and their presence in very remote areas prevents the entry of outsiders, then they should be allowed to stay. This would help the Department, given the limited manpower and resources to monitor these interior and unapproachable areas.

Manpower and other facilities

To start with, the Forest Department (FD) has very little manpower. Illegal activities like ganja cultivation, etc., usually take place in areas where the terrain is very tough, difficult to approach, and would take several hours to reach, requiring camping facilities. Adequate manpower is needed to stop or control any illegal activity that is discovered. The staff posted in these areas are not interested in taking up the job as these areas are remote and there is not enough equipment such as raincoats, field equipment, boots, ammunition,

(continued on p.17)

(continued from p.16)

etc. for the staff. Establishing temporary camps in these areas, with the FD and other conservation agencies providing food and other resources to the watchers and motivating the FD staff would facilitate better protection of these remote areas.

KMTR and its environs

Kalakadu-Mundanthuri Tiger Reserve can support only a small population of elephants. This is due to the availability and abundance of elephant food plants, and their varying distribution place-to-place and season-to-season. Therefore, the elephants move extensively from one patch to the other. Except in Mundanthurai plateau and a few lower regions (Singampatti ex-jamin), most of the areas in the reserve are steep with many valleys rising into peaks. This pattern has a major impact on the movement of elephants and prevents them from coming down into the valley. They are, therefore, restricted to mostly the upper reaches. Elephants do come to the foothills, mainly for the crops cultivated in villages and palm trees grown to demarcate the boundary along the foothills or grown naturally. However, the elephant habitat within KMTR is intact and has long-term conservation value for the species. Conservation of elephants and its habitat in KMTR cannot be considered in isolation and any aspect of elephant conservation should be based on the conditions and quality of the habitat available for elephants in the adjoining areas such as Neyyar, Peppara and Shendurani (of Kerala State) across the political border, buffered by Kanniyakumari, Thirunelveli (of Tamil Nadu State) and Trivandrum (of Kerala State) Forest Divisions.

Beyond KMTR

The elephant population in southern India is distributed in nine distinct sub-regions of the Western and Eastern Ghats. Narrow corridors connect some of the populations or habitats of these sub-regions, while some of their contiguity is broken by a variety of factors (Sukumar, 1989). Periyar and Agasthyamalai sub-regions come under the Periyar-Kalakadu Tiger Conservation unit, which has an area of about 5,000 km² of very productive habitat available for many species of conservation interest (Dutt, 2001). Ariankavu Pass of Shencotah Gap separates these two sub-

regions, and there was once a tenuous link between them through the pass. Currently the link is broken due to a railway line and constant vehicular traffic along the Shencotah-Punalur highway. It is not known whether or not elephants move across these regions. Connecting a link between this compact unit and the remainder north of Western Ghats (to Periyar sub-region) would provide a much larger habitat for elephants.

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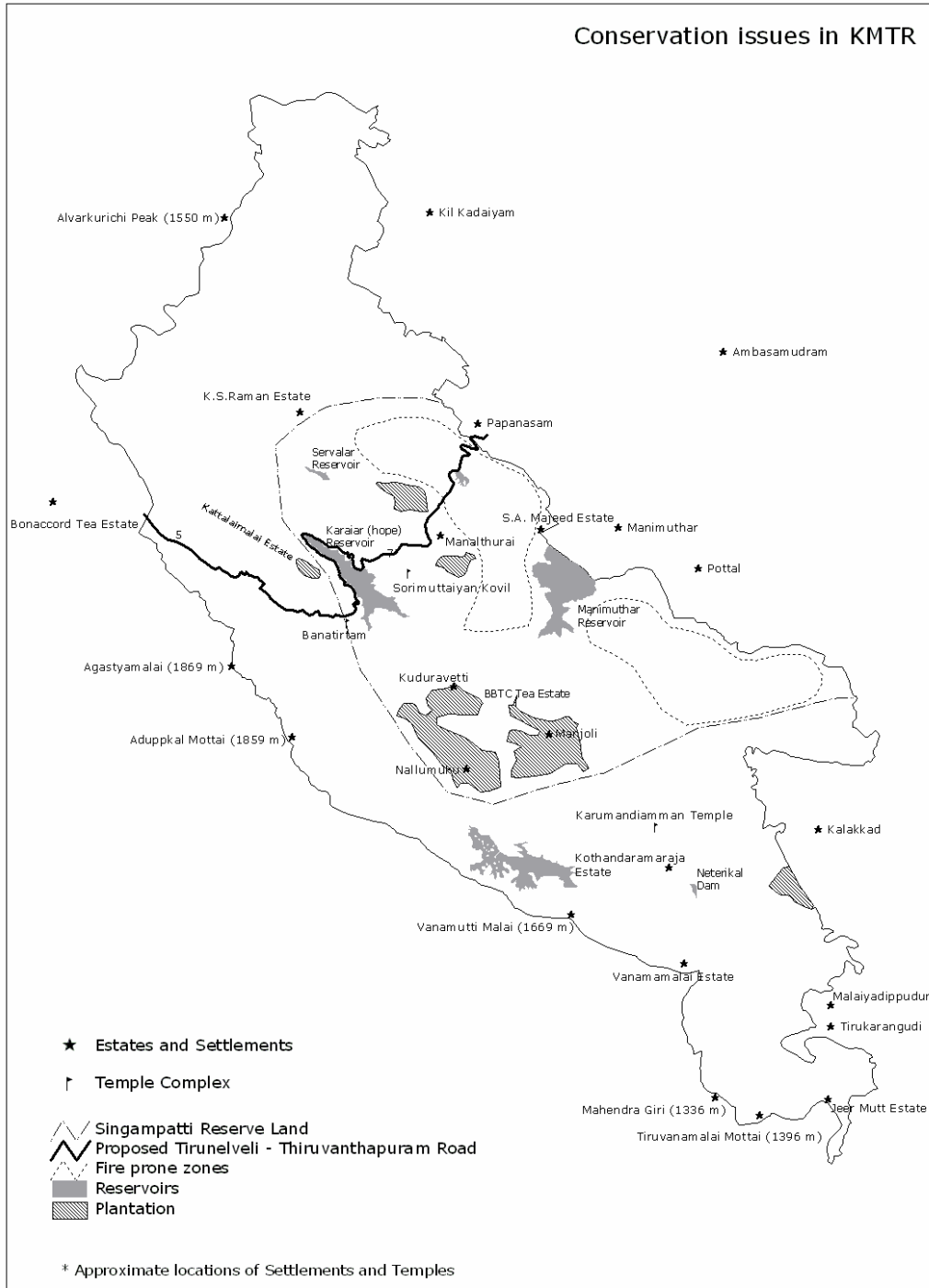
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Table 1: Direct and indirect elephant sightings in KMTR

S.No	Region	Direct sightings			Indirect sightings
		Number of elephants	Month of sighting	Age-Sex Classification	Month of Sighting
1	Mundanthurai	12	July	-	January, February, May, August September, October, December
		18	-	-	
		23	-	-	-
		1	-	Adult male	-
		10	November	-	-
		5	-	-	-
		2	-	-	-
		3	-	-	-
		20	May-June	-	-
		1	-	-	-
2	Kalakad	10-15	February	-	July, August, September, October November, December.
		7	July	-	
		5	March	2 calves	-
		4	June	-	-
3	Kodayar	11	October	-	-
		7	October	-	-
		5	March	2 calves	-
		11	June	3 calves	-
		2	April	Adult male	-
		1	March	Adult male	-
		2	-	-	-
		7	-	-	-
		8	-	-	-
		10	-	-	-
4	Ambai	7-8	-	-	-
5	Kadayam	12	-	-	October
		8	-	-	-
6	Tirukarngudi	-	-	-	August

Data not available



MARTES FLAVIGULA: IN SEARCH OF CONSERVATION

by Ritesh Joshi, Lalit Kumar, Deepak Dhyani and Ravi Dimri

Introduction

India is recognized as one of the mega-rich biodiversity centers in the world, as its different climatic conditions support a high variety of ecosystems, rich with myriad types of floral and faunal diversity. Presently, the natural habitats of most of the wild animals are being destroyed, mainly due to anthropogenic activities, environmental changes, changes in the global climate and human encroachments deep into the forest regime. As a result, there has been a rise in the competition among the various species for food, shelter and other requirements. In Garhwal Himalaya, high altitude areas had a rich variety of floral and faunal species, including a few found only in this region. India has an estimated 81,000 faunal species, representing about 6.4 percent of the world's fauna (Ministry of Environment, 1994). Over the past 200 million years 100-1,000 species became extinct every century. However, in recent centuries human activities have accelerated the extinction of species. Today the extinction rate is 1,000-10,000 times higher than the natural rate before human intervention (Wilson, 1998).

Himalayan yellow-throated marten (*Martes flavigula*)

The Himalayan yellow-throated marten (*Martes flavigula*) belongs to the family Mustelidae, Class Mammalia and Order Carnivora. It is restricted to the middle and high altitude areas of the Garhwal Himalaya and its usual range extends from 600 to 3000 m above sea level. In the Himalayan region the yellow-throated martens keep to the forest limits and are not found above the timberline. The animal's characteristics reflect its arboreal habit and it is found in hilly terrains and undulating ground, especially where *Rhododendron* spp. (Buransh) and *Quercus* spp. (Oak) grow in profusion. The lush, cool elevated sub-alpine and sub-tropical moist deciduous forests that lie in the high and

middle altitude regions of Uttarakhand are natural homes to a large population of martens. This terrestrial omnivore displays great adaptability for living in different climatic conditions, as the tigers and panthers have. The marten was once present in all the forest tracts of the Garhwal Himalaya, but now it is found in scattered populations in disjointed ranges.

Presently, mainly due to the diminishing prey and forest, the marten population has been reduced considerably. Almost nothing is known about the ecology of this animal and there are no detailed descriptions of the animal's habits and habitat or behavioral biology in the literature. The present study is a first effort towards studying the ecology of this animal in the high and middle altitude zones of the Garhwal Himalaya. Although most of the wild animal species in these areas are presently listed under the threatened category, due to the lack of any preliminary studies the exact status of the marten is still unknown in central Himalaya. According to *IUCN's Red list of threatened mammals*, the Himalayan marten is categorized under the *indeterminate category* (<http://www.wii.gov.in/nwdc/mammals.htm>).

Martens feed on both plant and animal resources and obtain their natural food from the mixed forest as well as from peripheral areas closer to human habitation and settlements. They are well-known omnivores, but primarily carnivores, and have also been observed feeding on foliage. The animals forage for food in the early hours of the morning and in the evenings just before dark. They may also forage in the night hours, but the midday is the time for rest. Their feeding signs such as fresh footprints, faeces, etc., were mostly observed in early morning hours and closer to the human habitation area, which confirms that their movement activities are also at peak during the night. Martens often climb trees to reach arboreal food such as flowers, ripe fruits and seeds, but all

of these are not available year round; therefore, the martens are dependent on whatever is available according to the different seasons. They generally feed on the fruits of species like – *Rhododendron* spp. (Buransh), *Pyrus* spp. (Apple), *Prunus* spp. (Peach) etc. Plant parts of various species are consumed year round. Martens were also observed feeding on a few insects like honeybee (*Apis* spp.), ants, termites and occasionally on the carcasses of wild and domestic animals.

Himalayan rats and mouse-hares are also preferred food items for this mammal in the high altitude zones, especially during summer and the monsoon, but during the winter season when whole of the area is covered under snow they move towards lower slopes. In the high altitude areas of Garhwal Himalaya, the increasing human population and anthropogenic or developmental activities provide them with supplementary food resources from agricultural fields. During the post-harvesting period, the crop fields are a major feeding and hunting ground for this animal, as at that time the avifaunal species are searching the fields for grains, seeds, insects, macro-organisms, etc. The higher proportion of animal food in the diet indicates that the marten is predominantly a carnivore in nature.

Movement is one of the prime characteristics of any animal and is directly linked with the animal's feeding habits. The marten is not a wide-ranging mammal, but according to changes in the season they traverse more distances to fulfill their routine requirements.

The present investigation revealed that martens are social animals, as they mostly spend time in close association with each other and are always seen in pairs, although according to an earlier report they generally prefer a solitary life (Prater, 1998). They move around both by day and by night, most commonly on the sloppy and rocky terrains and in the grassy patches present within the mixed forests of *Rhododendron* spp., *Pinus* spp., *Quercus* spp., *Cedrus* spp., *Cupressus* spp., *Abies* spp. etc. In the middle Himalaya they are well capable of living under dry conditions and in forests of *Acacia* spp., *Pinus* spp., *Ficus* spp., *Syzygium* spp., *Mallotus* spp., etc.

When their natural forest habitats are lost, most wild animals tend to move towards the human habitation areas and the same is happening with the marten. From the investigation it was inferred that their movements were frequently closer to the forest habitats that are peripheral to human settlements. Martens generally have home ranges of 2-3 km, but this could be affected by the abundance or scarcity of natural food. For instance, if local seasonal migration occurred among local bird species or other small herbivore mammals, then these events could alter its home range for a short period of time.

According to the local residents, this animal occasionally preys on small herbivores like Bharal (*Pseudois nayar*), Musk deer (*Moschus moschiferus*), etc., and they commonly kill young fawns of the small hoofed animals. The study inferred that martens are skillful hunters and take turns to tire out the prey by surrounding it and then snapping at and biting it. When on the hunt they will pursue the prey for hours until they finally succumb to exhaustion. Due to the lack of any preliminary studies on the behavioral biology of the marten, it is difficult to correlate the results of this study with others. A study on the breeding biology and seasonal activity pattern of this mammal is ongoing. Nothing has been written about the breeding habits of the marten (Prater, 1998).

Impact on the regeneration potential of honey hives in forest habitats

A special feature of the yellow-throated marten is its fondness for honey hives – a trait shared with the Himalayan black bear (*Selenarctos thibetanus*). In order to obtain this favored food item, the marten will often uproot the honey hives from the large branches of trees. They are known to cause excessive damage to these hives and are wasteful feeders. When an animal is feeding it seldom spends much time feeding on one particular food. While feeding on hives the total amount of hive matter removed by the martens is not fully consumed. In fact, a relatively small part is dropped to the ground and left as such. Investigation indicates that at present, honey hives are being continually depleted from the natural

forest habitats, but the local people do not seem to be interested in cultivating honeybees. This is due to the presence of the marten, especially nearer to the human habitation areas. This might well obstruct the scope of apiculture in Uttarakhand state, especially in the high and middle altitude regions of Garhwal Himalaya. On one hand the State Government is trying to promote self-employment by providing technical knowledge and financial assistance through concerned departments to the dwellers of rural areas, especially those living in remote regions. On the other hand, this matter is becoming a subject of conflict and might be one of the reasons influencing the regeneration potential of natural honey-hives and the apiculture industry in the state. More study is needed so that we can provide a better management plan regarding nature conservation with socio-economic upliftment strategies for the newly established state of Uttarakhand.

Threats and recommendations

The impacts of the developmental activities on the environment restrict the animals' routine activities, and as a result their fixed natural paths were observed to change rapidly. The Garhwal Himalaya represents one of the important sub-tropical, temperate and sub-alpine protected areas for martens in India. At present, observations from this study indicate that the marten population is below the region's carrying capacity, since there are no obvious signs of any over-utilization and/or habitat deterioration. The long-term survival of martens and the viability of the area itself as a self-sustaining ecosystem would depend very much on wise management practices that incorporate both socio-economic as well as ecological considerations.

Central Himalaya is a good natural home for this flagship species – the Himalayan yellow-throated marten – but their increasing straying tendencies reveal a growing uneasiness which is forcing them to move out of their traditional habitat. Habitat destruction is most likely the major threat to martens in this region. Hunting for body parts also appears to be a threat, since different body organs like bones, etc. are thought to be useful in treating

a few of the mortal diseases. Hunting for the animal's meat could also be a serious threat to this animal in the Northeast region of India (Kumar, 2004). According to the local people martens are occasionally killed by panthers and have also died in snares laid for birds. On the basis of the present investigation, on earlier available information, and on the traditional knowledge of local communities, the following recommendations are proposed to help us to preserve their status:

- It has been observed at different locations that people are not careful and aware about the hazards of dumping the remains of food items. These dumps not only attract the martens, but also attract a few other herbivorous wild animals, which generally leads to drastic changes in the general behavioral pattern of the animals. It is recommended that tourists and local people must be taught regarding environmental pollution.
- The regular monitoring of this animal within the Garhwal Himalaya can help us determine its exact status – whether it is endangered, vulnerable or rare.
- Eco-development and conservation education activities taught through organizing training programmes, workshops, etc., can help to develop a better management plan for the conservation of this wild Himalayan animal species.
- It is recommended that during the summer season when a large number of tourists visit the said area, the concerned officials should monitor the human activities and direct the people to learn about nature/environment conservation. That will help to create awareness among the people about the conservation issues of Himalayan biological diversity.

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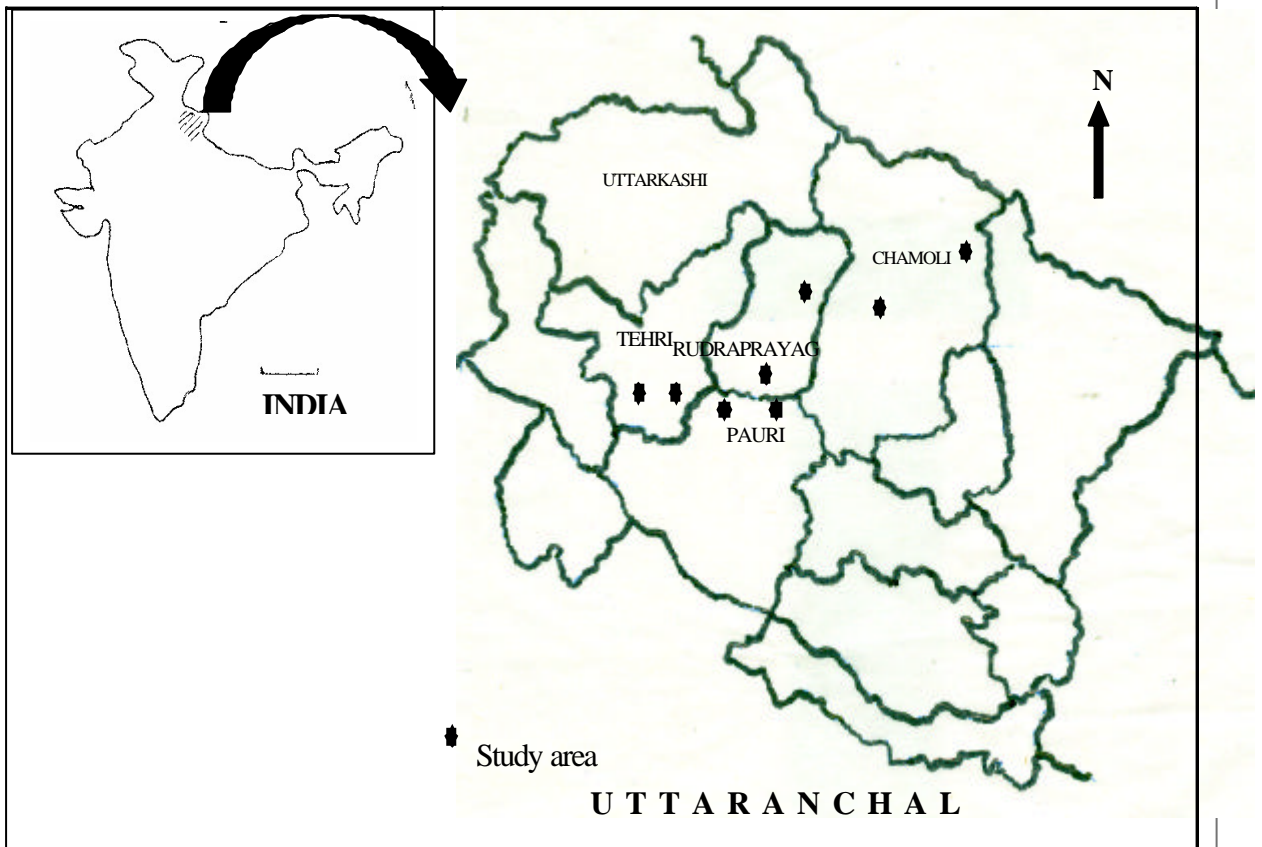


Figure 1: Map showing few of the natural habitats of the Himalayan yellow-throated marten in Garhwal Himalaya, Uttarakhand, India.

THE GIANT SQUIRREL (*Ratufa indica*) IN SIMILIPAL TIGER RESERVE, ORISSA, INDIA

by S.D. Rout and D. Swain

Introduction

The genus *Ratufa* is an Indo-Malayan taxon of four species of tree squirrels (Order Rodentia, Family Sciuridae, Sub-family Sciurinae). There are about 121 species of tree squirrels, including the giant and pigmy squirrels (Moore, 1959). Ellerman (1940) reports that sixteen genera and about 56 species of tree and ground squirrels occur in the oriental region. Tropical Asia contains the most diverse squirrel fauna of any other region in the world. The Malabar or Indian giant squirrel (*Ratufa indica*) occurs in Peninsular India.

The giant squirrel (*Ratufa indica*) is exclusively a forest animal and is the most brightly colored of the different races of Indian giant squirrels. This race is distributed from evergreen to moist deciduous forests of Western Ghats in Peninsular India. The ecology of Asian squirrels has been scantily studied and published information is scarce. *Ratufa indica* is a top canopy dwelling species and rarely travels on the ground (Ramachandran, 1988; Borges, 1989; Datta, 1993). It feeds in the upper canopy levels (Payne, 1979, 1980; Ramachandran, 1988) and requires tall, profusely branched trees in which to construct their dreys (nests). There was no published information available on the ecology of this species in the Similipal Tiger Reserve.

Indian giant squirrel

The Indian Giant Squirrel inhabits the deciduous, mixed deciduous, and moist evergreen forests of peninsular India, south of the Ganges (Prater, 1980) and is listed in Appendix II of CITES (Favre, 1989) and Schedule-II of the Wildlife (Protection) Act, 1972 of the Govt. of India. The present communication reports the study on the distribution

pattern, food plants, nesting habits and conservation of *Ratufa indica* in Similipal Tiger Reserve, Orissa, India.

Study area

The Similipal massif (21°-28' and 22°-08' north latitude and 86°-04' and 86°-37' east longitude) is situated in Mayurbhanj district of Orissa State and stretches over an area of 2,750 km² (Swain & Nanda, 1997). The Similipal forest is one of India's mega-biodiversity zones with a rich population of flora and fauna. The biological diversity of Similipal is high. The floral and faunal composition of Similipal is 7% flowering plants, 8% orchids, 7% reptiles, 20% birds and 11% mammals. The Reserve is a link between South India flora and fauna and those of the sub-Himalayan northeast (Anonymous, 2003). The Reserve has a well demarcated core area as well as buffer zones. The core zone has seven ranges, namely Upper Barha Kamda (UBK), Chahala, Jenabil, Nawana (South), Nawana (North), Pithabata and National Park. The buffer zone has twelve ranges falling into three forest divisions, namely Baripada, Karanjia and Rairangpur.

Methods

The study on distribution was conducted in the Similipal Tiger Reserve during the 2004 census, which was based on the direct census method (Brower, Zar and Ende, 1990) based on actual sightings of squirrels. Giant squirrels were located by walking slowly through the forest in the study area. Since the animal is arboreal, any movement in the canopy can be noticed. The loud calls, the sound of gnawing nuts, movement in the arboreal pathways, etc. aided in spotting their locations in the study area. Since the giant squirrels are large

and brightly colored, they can be easily located by scanning the canopy. The animal's tail, which is longer than the body and black in color, can be spotted hanging down while the animal is feeding. All the animals sighted or flushed were noted on the proforma. The animals were observed with the help of 10x35 Leitz binoculars. The number of squirrels censused was estimated using the following formula (Hayne, 1949):

$$D = \frac{104\sum(1/d_i)}{2L}$$

Where, D = the population density (number per ha), L = the length of transect (in meters), d_i = the distance from the observer to the i th animal sighted, measured (in meters) to the point where the animal was at the time it was sighted, 104 = factor converting m^2 to hectares. The direct sighting census operation was conducted in 61 units and covered a distance of 122 km over four days

To study the squirrels' feeding and nesting activities, numerous field trips were undertaken to the core area of Similipal Tiger Reserve. Feeding activities were related to the consumption of the parts of plants that were found at the bottom of the trees – including buds, flowers, fruits, leaves and petioles. The nesting ecology was also studied in the south central region of the core zone. Data on nesting was collected from 53 trees. Tree height, crown height (the distance from the top of the tree to the lower branch) and crown width (the maximum spread of the crown) were estimated visually. The tree species, height of the drey from the ground, the number of dreys on the tree, the twigs used for nest building, and interspecies interactions with langurs were recorded.

Observations and discussion

Distribution

The present study indicates a wide distribution of giant squirrels in Similipal Tiger Reserve. According to the census, there were 10,660 squirrels estimated in different compartments of Similipal Tiger Reserve. The study on the distribution of

Ratufa covered 150 km^2 of forest area out of the total 2,750 km^2 area of Similipal Tiger Reserve. The distribution pattern of the giant squirrels indicates the quality of forest canopy of Similipal Tiger Reserve (Singh, 1997). Canopy continuity near nesting trees is essential to facilitate the squirrels' movement along the arboreal pathway. Tree squirrels have been observed to build dreys on trees near neighboring trees with interlinking crowns (Patton, 1975; Hall, 1981; Ramachandran, 1988). Thus, the observations of the abundance of *Ratufa* in different compartments of Similipal indicates that it is one of the most luxuriant and healthy forests in Orissa State.

Food plants

The squirrels are diurnal and are active during the early hours of the day and late hours of the evening and rest during midday. This activity forms 25% of the total activity (Johnsingh and Joshua, 1991). During the study period a total of twenty-four species of food plants were recorded. The Giant squirrel depends mostly on seeds of *Careya arborea*, *Terminalia bellirica*, *Terminalia chebula*, *Tamarindus indicus* and *Terminalia tomentosa*.

Nesting habits

The drey is usually located at the interlinking of the crowns of neighboring trees, so as to allow easy access for jumping and moving away from the drey. This method of drey construction has also been observed in the Kaibab squirrel (Hall, 1981). Data on nesting habits was randomly collected during the field trips to Similipal. Fourteen species of plants have been reported to hold *Ratufa* dreys. Dreys are constructed by depositing a large number of twigs with leaves on the forked twig. The mouth of one old nest on a *Schleichera oleosa* tree was 1 cm in diameter. The entry into the nest was placed horizontal to the ground. The depth of the nest was 35 cm and the inner diameter was 40 cm. The nest occupied an area of 123x54 cm. Squirrel dreys are distinct from bird's nests in having leaves of the nesting tree interwoven in the middle of twigs. Freshly constructed nests were sighted mostly during the months of September-November. The nests are built amid small branches at a mean height of about

17.3 m above the ground (range=12-30 m for n=53nests).

In the study area, trees species such as *Michelia champaca*, *Shorea robusta* and *Schleichera oleosa* were favored most for nesting. Plants where nests were found, but had no signs of feeding included *Kydia calysina*, *Vitex peduncularis*, *Lagerstromia parviflora* and *Litsea monopetala*. Food plants where no nests were detected included *Emblica officinalis*, *Terminalia bellirica*, *Buchanania lanzan*, *Gmelina arborea*, *Terminalia chebula*, *Anthocephalus chinensis*, *Bridelia retusa*, *Careya arborea*, *Adina cordifolia*, *Eugenia operculata*, *Dillenia pentagyna*, *Bulbophyllum triste*, *Cassia fistula* and *Tamarindus indica*.

A giant squirrel will often construct more than one drey during a season. Individual squirrels used more than four nests within a territory at given time. The reason for the multiple nest phenomenon was either to escape from nest predators like langurs and Rhesus macaques, or to provide protection from climate factors like temperature or rain.

Conservation

The distribution of the Indian giant squirrel has been reduced to isolated forest patches (Borges *et al.*, 1992) due to the forestry operations and tree felling, even in protected areas. Hence, for the effective management and conservation of *Ratufa indica*, it is important to document the species' distribution, food plants and nesting behavior in the forests. We are still far from understanding the ecology of this species, given that no serious study has ever been undertaken in Similipal to assess the status and biology of the animal. In the absence of such a study, it would be difficult to suggest sensible management policies, except to recommend the protection of already known squirrel habitats.

Another threat to the long term survival of *Ratufa* comes from the activities of nomadic tribes like the Khadias, Mankidias and Shabaras. They are responsible for the illicit felling of old trees when they collect honey, wax and resin. In addition, the animal is also killed by some tribes in Similipal for use in medicinal preparations and for its attractive

fur. There is also a thriving trade in smuggled infant *Ratufa* to keep as pets. Therefore, immediate conservation measures are warranted or else we run the risk of losing our only squirrel. This would not mean just the loss of a single species, but a loss to the entire ecosystem.

Some of the urgent conservation measures that have been initiated include:

- strengthening forest protection efforts to see that their habitats are well protected so the squirrels have adequate food, live in healthy natural surroundings and can breed to maintain a viable number of their kind;
- monitoring the giant squirrel population to study their birth-death rate, predator-prey ratio and their scientific ecology to identify and eliminate causes that hamper their population growth;
- establishment of a long term ecological monitoring programme and the development of an integrated conservation strategy.

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Table-1: Population density of Giant Squirrel in Similipal Tiger Reserve.

Range study site	Density/ha(D)	Confidence level { $\pm t(SE)$ }*	Area in ha	Total Number
UBK	0.062351	0.045816	1,9441.6	1,212
CHAHALA	0.095868	0.05037	9,772.12	937
JENABIL	0.046701	0.027531	12,351.30	577
NAWANA (South)	0.132262	0.081619	15,272.12	2,020
NAWANA (North)	0.081746	0.080839	8,451.62	691
PITHABATA	0.140496	0.084397	7,726.38	1,086
NATIONAL PARK	0.223971	0.146771	9,583.24	2,146
BARIPADA DIVN.	0.052381	0.036691	21,855.48	1,145
KARANGIA DIVN.	0.02	0.025818	24,747.05	495
RAIRANGPUR DIVN.	0.022222	0.047556	15,773.70	351
TOTAL			14,974.61	10,660

Note: t = Students t , SE = Standard error

STUDY ON THE STATUS AND VARIOUS USES OF INVASIVE ALIEN PLANT SPECIES IN AND AROUND SATCHARI NATIONAL PARK, SYLHET, BANGLADESH

by Sharif Ahmed Mukul, Mohammad Belal Uddin and Mashiur Rahman Tito

Introduction

During past two decades Invasive Alien Species (IAS) have gained wider recognition by scientists for their severe ecological and economical impacts worldwide, and have been identified as one of the greatest threats to native ecosystems, habitats and species. In fact, such species are introduced for their rapid growth, efficient dispersal capabilities, large reproductive output and tolerance to a broad range of environmental condition (Campbell, 2005). Although it has been widely believed that such characters of IAS frequently threaten the native biodiversity, still there are some contradictions in the definition and the use of the term IAS, and not all of these species are harmful (Wittenberg and Cock, 2001). Recently, Dr. Parvez Harris, a Bangladeshi scientist, observed that the powder obtained from the dried root of water hyacinth, one of the major IAS of Bangladesh and other countries of the tropics, can considerably reduce the arsenic contaminants from water and render it unobjectionable for human drinking. Bangladesh is thought to have more than 300 alien species, some with invasive natures which grow either wildly or are widely cultivated throughout the country (Hossain and Pasha, 2001). Among them, most of the herbs and shrubs were introduced during the British colonial period for their aesthetic value and most of the timber species were introduced in the country from the late eighties to early nineties to meet the country's rapidly growing demand for timber. A number of studies have been conducted on the ecological and economical impacts of IAS at both national and regional levels, but very few studies have focused on their use and role to local livelihoods. Our study

attempts to demonstrate the status and various uses of these so-called invasive alien plant species in and around Satchari National Park, located in the northeastern hilly regions of Bangladesh.

The study area

Satchari National Park is one of the newest among the eighteen protected areas of Bangladesh. The area of the park is about 243 ha and is comprised of the Raghunandan Hills Reserve Forests (RF) within the Satchari Range. The park is situated nearly 130 km northeast of Dhaka and is located in Chunarughat Upazila (administrative unit) of Habigonj District.

The southern part of the park is bordered by India; other adjacent areas are covered by tea estates, rubber, agar plantations and paddy fields. Although this forest classically belongs to the evergreen type, the large-scale conversion of the indigenous forest cover to plantations has changed its forest type entity (Choudhury *et al.*, 2004). Now only 200 ha have natural forest; the rest is secondary-raised forest. It is also one of the last habitats of Hoolock gibbons (*Bunopithecus hoolock*) and the rare bird species Hooded Pitta (*Pitta sordida*), in the country.

The topography of the Satchari area is undulating with slopes and hillocks, ranging from 10 to 50 m in elevation. The climate is tropical in general. The total annual average rainfall is 4,162 mm. A number of small, sandy-bedded streams drain the forest during the rainy season. The maximum and minimum temperature of the area is 32°C and 12°C respectively. The relative humidity fluctuates between 74% to 90%.

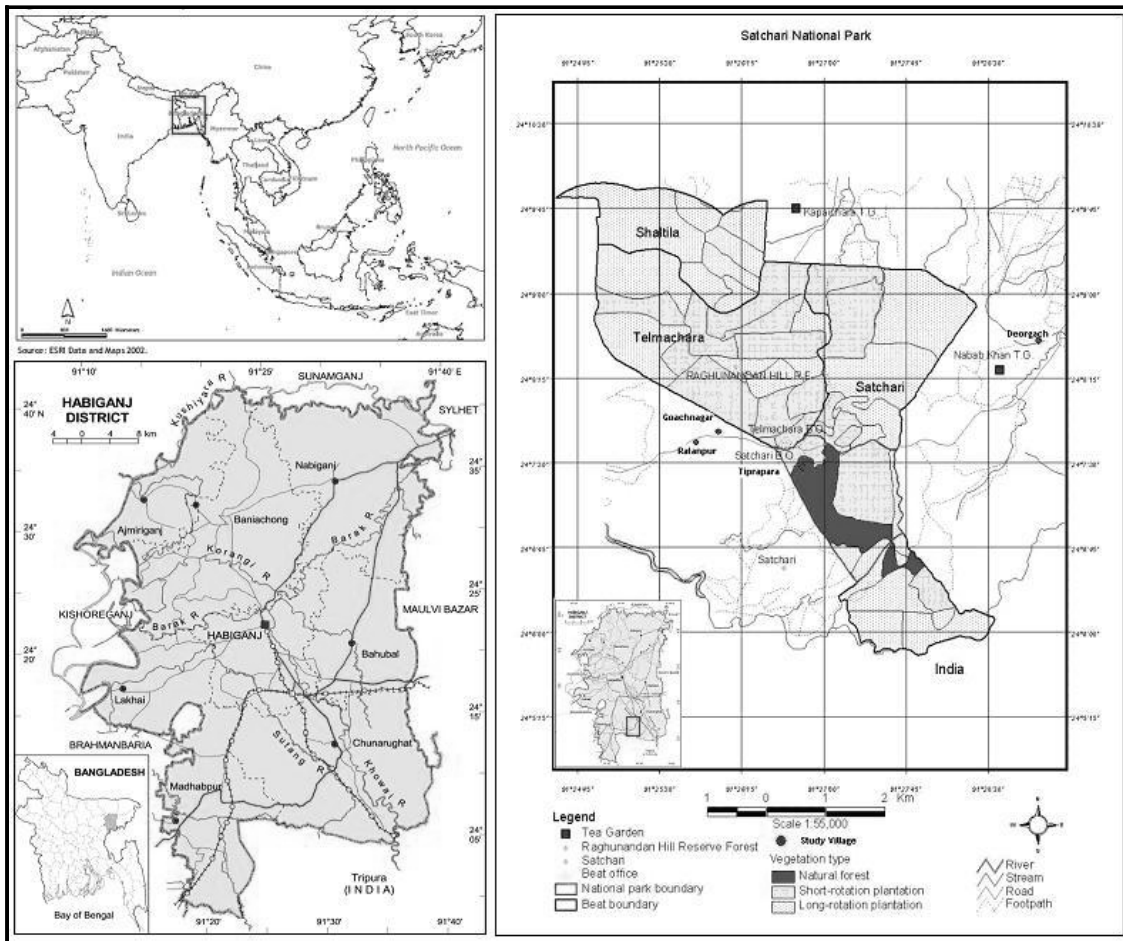


Figure 1. Location map of the study area

Methodology

The data for this paper was collected during a course of intensive field visits undertaken to Satchari during February to June, 2006. During the course of the field visits the authors surveyed a number of sample plots in and around the national park boundary to identify the IAS plants available in the locality. Specimens and photographs of unfamiliar species were also collected. Some group discussions were also arranged with the local inhabitants to learn the various uses of the identified species in the Satchari area.

Several authors (e.g. Barua *et al.*, 2003; Islam *et al.*, 2003; and Hossain and Pasha, 2001) have studied various aspects of IAS in Bangladesh; to classify a plant species as an invasive alien species the authors have followed the available literature.

Results and discussion

Invasive alien plant species of Satchari

During our intensive field survey we recorded a total of 19 alien species belonging to 12 different families; 15 of them were found to have been reported as IAS from various literature. Species were mostly found to belong to the Family Fabaceae (26%), followed by the Family Asteraceae (11%), Meliaceae (11%) and Verbenaceae (11%). Most of the recorded species were trees (47%), followed by some herbs, shrubs and others. Most of the species were found growing in natural forest (i.e. in the national park and adjacent reserved forest), while rest were found along roadsides, in waste and fallow lands, tea gardens and agricultural fields.

Peoples' use and perception of various IAPS

We have documented twelve diverse uses of the identified species in and around Satchari National Park. However, most of the species were found to be of multipurpose use. For example, water

hyacinth is considered as one of the 100 worst IAS of the world (Lowe *et al.*, 2000), but is used by the local people for 3 different purposes. The majority of identified species were found to be used for fuel, followed by timber production, medicinal or curative uses, fodder, and many others.



Figure 1. Some common IA plant species of Satchari (clockwise: lantana; oil palm; siam weed and water hyacinth)

Our study also revealed that the majority of the identified tree species in the locality were introduced to meet the increasing demand for timber. Most of the weeds, both aquatic and terrestrial, and shrubs are reported to have been in the locality for a long period of time. Although the people of the Satchari area not conversant with the term IAS, they prefer such species of timber for their fast-growing nature. However, during our survey they reported 5 species as being very harmful to the local ecosystem, another 6 species that were moderately harmful, and 4 species that were less or least harmful.

Conclusions and recommendations

It is true that the so-called invasive alien species have some negative impacts on local ecosystems, but not all of them are harmful or useless. Besides, of the many alien species in the country, their uses and impact on local ecosystems have yet to be identified. Therefore, a national programme must be initiated to distinguish the harmful from the harmless species and to identify the use and impacts of the former and latter. The Government should be cautious in introducing alien species in plantation programmes and should establish clear

Table 1. Various alien plant species (invasive) found in and around the national park area

Botanical name	Common name	Local name	Suspected origin	Habit	Occurrence*	Level of invasion+	Uses
<i>Acacia auriculiformis</i>	Acacia	Akashmoni	Australia	Tree	***	+	Ti, Fu, N
<i>Acacia mangium</i>	Mangium	Mangium	Australia	Tree	**	+	Ti, Fu, N
<i>Albizia odoratissima</i>	Ceylon Rosewood	Siris	-	Tree	**	?	Ti, Fu, Sh
<i>Alternanthera philoxeroides</i>	Alligator weed	Helench	South America	Terrestrial /aquatic herb	**	++	Fm
<i>Eichhornia crassipes</i>	Water hyacinth	Kachuripana	South America	Aquatic weed	***	+++	Fod, Fe, Oth
<i>Elaeis guineensis</i>	African oil palm	Oil palm	North America	Palm	***	+++	Fa
<i>Eucalyptus camaldulensis</i>	Eucalyptus	Eucalyptus	Australia	Tree	**	++	Ti, Fu
<i>Chromolaena odorata</i>	Siam weed	Uzaru lata	North America	Shrub	***	+++	M
<i>Imperata cylindrica</i>	Cogon grass	Chan	North America	Perennial weed	***	+++	Th, Fod, Fu
<i>Ipomoea aquatica</i>	Morning glory	Kalmi	Tropical Africa	Herb	**	++	Fm, Fod
<i>Lantana camara</i>	Lantana	Lanthan	South to Central America	Shrub	***	++	M, O
<i>Leucaena leucocephala</i>	Horse tamarind	Ipil-ipil	Northern to Central America	Tree	*	+	Fod, Ti, Fu
<i>Mikania scandens</i>	Mile-a-minute weed	Assam lata	South-Central America	Climber	***	+++	M
<i>Mimosa pudica</i>	Giant mimosa	Lazzabati	Central and South America	Herb	***	++	M
<i>Pinus elliottii</i>	Pine	Jhau	Caribbean	Tree	*	+	Fu
<i>Salvinia molesta</i>	Salvinia	Topapana	Brazil	Aquatic weed	**	++	Fe
<i>Swietenia macrophylla</i>	Mahogany	Mahogani	Central and South America	Tree	***	?	Ti, Fu
<i>Swietenia mahagoni</i>	True mahogany	Mahogani	North America	Tree	***	?	Ti, Fu
<i>Tectona grandis</i>	Teak	Shegun	Myanmar	Tree	***	?	Ti, Fu

Key notes:

Occurrence*: * - rarely found, ** - fairly found, *** - commonly found.

Level of invasion+: based on peoples perceptions; + - low impact, ++ - moderate and +++ - high level of invasion.

Uses: Fod- fodder, Fu- fuel, Fm- food for men, Ti- timber, Fe- organic fertilizer, M- medicinal, N- soil amelioration through nitrogen fixation, Th- thatching O- ornamental, Sh- shade provider, Fa- food for animal, Oth- others.

and effective quarantine regulations for alien (invasive) species. In addition, a standard and comprehensible procedure for the introduction and monitoring of alien species is necessary.

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FOREST NEWS

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CAPTURING OPPORTUNITIES FOR THE POOR IN FOREST HARVESTING AND WOOD PROCESSING

Globally, more than 1.6 billion people rely on forest resources for their livelihoods. Ironically, while often living in the midst of valuable forest resources, most of these 1.6 billion forest-dependent people are poor. Due to restrictions and controlled access, the poor typically view forests as a bothersome obstacle to be removed to make way for agriculture, as places from which to collect fuelwood and other non-wood forest products, or as areas “off-limits” to all but the privileged and powerful.

A more fortunate minority of the forest-dependent poor have gained limited recognized rights to harvest and use certain specified forest resources (but rarely timber) – usually in exchange for contributing to forest protection or rehabilitation. For the most part, however, the rural poor realize only subsistence benefits from forests or perhaps some meager levels of cash income.

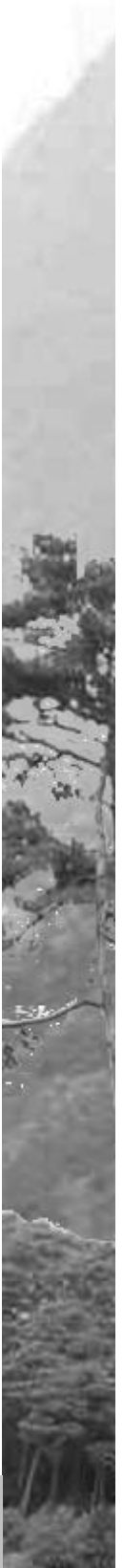
The most valuable commercial resource contained in most forests is timber. Yet, despite the high value of wood and wood products, the poor have rarely benefited significantly from timber extraction or wood processing. This reflects a generalized marginalization of the poor over time. It also reflects a widespread perception that the (uneducated) poor have no capacity to manage and use forests sustainably and an indifference to the plight of the poor. However, with poverty reduction now at the forefront of most development strategies, it is time to rethink the potential for forests and forestry to contribute to the well-being of the rural poor.

Can forests be consciously managed to increase income and employment for the poor without

compromising overall national economic development objectives or environmental values? Are local people capable of effectively and efficiently engaging in small-scale timber harvesting and wood processing? Are private companies and state forest enterprises willing to work with local people and allow them to extract and process timber that might otherwise be uneconomical to remove from the forest? Are governments ready to shift paradigms of forest management and utilization to give greater access to the poor? What laws and regulations need revision to facilitate such new approaches in forest management?

In October 2006, 155 forestry experts and professionals from 33 countries gathered in Ho Chi Minh City, Vietnam, to ponder these issues and to discuss the opportunities and constraints related to small-scale forestry for the benefit of the poor. The *International conference on managing forests for poverty reduction: capturing opportunities in forest harvesting and wood processing for the benefit of the poor* was organized by FAO, the Regional Community Forestry Training Center for Asia and the Pacific (RECOFTC), the Netherlands Development Organization (SNV), the Tropical Forest Trust (TFT), the Asia-Pacific Forestry Commission (APFC), the World Wildlife Fund (WWF), and the Department of Forestry in Vietnam, with sponsoring support from the International Tropical Timber Organization (ITTO) and the Netherlands Development Cooperation.

The conference provided an opportunity to discuss and share experiences on practical



ways in which small-scale forestry can be harnessed for poverty reduction. The aim of the conference was to take a first step towards the development of appropriate policies, incentives, legal frameworks, institutional arrangements, markets and appropriate technologies for supporting the development of viable small-scale harvesting and wood processing of direct benefit to the poor.

The conference made it clear that success stories of linking poverty reduction with small-scale forest-based enterprises through a range of modalities *do* exist. However, the conference also confirmed that there are many challenges in establishing these links and that there is still a lot of work to be done in terms of building understanding for and finding proper ways to reduce poverty through small-scale forestry.

The conference consisted of two days of presentations on small holder forestry case studies, one day of working group discussions, and one day for field trips.

It was further divided into five technical sessions:

- policies and legislation;
- economic issues;
- forest management modalities and institutional aspects;
- technical aspects; and
- accessing markets.

Policies and legislation

The technical session on policies and legislation focused on instruments that can potentially serve both forests and the poor.

Strengthening the rights of the rural poor to access and use forest resources is still a critical need that should be addressed in parallel with capacity building and small enterprise development. Appropriate and stable policies, laws, and regulations are required to encourage resource users to make investments in forest product development. Rules and regulations that guide harvesting and processing by small-scale operators must be simplified to facilitate the participation of the rural poor and reduce opportunities for corruption.

Economic issues

The session on economic issues raised the question: if small is beautiful, is it also cost effective? The question was not definitively answered during the conference, but it appears that small-scale forest enterprises can be viable and competitive under some conditions. Associations and producer groups can help to create economies of scale and give more bargaining power to the poor. Financial institutions and the commercial sector can play important roles in enabling small-scale forest enterprises to develop and flourish. Developing sound business plans and conducting feasibility studies before going into business can reduce the risk of failure. Linking small-scale producers with larger private companies can provide mutual benefits. More work is needed to develop tools for better understanding the impacts of community-based forest enterprise development on the poor. The conference emphasized the importance of ensuring that the poor are supported in developing their capacities and assets, rather than simply providing labor in forest harvesting and processing.

Forest management modalities and institutional issues

The conference revealed that major problems with community-based forest enterprises often relate to benefit-sharing arrangements. Explicit efforts are therefore required to help move toward more equitable and fair benefit sharing and decision making. Culture-specific institutional arrangements can help foster more democratic and participatory decision making and management. Skilled facilitation of stakeholder dialogues and participatory processes could help the give greater voice to the poor and under-privileged. There is a need to build capacity at all levels and share information about different management approaches and options.

Technical aspects

An essential element in successful small-scale forest harvesting and wood processing is the use of appropriate practices and affordable equipment. Affordable and appropriate practices and

equipment do exist, but information about them is not widely known or recognized. Moreover, the use of these technologies may be constrained by the lack of local capacity or by policy and legal barriers. For poverty reduction, appropriate technologies need to be supplemented by institutional support to ensure they are appropriately applied and made readily available to the poor.

Accessing markets

The conference acknowledged the importance of small-scale forest enterprises having a business focus from the outset if they are ever to prove profitable and economically viable. Small-scale enterprises face major constraints in accessing capital, market information and business know-how. Associations, cooperatives, and producers groups can help by pooling resources, improving product quality, reducing transaction costs, and providing stronger bargaining positions. It was noted that associations cannot make bad businesses into good ones, but can help good businesses improve and grow.

Outcome and conclusions

A key conclusion of the conference was that there is a widespread need for building linkages between the respective stakeholders involved in forestry and poverty reduction. This includes forest policy

makers, the private sector, local communities, development organizations and donors. For forestry to truly benefit the poor, conscious decisions must be made to change the way forests are managed and allocated, and most importantly how the benefits of forest utilization are shared. Poverty reduction has to become an explicit priority of forest management and not simply a hoped-for by-product. It is important that all stakeholders cooperate and seek mutually beneficial partnerships in terms of applying the right technology, creating access to markets, improving forest management, and creating employment opportunities for the poor and disadvantaged.

The importance of engaging more effectively with the private sector was repeatedly highlighted during the conference. It was further recognized that clear property rights, simple and stable policies and strong local institutions are essential if poorer members of society are to access and benefit from forests. However, it was also noted that the poor can be very difficult to identify and to reach, and that more efforts are required to identify and build upon promising existing efforts.

The conference produced a statement calling for widespread support and recognition of the potential of forest harvesting and wood processing to benefit the poor (see following).

**2006 HO CHI MINH CITY STATEMENT ON
MANAGING FORESTS FOR POVERTY REDUCTION
3-6 October 2006
Ho Chi Minh City, Vietnam**

In consideration of the following:

- The Millennium Development Goals aim, among others, to halve poverty by 2015 and promote environmental stability.
- Forests can greatly contribute to poverty reduction while providing environmental services, considering their vast coverage, abundant resources, and the millions of people depending on them for subsistence and survival.

- Demands on forests and trees are increasing, with about 1.6 billion people relying heavily on forest resources for their livelihoods.
- Some 350 million of the world's poorest people are heavily dependent on the forests for their survival.
- In most forested areas, the most significant value and income opportunities come from timber harvesting and wood processing.
- Forest resources can generate substantial capital and spur economic growth but forest wealth has generally not been shared equitably, especially with the rural poor and disadvantaged.
- Community management and protection responsibilities already provide services which must be recognized in the form of government compensation or payment for environmental services.
- Policy, institutional, socio-economic, market, and technical barriers exist in many countries, constraining the potential of forest management to reduce poverty.
- Policies, laws and rules are rarely well-implemented in a way that reduces poverty, due to lack of effective and efficient monitoring and control systems.
- Adherence to sustainable forest management principles and practices is fundamental to successful implementation of pro-poor programs and projects.
- Community-based forestry is one of the key strategies in promoting sustainable forest management and in reducing poverty in rural areas.
- Timber is often out of poor people's reach but, where rights and policy frameworks are favorable, small and medium forestry enterprises can reduce poverty.
- New trends with respect to markets, technologies and institutions offer ample opportunities for employment and for generating income in rural areas.
- There is a pressing need for the different stakeholders, including policy makers/decision-makers, development and donor organizations, development practitioners, the private sector, and local communities to work collectively to enhance the contribution of forest management and timber harvesting in poverty reduction, thereby contributing to the overall achievement of the Millennium Development Goals.

Therefore, we, the participants of the 2006 International Conference on Managing Forests for Poverty Reduction do hereby call for policy makers and decision-makers to:

- Improve access to, and expand opportunities for management of forest resources by the poor, by creating or reviewing policies that will enable local communities and individual households to economically benefit from these resources taking into account traditional rights, knowledge systems and social values.
- Simplify forest policies, laws and regulations on forest resource allocation, harvesting, transporting, processing and marketing and benefit sharing, and enforce them equitably.
- Facilitate and promote the formation and operation of community-based organizations and ensure their empowerment and capacity building.
- Institutionalize a comprehensive support system and incentives to promote the development of community-based small and medium scale wood-based enterprises supportive of poverty alleviation.
- Integrate forest and natural resources into poverty reduction strategic plans.
- Develop policies on devolution of forest management to include economic partnerships between communities/households and the private sector for achieving poverty reduction objectives.

- Develop and strengthen partnerships of local communities with civil society organizations.
- Ensure regular monitoring and evaluation of policy implementation.

We also call on forest-related development organizations and donors to:

- Support and monitor the formulation and implementation of forest policies, programs and projects that will enable poor people to have access, control and benefits over valuable timber resources in addition to other forest resources.
- Develop and implement initiatives and methodologies that strengthen the rights, capabilities and decision-making power by local communities to sustainably manage forest resources and benefit from the commercial use of these resources.
- Facilitate effective dialogue and participatory planning and agreement among stakeholders (public sector, private sector, local communities) towards sustainable forest management and poverty reduction.
- Facilitate the design of methodologies and local development processes that will ensure that poor people will benefit most from sustainable forest management utilization and high-value forest resources, using a people-centered development approach which promotes inclusion and equity, works in the context of the existing social and institutional framework, and builds on indigenous knowledge.
- Ensure sustainability of development initiatives and benefits to the poor after project completion.
- Support and develop monitoring and evaluation mechanisms and research that assesses socio-economic impacts and documents and analyzes the contribution of forests in poverty reduction.
- Improve coordination among development and donor organizations, and facilitate linkages between the private sector, public sector and local communities in order to ensure their access to information and knowledge which promotes a pro-poor focus.
- Promote pro-poor forest enterprise development that is market driven and pays attention to poor people's capacities and potentials. (e.g., quick return silvo-pastoral systems, simple technologies.)
- Raise awareness of how to link enterprise/business development with livelihood improvement processes which are understood and determined by the poor.

In addition, we call on the private sector to:

- Contribute to the development and operation of small and medium forest enterprises that serve both business and poverty reduction objectives.
- Establish mutually beneficial partnerships (medium to long term) with local communities/ households and associations to harness the socio-economic potentials of sustainable forest management and utilization.
- Apply appropriate technologies, make investments in forest resource rehabilitation, support human resource development, and promote market access for the poor to allow them to benefit from forest harvesting and processing.
- Improve social responsibility towards their own employees.

And we ask local communities to:

- Establish meaningful partnerships with other stakeholders to support sustainable forest management and viable forest enterprises, and to maximize benefits from their operations.

- Institutionalize local mechanisms to ensure more equitable benefit sharing and gender mainstreaming from responsible forest management and utilization.
- Institute a sense of responsibility, accountability and transparency among local community members to ensure that harvesting privileges and group funds will not be mismanaged.
- Adopt sound business approaches to the management of their forest resources.
- Ensure that women and other disadvantaged groups are represented in decision-making and benefit-sharing processes.
- Mobilize natural and human resources to generate financial and social capital.
- Play a more proactive role in policy-making processes for forest management such as land allocation, land-use rights, forest product trade, etc.

REHABILITATION OF COASTAL FORESTS AFTER THE TSUNAMI

Workshop on coastal forest rehabilitation and management in Asian tsunami-affected countries, 26 September 2006, Bangkok, Thailand

Twenty months after the 2006 Indian Ocean tsunami, FAO held a one-day workshop in Bangkok on *Coastal forest rehabilitation and management in Asian tsunami-affected countries* to exchange information on post-tsunami coastal forest rehabilitation and identify related long-term needs.

The workshop was organized by the Government of Finland-funded “Forestry programme for early rehabilitation in Asian tsunami affected countries” and centered on presentations provided by representatives of national forestry agencies from India, Indonesia, Malaysia, Maldives, Myanmar and Sri Lanka. The presentations drew attention to:

- the pre-tsunami status of coastal trees and forest resources, and impacts of the tsunami;
- the status of rehabilitating coastal forest and issues that have emerged;
- lessons learned, policies, legislation and institutional factors affecting management of coastal forests and trees; and
- key needs to support short- and long-term efforts in coastal forest rehabilitation and management.

Representatives of regional and international organizations, NGOs and donors also participated, and presentations of programmes and activities in coastal forest rehabilitation were given by the IUCN-led “Mangroves for the Future” initiative, the Green Coast/WWF Aceh project and the Coastal Greenbelt Initiative of the Global Environment Centre.

The meeting’s main message was that although the tsunami caused direct damage to forests in the worst hit areas of Indonesia, Sri Lanka and India, a more significant outcome has been heightened awareness of the degraded state and continuing loss of coastal trees and forests in the region. The social and environmental implications of these losses are varied, but in general the repercussions of forest and tree removal are felt most acutely by poorer sections of society and associated environmental costs are seldom born by those reaping direct benefits.

The opportunity therefore exists to improve the situation through reform of policy and management systems, such that conservation and rehabilitation of coastal trees and forests are better facilitated.

The direct activity of planting trees is an integral part of this effort, but by no means the only component, as post-tsunami experience has shown – seedlings were often planted only to be subsequently removed or to die because the prevailing policy, economic and physical environments were inadequate.

Recommendations in relation to coastal forest rehabilitation in the areas of information collection and coordination; policy, legislation and institutions; and capacity building and technical assistance were generated by workshop participants. Prominent themes included:

- Making better use of local knowledge during project activities and disseminating information at the local level and in local languages;
- Collecting and disseminating information on the effects of climate change on coastal forests and the role of coastal forests in mitigating associated adverse effects;
- Preparing guidelines on good practices, training and extension and technical matters in relation to coastal forest protection and management;
- Developing guidelines to incorporate forestry into disaster-management strategies;
- Reducing policy conflict and overlaps detrimental to coastal forests and developing

regulations to bridge gaps between policy and implementation;

- Building capacity in relation to, and improving levels of, participation and consultation in relation to coastal area policy and planning;
- Strengthening links among field programs and research and education institutions to support improved coastal forest rehabilitation and management; and
- Implementing technical, communication and policy-related training for government and non-government organizations in relation to coastal forest rehabilitation.

The recommendations of the workshop reinforced the appropriateness of many of the activities undertaken by FAO's current regional forestry-tsunami programme and provided valuable inputs for future work such as that proposed under the "Mangroves for the Future" initiative, due to begin in 2007.

Outputs from the workshop, including the country papers and recommendations, are available at the following address: www.fao.org/forestry/site/35733/en.

FAO FORESTRY STAFF MOVEMENT

FAO's Director-General has appointed **Mr. Jerker Thunberg**, a national of Sweden, to succeed Mr. François Wencélius as the next Manager of the National Forest Programme Facility. Mr. Thunberg will begin his new duties at the beginning of February 2007.

Ms. Susan Braatz, a U.S. national, will transfer back to FAO Rome after completing her assignment as Programme Coordinator for Project OSRO/GLO/502/FIN (Forestry Programme for Early Rehabilitation in Asian Tsunami-Affected Countries).

Mr Jeremy Broadhead, a British national who served as Assistant Coordinator for the Project, has now been appointed Coordinator of the Project, effective 5 January 2007.

Mr Broadhead holds a B.Sc. in Ecological Science/Forestry from the University of Edinburgh, United Kingdom (1994) and a Ph.D. in Agroforestry from the University of Nottingham, United Kingdom (1999).

EXPERTS JUMP START ASIA-PACIFIC FORESTRY OUTLOOK STUDY

How should a two-year process to assess the future of forests and forestry in Asia and the Pacific begin? One thing is certain – it needs to start on solid footing. Mindful of this, there seems no better way to begin than by picking the brains of some of the best forestry thinkers in the region. So we did!

A Scientific Committee was established to function as a “think tank” to support the implementation of the second Asia-Pacific Forestry Sector Outlook Study (APFSOS). The committee comprises 18 experts who bring a diverse range of perspectives to the table, including broad geographic diversity, various stakeholder views, and a blend of youth and experience.

The first meeting of the Scientific Committee was held 23-25 November 2006, in Chiang Mai, Thailand. The Committee was briefed on the planned implementation of the outlook study and sessions were devoted to discussing:

- overall approach for the outlook study;
- major drivers of change in the region;
- broad trends in societal transitions and their implications;
- potential topics for APFSOS thematic studies;
- structure of regional and sub-regional reports; and
- elements of a broad vision for the Asia-Pacific forestry sector.

The Scientific Committee addressed most of these items in brainstorming sessions. In the session on major drivers of change, the committee discussed key developments and forces, and their implications for forests and forestry. The forces were broadly categorized as environmental, economic and social in nature. Diverse situations pertaining to the region were discussed, providing substantial clarity to the process.

Discussions on broader societal transformations emphasized that the region is undergoing fundamental change and that the proportion of

different segments of society (forest-dependent, agrarian, industrial and post-industrial) will differ throughout the region and among countries over the next 15 years, affecting the values and perceptions on forests. These will have major influence on policy making in coming years. Analyzing societal transitions will require an assessment of a range of indicators, such as agriculture’s contributions to GDP, changes in employment and livelihoods, trends in urbanization, dependence on industrial and service sectors, and formalization of the informal sector.

The Scientific Committee identified, reviewed and prioritized topics for specific in-depth thematic studies. It noted that some priority topics were already relatively well researched by a number of institutions. Hence, the outlook study might merely synthesize available information for these topics. The Scientific Committee emphasized that the thematic studies should have a strong outlook focus, specifically examining what may happen over the next 15 years.

In the final session, a preliminary vision statement for forestry in Asia and the Pacific was articulated, that:

...forests are sustainably managed to provide the mix of goods and services according to what all segments of society want (environmental services, wood products, non-wood forest products, community benefits) in a balanced way that is transparent, equitable, participatory and responsive to stakeholders – with institutions that give clear authority/responsibility/accountability to managers (whether government, local communities or the private sector) who have appropriate knowledge, skills and resources.

The Scientific Committee meeting was highly productive – helping to establish a solid base at the start of the outlook study. The constructive and insightful inputs for the Scientific Committee have ensured a positive launch to this important endeavor.

ARE FOREST GOVERNANCE AND DECENTRALIZATION HEADING IN THE RIGHT DIRECTION?

In an effort to review experiences in decentralizing forest management and reforming forest governance, FAO joined with the Center for International Forestry Research (CIFOR), the International Tropical Timber Organization (ITTO), Swiss Intercooperation, the Swiss Federal Office for the Environment, the Regional Community Forestry Training Center (RECOFTC), the Philippine Department of Environment and Natural Resources, the Indonesian Ministry of Home Affairs and the Indonesian Ministry in organizing the *Yogyakarta workshop on forest governance and decentralization*, 4-6 September 2006, in Indonesia. The workshop attracted 133 participants from 21 countries, including representatives of local, provincial, state and national governments, community organizations, and international organizations.

The objectives of the workshop were to:

- share recent experiences and lessons learned from countries implementing decentralization and broader governance reform in their forestry sectors at different levels of administration;
- identify the implications of trends and lessons learned for national and sub-national forest policy formulation and implementation processes, and poverty reduction strategies; and
- recommend approaches for strengthening policies, institutions, and practices of decentralized forest governance systems to reduce the gap between theory and practice.

The workshop also served to assess progress in decentralization and forest governance since the *International seminar on decentralization and devolution of forest management in Asia and the Pacific*, convened by FAO, RECOFTC, and DENR, in Davao, Philippines, in 1998.

The workshop included presentations in plenary and breakout groups, working group discussions, field trips, and parallel panel discussions on three themes.

Highlights and key messages of the workshop

General:

- Decentralization is not a panacea (outcomes vary, local antecedents have major influence)
- Decentralization must be viewed as “a work in progress” – various points of tension are to be expected
- Decentralization
 - takes time (gradual vs. big bang approaches)
 - requires constant renegotiation and adaptation

Rights, roles, and responsibilities:

- There is a need to further clarify roles, rights and responsibilities under decentralization
- Clarity and stability of tenure regimes (right to own, access, use, sell, transfer, etc.) are essential

Institutions, organizations, capacity building, infrastructure, and legal aspects:

- There are major issues of inequity (gender, ethnic/tribal, caste, across regions, within and among communities)
- Inequities and uneven access to resources and processes of decision-making related to forests constrain effectiveness of decentralized forest governance
- Capacity building and empowerment is critically needed at all levels
 - spaces for targeted empowerment
 - capacity to negotiate
 - infrastructure support
 - resources and enabling environment
- New ways of thinking and doing things that allow for local adaptation and diverse institutional arrangements are essential

- honest consultation
- transparency and accountability
- incentives and disincentives
- Legal and regulatory frameworks need to be further clarified; gaps need to be addressed
 - inconsistencies and inequities need to be redressed
 - understanding links between “illegalities” (small-scale and large-scale)
- Corruption and perverse incentives need to be tackled
 - alliances with civil society, use of the media
 - advocacy and direct action

Financial incentives and investment:

- Funds provided for decentralization are generally inadequate
- Decentralization has often meant devolving costs and burdens with uncertain benefits
- Major revenue-generating rights and resources remain centralized
- Various sources of funding for decentralized forest management can be better accessed
 - central government
 - local government
 - local communities
 - external donors
 - private sector (untapped potential)

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

RUSSIA INFORMS CHINA OF PLANNED FORESTRY CODE CHANGE

Russia has informed China, a major consumer of Russian timber, of its plans to amend forest legislation in order to protect vast forest resources in Siberia and the Far East. The planned amendments will promote sustainable forest management by imposing duties on unprocessed roundwood exports, adopting a new forestry code and reviewing forest leasing policies to give priority to large, vertically-integrated timber companies for longer concession periods. More than 40 percent of China's total log imports come from the Russian Far East, a figure that is expected to rise in the next few years.

- *NOVOSTI, Russian News and Information Agency* -

EUCALYPTUS PLANTING IN LAOS

Oji Paper and 10 other Japanese companies have joined forces on a tree planting project in Laos to provide reliable sources of raw material for paper making. The project began in 2005, after the Oji Lao Plantation Forest Co. was jointly set up by

Oji Paper and the Laotian government. The joint venture will secure 50,000 hectares for tree planting activities for the next 50 years, and will plant eucalyptus trees on about 7,000 hectares annually for seven years.

- *Japan for Sustainability* -

U.S. AND INDONESIA TO ADDRESS ILLEGAL LOGGING

The United States and Indonesia agreed to begin negotiations on a trade agreement to combat illegal logging of forests in Indonesia. The new agreement on logging will seek to support existing efforts Indonesia is making in this area while making sure that Indonesia's legally produced timber and wood products continue to have access to the U.S. market. U.S. lumber companies applauded the announcement, saying the price of legally produced U.S. timber is reduced by more than \$460 million annually because of competition from illegally produced timber.

- *Associated Press* -

MALAYSIA TO ISSUE GREEN BONDS TO GROW FORESTS

Malaysia is planning a maiden issue of agricultural bonds to grow forests. The government has approved a 15-year bond issue, worth up to 2 billion ringit (US\$ 533 million), to cover forest replanting over an area of 375,000 hectares. The 15-year cycle has been chosen as this corresponds to the growth cycle of fast-growing tree species. The government has allocated some 200 million ringit as seed money for the timber industry for 2006.

- Reuters News Service -

FIRST FORESTRY PROJECT REGISTERED UNDER CLEAN DEVELOPMENT MECHANISM

In November 2006, the first reforestation project under the Clean Development Mechanism (CDM) was registered with the UN Framework Convention on Climate Change (UNFCCC) and thereby passed the formal prerequisite for the verification, certification and issuance of temporary Certified Emissions Reductions (tCERs). Detailed information on the "Facilitating Reforestation for Guangxi Watershed Management in Pearl River Basin" project, in China, can be obtained at:

<http://cdm.unfccc.int/Projects/DB/TUEVSUED1154534875.41/view.html>

- UNFCCC -

CHINA OVERTAKES ITALY AS LARGEST FURNITURE EXPORTER

China recently became the world's largest exporter of wooden furniture, overtaking Italy from its long-held position. China has maintained an impressive upward trend in furniture production, driven by strong growth in both furniture exports and domestic consumption. China's furniture is exported mainly to the USA, the European Union and Japan.

- ITTO TTM Report 11:20 -

CAN THE FOREST PRODUCTS INDUSTRY BE PART OF A BIO-SOLUTION TO CLIMATE CHANGE?

Participants of the *International Seminar on Energy and Forest Products Industry*, convened

in October 2006, in Geneva, concluded that the global forest products industry can play a significant role in combating climate change by optimizing the use of raw material, increasing efficiency, producing bioenergy and expanding into bio-refinery products – while simultaneously enhancing the competitiveness of the sector. The meeting was jointly organized by FAO and other partners, and brought together intergovernmental and private sector organizations to discuss the role of forest products industry in addressing climate change issues.

- FAO -

WORLD BANK LENDS SUPPORT TO FORESTRY DEVELOPMENT IN CHINA

The World Bank has approved a US\$100 million loan to help China develop and protect its forest resources. The "Guangxi Integrated Forestry Development and Conservation Project" aims to assist China in improving the effectiveness of its forest management and institutional arrangements in timber production, watershed protection, and nature reserves management, and to enhance the conservation of globally significant biodiversity in selected areas of the Guangxi Zhuang Autonomous Region. The loan is supplemented by US\$5.25 million from the Global Environment Facility (GEF), to be used for biodiversity conservation.

- China View -

ASIAN DEVELOPMENT BANK TO HELP TACKLE DEFORESTATION AND RURAL POVERTY IN VIETNAM HIGHLANDS

The Asian Development Bank (ADB) recently approved a US\$45 million loan to Vietnam to help develop sustainable forest management over one-third of the country's natural forests and improve forest sector governance, management and incentive regimes in the country's highland provinces. It also aims to reduce poverty in 60 communes by involving over 80,000 of the country's poorest households in sustainable forestry development. The program will support the development of small businesses to improve the use of forest

resources, strengthen supply and market chains and increase the value of forest-based goods and services.

– VietNamNet Bridge –

KYOTO MODEL FOREST LAUNCHED

The inaugural meeting of the Kyoto Model Forest Association took place in Japan on 8 November 2006. The model forest aims to protect and nurture the forests of Kyoto through the active involvement of local citizens and other stakeholders, and to contribute to the creation of a sustainable society by enhancing the ties between local residents and the surrounding forest. Kyoto Prefecture has a rich and close relationship with its forests and landscapes, and has a globally important natural and cultural heritage to safeguard for future generations.

– International Model Forest Network –

DELL SAYS “PLANT A TREE, HELP THE ENVIRONMENT”

Dell announced that the computer company would begin a program called “Plant a Tree for Me,” asking customers to donate US\$2 for every notebook computer they buy and US\$6 for every desktop PC. The money will be given to the Conservation Fund and the Carbonfund – two non-profit groups that promote ways to reduce or offset carbon emissions – to buy and plant trees. The company urged the electronics industry to foster the planting of trees to offset the effect on the environment of the energy consumed by the devices they make.

– New York Times –

INDIA’S POOR WIN RIGHT TO FOREST RESOURCES

India’s recently enacted Recognition of Forest Rights Bill 2006 will grant land ownership and the right to live off minor forest products to those who have lived in the forest for at least three generations. More than 40 million people depend on the country’s forests, eking out a meager living from simple farming, picking fruit and collecting honey. The passage of the bill, however, raises concerns that illegal settlers may take advantage

of the law, consequently degrading the forests and hampering efforts to save endangered species.

– Reuters –

FIJI PLANS EXPANSION OF PINE PLANTATIONS

The Fijian government recently renewed its commitment to expanding pine plantations on native lands and has allocated US\$180,000 to the Fiji Pine Trust to continue with its nationwide programs in 2007.

– Fiji Times –

INDONESIA TO BAN LOGGING IN NATURAL FORESTS

To prevent further destruction of the country’s tropical forests, the Indonesian government says it will ban the use of natural forest trees by the pulp and paper industry by 2009 and by the entire wood industry by 2014. Timber processing factories would have to establish new timber plantations to ensure supply of logs by 2014.

– ITTO Tropical Forest Update –

CHINA BANS OVERLAND TIMBER IMPORTS FROM MYANMAR

China recently imposed a ban on overland timber imports from Myanmar, resulting in dramatic cuts in flows of illegal timber, according to Global Witness (a watchdog NGO monitoring timber flows in Asia). At the request of the Myanmar government, the government of China instructed Chinese border checkpoints in Yunnan Province to stop imports of all timber and mineral products from Myanmar, which were presumed by both governments to be illegal when sent by land as opposed to better-regulated sea transactions.

– ITTO Tropical Forest Update –

UN INITIATIVE TO PLANT A BILLION TREES WORLDWIDE

The United Nations Environment Program (UNEP) and Africa’s Nobel laureate, environmentalist Wangari Maathai, launched a project in November 2006 to plant a billion trees worldwide to help fight climate change and poverty. Ms. Maathai urged people from all over

the world to plant trees to combat global warming. "There are six billion of us and counting. So even if one-sixth of us each plant a tree, we will definitely reach the target," she told reporters.

– CNN.com –

BEIJING OLYMPICS BLOCKS USE OF VIRGIN WOOD FROM INDONESIA

The Beijing Organizing Committee for the Games of the XXIX Olympiad (BOCOG) announced that a review has confirmed that none of the venues is using, or will use, timber from virgin forests in Indonesia. Guidelines outlining the environmental standards for Olympic venues mandated the use of sustainably produced materials and prohibited the use of timber products from virgin forests.

– ITTO TTM Report 11:11 –

JAPAN'S GREEN PROCUREMENT POLICY COMES INTO EFFECT

Japan's new green procurement policy for forest goods and services requires that all timber bought by the state should be legal according to forest laws in producing countries and sourced from forests under sustainable management. The policy provides guidelines on ways in which importers can verify that products are legal and sustainably produced. Such public procurement policies designed to block imports of illegally harvested timber have now been adopted in the United Kingdom, Netherlands, Norway, Sweden, France and Denmark. Germany is in the process of developing a similar policy.

– ITTO TTM Report 11:11 –

ILLEGAL LOGGING COSTING BILLIONS

Illegal logging is threatening the livelihoods of millions of the world's poor, robbing governments of billions of dollars in revenue and undermining legitimate logging businesses according to the World Bank. In developing countries, illegal logging alone causes estimated losses in assets and revenue in excess of \$10 billion a year. A further \$5 billion in revenue is lost each year through tax evasion and loss of royalties on legal logging.

– Reuters –

CHINA'S GIANT PANDA SANCTUARY PUT ON UN HERITAGE LIST

The Sichuan Giant Panda Sanctuary in China, which covers more than 2 million acres and is home to over 30 percent of the world's endangered giant pandas, has been added to the World Heritage List. The prestigious listing obliges authorities to protect the natural habitat. Chinese conservationists praised the decision as a step towards protecting the shy symbols of China's disappearing wilderness.

– Reuters –

ELEVEN TIGER RESERVES IN INDIA HAVE LOST FOREST COVER

There has been a decrease in forest cover in 11 of the 28 tiger reserves in India, while 5 reserves have shown an increase in the same. The forest cover in the remaining 12 has remained unchanged, according to a report, "Forest Cover in Tiger Reserve of India – Status and Changes," brought out by the Forest Survey of India and Directorate of Project Tiger.

– The Hindu, India –

"Trees are poems that the earth writes upon the sky."

Khalil Gibran



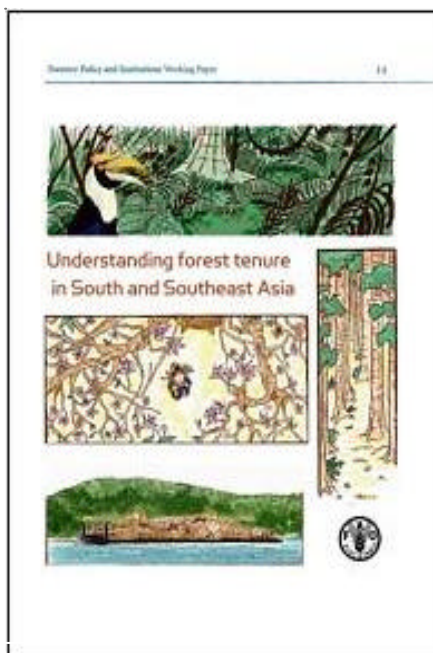
PROCEEDINGS OF CHINA FOREST FORUM

Organized by the State Forestry Administration P.R. China, Chinese Academy of Forestry, World Bank, FAO and the International Forestry Cooperation Center.

The purpose of the meeting was to discuss: a) forestry policy; b) wildlife conservation; c) forest industry and trade; d) forest resources management; e) forest restoration; and f) partnership and participation stakeholders.

For copies please write to:
State Forestry Administration P.R. China
No. 18 East Street, Hepingli, Beijing 100714
CHINA

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NOW AVAILABLE – WORKING PAPER NO.14: UNDERSTANDING FOREST TENURE IN SOUTH AND SOUTHEAST ASIA

For further information please contact:
E-mail: Francesca.Romano@fao.org
Forestry Policy and Institutions Service (FONP)
Viale delle Terme di Caracalla, 00100 Rome, Italy
Fax: +39-06-57055514

or consult the website: www.fao.org/forestry/site/33848/en

COMMITTEE ON FORESTRY



COFO 2007

“Weaving knowledge into development”

12 to 16 March 2007, Rome, Italy

COFO Provisional Agenda

- State of the World's Forests 2007
- Forests and energy
- Forest protection
- Putting forestry to work at the local level
- Progressing towards sustainable forest management, including in-session seminar on action at the regional level
- Shaping an action program for FAO in forestry

Forum and Dialogue on Key Forest Issues

- National forest programs
- Forests and energy
- Fire management
- Forest health
- Forest tenure
- Community-based forest enterprises
- National and global forest assessments
- Voluntary guidelines to promote sustainable forest management
- New generation of watershed management programs
- Interface between forestry and agriculture
- Avoided deforestation

Information Sessions & Other Meetings

- Regional Forestry Commission bureaux
- Collaborative Partnership on Forests
- Congo basin forest strategy
- Liberia forest strategy
- Social standards for sustainable certified forests
- Commonwealth Forestry Association
- Project marketplace
- Targets for the Swedish forest sector

For more information, please visit the following website: <http://www.fao.org/forestry/site/35914/en/>

FAO ASIA-PACIFIC FORESTRY CALENDAR

17-19 January 2007. Bangkok, Thailand. **2nd Regional Workshop Strategic Planning Process for the Asia Regional Model Forest Network**. Contact: RECOFTC; E-mail: info@recoftc.org

22-26 January 2007. Philippines. **Workshop on Negotiation Skills for Forestry Sector**. Contact: Dominique Reeb, Senior Forestry Officer, FONP, FAO Forestry Department, Via delle Terme di Caracalla, 00100, Rome, Italy; E-mail: Dominique.Reeb@fao.org

31 January - 2 February 2007. Chiang Mai, Thailand. **Asia-Pacific Forestry Sector Outlook Study II Focal Points Meeting**. Contact: Patrick B. 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

31 January - 2 February 2007. Beijing, China. **National Workshop on Forest Tenure**. Contact: Thomas Enters; E-mail: Thomas.Enters@fao.org

12-14 February 2007. Rome, Italy. **Expert Meeting on Understanding Forest Tenure**. Contact: Dominique Reeb, Senior Forestry Officer, FONP, FAO Forestry Department, Via delle Terme di Caracalla, 00100, Rome, Italy; E-mail: Dominique.Reeb@fao.org

20-22 February 2007. Nadi, Fiji. **Asia-Pacific Forestry Sector Outlook Study II Focal Points Meeting for South Pacific**. Contact: Aru Mathias, Forestry Officer, FAOSAPA; E-mail: Aru.Mathias@fao.org

4-11 March 2007. Bangkok and Chantaburi, Thailand. **2nd International Conference on Agarwood**. Contact: M. Kashio, Forest Resources Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel.(662)697-4141; Fax: (662) 697-4445; E-mail: Masakazu.Kashio@fao.org

13-16 March 2007. Rome, Italy. **18th Session of the Committee on Forestry (COFO)**. Contact: Doug Kneeland, Secretary COFO, FAO Forestry Department, Via delle Terme di Caracalla, 00100, Rome, Italy; E-mail: Douglas.Kneeland@fao.org

21-22 March 2007. Bangkok, Thailand. **Second Regional Community Forestry Forum for Asia**. Contact: Peter Stephens, Capacity Building Services, RECOFTC; E-mail: opjs@ku.ac.th

9-11 April 2007. Jakarta, Indonesia. **International Conference on Biofuels Science and Business Opportunities**. 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 April - 4 May 2007. Bangkok, Thailand. **Forest Policy Short Course**. 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

8-10 May 2007. Kuala Lumpur, Malaysia. **Developing Invasive Species Management Plans**. Contact: K.V. Sankaran, APFISN Coordinator; E-mail: sankaran@kfri.org

6 June 2007. Shanghai, China. **48th Session of the Advisory Committee on Paper and Wood Products (ACPWP)**. Contact: Olman Serrano, Senior Forestry Officer, FOPP, FAO Forestry Department, Via delle Terme di Caracalla, 00100, Rome, Italy; E-mail: Olman.Serrano@fao.org

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FORESTRY PUBLICATIONS: FAO REGIONAL OFFICE FOR ASIA AND THE PACIFIC (RAP)

- APFC - The unwelcome guests: Proceedings of the Asia-Pacific Forest Invasive Species Conference (RAP Publication 2005/18)
- Helping forests take cover (RAP Publication 2005/13)
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- Forests for poverty reduction: can community forestry make money? (RAP Publication: 2004/04)
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- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
- Bringing back the forests: policies and practices for degraded lands and forests (RAP Publication 2003/14) **out of print**
- Community forestry – current innovations and experiences (CD-ROM included)
- Community-based fire management: case studies from China, The Gambia, Honduras, India, the Lao People's Democratic Republic and Turkey (RAP Publication: 2003/08)
- Practical guidelines for the assessment, monitoring and reporting on national level criteria and indicators for sustainable forest management in dry forests in Asia (RAP Publication: 2003/05)
- Giants on our hands: proceedings of the international workshop on the domesticated Asian elephant (RAP Publication: 2002/30)
- Communities in flames: proceedings of an international conference on community involvement in fire management (RAP Publication: 2002/25)
- Applying reduced impact logging to advance sustainable forest management (RAP Publication: 2002/14)
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- Proceedings of the International Conference on Timber Plantation Development, 7-9 November 2000, Manila, Philippines
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- Forest out of bounds: impacts and effectiveness of logging bans in natural forests in Asia-Pacific (RAP Publication: 2001/08)
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- Development of national-level criteria and indicators for the sustainable management of dry forests of Asia: background papers (RAP Publication: 2000/08)
- Development of national-level criteria and indicators for the sustainable management of dry forests of Asia: workshop report (RAP Publication: 2000/07)
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- Decentralization and devolution of forest management in Asia and the Pacific (RAP Publication: 2000/01)
- Asia-Pacific Forestry Towards 2010 - report of the Asia-Pacific Forestry Sector Outlook Study
- Trees commonly cultivated in Southeast Asia: an illustrated field guide - 2nd edition (RAP Publication: 1999/13)
- Code of Practice for forest harvesting in Asia-Pacific (RAP Publication: 1999/12)

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