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TIGER PAPER

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Contents

TIGERPAPER

Status of Serow in Assam.....	1
Tiger-Human Conflicts in Sundarban Tiger Reserve.....	3
Studies on Indian Wild Buffalo in Udanti Wildlife Sanctuary.....	7
Preliminary Survey of Herpetofauna of Blackbuck NP.....	11
Dudhwa NP - Success Story of Conservation of Great Indian One-Horned Rhinoceros.....	15
Endangered Birds of Dungarpur Hills.....	16
Chronometric Aptitude of a Few Birds in Sikkim.....	19
Population Status of White-headed Langur in China.....	21
Status of Wild Elephants in the Forests of Orissa, India.....	29

FOREST NEWS

World's Forestry Officials Meet in Rome.....	1
Does Your National Forest Programme Need a Boost?.....	3
What's Happening With FAO Regional Forestry Projects?.....	5
Making the Most of Scarce Resources for Effective Forestry Research.....	6
Man-Made Forests: Using Indigenous and Exotic Species in Vietnam.....	7
Promoting Awareness of Certification and Local Auditing Systems.....	7
Non-Timber Forest Products and Tribal Community Development.....	8
Participatory Approaches in Conservation and Management Of Mangrove Forests.....	9
Forthcoming Conference on Invasive Species.....	9
Lessons Learned From Model Forests.....	10
Asia-Pacific Forestry Chips and Clips.....	12
New RAP Forestry Publications.....	14
FAO Asia-Pacific Forestry Calendar.....	16

STATUS OF SEROW (*Capricornis sumatraensis*) IN ASSAM

by Anwaruddin Choudhury

Introduction

The serow (*Capricornis sumatraensis*) is well distributed all over the hilly tracts of north-eastern India (Choudhury, 2001). However, so far no detailed status report has been published. Two subspecies occur in the region: *C. s. jamrachi*, or the Himalayan serow, on the north bank of the Brahmaputra river, and *C. s. rubidus*, or the Burmese/red serow, on the south bank. In Assam, the former subspecies is very rare and occurs mainly in the Himalayan foothills in Lakhimpur and Dhemaji districts, with stragglers in winter elsewhere when it comes down to lower altitudes. The latter is, however, not uncommon at places such as Barail Range and Krabi Plateau (Choudhury, 1993a, 1995, 1997) and does not have noticeable summer-winter movements. Habitat loss and poaching have threatened the species in many areas of its range. The color differences between the two races is conspicuous: *jamrachi* is dark-grey while *rubidus* is chestnut-brown or reddish-brown.

Distribution

The following gives the district-by-district positions of the occurrence of the serow in Assam, the sites in **bold** having sizeable populations or where the species is relatively common.

Subspecies *jamrachi*: *Kokrajhar district* - Ripu RF [RF=Reserve Forest], Chirang RF (stragglers in winter in both areas); *Sonitpur district* - Nameri National Park (stragglers in winter); *Lakhimpur district* - Ranga RF, Kakoi RF, Dulung RF (rare but a few are seen every winter in all the areas); *Dhemaji district* - **Subansiri RF**.

Subspecies *rubidus*: *Tinsukia district* - Dirak RF, Saleki proposed RF (stragglers only); *Dibrugarh district* - Joypur RF (stragglers only),

Sibsagar [Sivasagar] district - Dilli RF, Anbhoypur RF (occasional or straggler); *Nagaon district* - Bagser RF, Doboka RF, Lumding RF, Borpani RF; *Morigaon district* - Kholahat RF, Sonaikuchi RF (occasionally in both); *Kamrup district* - Apricola RF, Apricola East RF, Morakdola RF (occasional), Amcheng RF, South Amcheng RF, **Garbhanga RF**, Rani RF, **Bogaikhas RF**, Moman RF, Gizang RF, Pantan RF (occasional in last three areas); *Karbi Anglong district* - Nambor Wildlife Sanctuary (occasional), **Kaliyani RF**, **East Karbi Anglong Wildlife Sanctuary**, **Karbi Anglong Wildlife Sanctuary**, **Jungthung RF**, **Langlokso proposed RF**, **Dhansiri RF**, **Disama RF**, Khaki RF, Inglongiri RF, Miyungdisa RF, Amreng RF, Balasor RF, Umjakini proposed RF, **West Mikir Hill proposed RF**, Borjuri proposed RF, Patradisa RF, Lungnit RF, Khunbamon RF, Borlangpher RF, and some scattered localities in Hamren sub-division; *North Cachar Hills district* - Krungming RF, Langting-Mupa RF, **Barail RF**, **Barail Range** from reserved forest boundary to Laike, **Simleng river area**, **Sarkihading range**, **Sangbar and farther west**, **Jenam Valley** and scattered elsewhere; *Cachar district* - **Barail RF**, **North Cachar Hill RF**, Madhura proposed RF, Upper Jiri RF, Barak RF, **Innerline RF**; *Hailakandi district* - Innerline RF, Katakhal RF (occasional); *Karimganj district* - Shingla RF, Badshahitilla RF, Longai RF (stragglers in all the areas).

Habitat

The serow is basically a hill forest-dwelling species and although it affects grassblanks, cliffs and rocky slopes, it is not partial to the latter habitats, unlike the goral (*Naemorhedus goral*). The subspecies *jamrachi* usually occurs in the higher hills, above 300 m elevation, but may come down to 100 m in winter. It occurs from tropical rain forest and deciduous forest in

Assam to subtropical and temperate forests, both conifers and broadleaf, in Arunachal Pradesh. The subspecies *rubidus* occurs from as low as 100 m to the highest parts of Assam (Laike area in Barail range, 1,959 m), from tropical rain forest, deciduous forest, abandoned jhums (shifting cultivation) to subtropical broadleaf forest on the Barails.

Approximate habitat available for the species in Assam is about 300 km² for *jamrachi* and about 7,000 km² for *rubidus*. The bulk of the habitat is in Karbi Anglong, North Cachar Hills and Cachar districts. Only about 400 km² of potential habitat is under the protected area network.

Conservation

Habitat destruction through felling and jhum cultivation and poaching for its meat are the main threats faced by the serow. About 2,400 km² of hilly area in Assam is currently under jhum. With the increase in human population, the jhum cycle has come down from more than 10 years to less than five years. Illegal felling and subsequent encroachment of cleared land has already affected large parts of North Cachar Hills, southern Kamrup, Karbi Anglong, Cachar and Hailakandi. The serow is one of the most commonly hunted species in Barail Range. Since 1950, the species has lost about 50% of its habitat. However, despite heavy hunting pressure it is still common in some areas. It is protected under Schedule 1 of the Indian Wild Life (Protection) Act and is listed in Appendix 1 of CITES. IUCN (1996) has listed *jamrachi* as 'vulnerable' and *rubidus* as 'endangered'.

The area that has been recommended on various occasions for protected status in Barail covering parts of North Cachar Hills and Cachar districts

(Choudhury 1989, 1993b) would protect a large population of the serow in Assam. This area, now about 800 km², seems to be suitable for sanctuary status and should be declared so without further delay.

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TIGER HUMAN CONFLICTS IN SUNDARBAN TIGER RESERVE, WEST BENGAL, INDIA

by Subrat Mukherjee

Introduction

The Sundarban mangrove forest spreads over an area of approximately 2,179.05 km²; this includes 1,952.87 km² of dense forest and 226.18 km² of sparse forest zones. In addition, there are 2,085 km² of estuarine rivers, tidal creeks, canals, seashores and mudflats. The total geographic area of the Indian Sundarbans is 9,630 km², including the Sundarban mangals, human settlements, agricultural fields, aquaculture farms, etc.

In 1947, the mangals of the Indian part of Sundarbans were partitioned from those of Bangladesh. Thus, the Indian portion of the Sundarban mangals (approximately 4,262 km²) came under the administrative control of 24-Parganas Forest Division of the State of West Bengal. This mangrove forest region falls between latitudes 22°32'N to 22°31'N and longitudes 88°10'E and 89°51'E.

In December 1973, Sundarban Tiger Reserve was established in the southeastern part of the Indian Sundarbans (eastern part of the Matla River), comprising an area of 2,585 km². This includes a land area of 1,680 km² and estuarine rivers, creeks and canals covering an area of about 905 km². Sundarban Tiger Reserve has a demarcated core area of 1,330.12 km² and a buffer area of 1,255 km².

Project Tiger was initiated in this area in 1973 with the objective of protecting the natural ecosystem by mitigating the effects of man-induced disturbances. The special objectives of the management of Sundarban Tiger Reserve are as follows:

- 1) to ensure effective preservation and protection of faunal associations in the reserve from poaching and external influences;
- 2) preservation and improvement of the

habitat from various hazards and interferences, including denudation, erosion, etc.;

- 3) to manage the habitat and wildlife of the area to achieve the optimum level of the tiger population and its prey base and other faunal associates.
- 4) elimination of exploitation of resources by gradually reducing the dependence of the people living in the fringe area of the tiger reserve.

Sundarbans is the only mangrove tigerland in the world and because of its unique biodiversity values it has been designated as a World Heritage Site by IUCN.

The entire Sundarban region, including the tiger reserve, was declared as a Biosphere Reserve in 1989 with the broad objectives of: 1) conservation of its ecosystem and the dynamic diversity; 2) promotion and monitoring of basic and applied research works; and 3) dissemination of knowledge and experience for education and training.

Study Area and Tiger-Human Conflicts

Sundarban Tiger Reserve's northern boundary has an interface with villages in districts of both north and south 24-Parganas. These villages have a high human population density. The cattle population is also very high. Most villages are part of the Gosaba administrative block, with a few which are part of Hingalgunge block. The main occupation of the villagers is agriculture and fishing, including the catching of tiger prawn seedlings. The people of the Gram panchayats (Satjelia-1, Satjelia-II, Rangabelia, Gosaba, Bali-I, Bali-II, Kumirmari and Mollakhali) are heavily dependent on Sundarban Tiger Reserve. The people enter the forest areas mainly to collect fish and honey after obtaining the necessary permits from the Forest

Department; however, illegal activities like tree felling, poaching of animals, collection of prawn seedlings and illegal fishing also take place. The collecting of *Nypa* leaf (Golpata) for use in thatching was halted in the mid-1970s by the authorities of Sundarban Tiger Reserve because it used to cause major conflicts between tigers and humans in the forest areas. Tiger-human conflicts can also occur when tigers stray into the fringe villages outside the forest areas and both situations are discussed below.

Tiger-human conflicts inside the forest areas

Conflicts inside the forest areas mainly occur when the animals are disturbed and irritated by the intrusion of people into their habitat. According to records from both Indian and Bangladesh Sundarbans, most of the attacks by tigers on human beings have involved honey collectors who generally penetrate the deeper forest areas in search of beehives. The honey collectors also burn *Phoenix* leaves to drive the bees away from the hives, which causes a lot of smoke and also disturbs the tigers. Honey collectors are easy prey for the tiger because members of the collecting group can get isolated from each other in the dense forest.

Fishermen and crab collectors can also fall prey to tigers in small creeks and sometimes even in

the rivers.

Tiger attacks on humans also occur in the felling coupes and sometimes prawn seed collectors have been attacked by tigers in the forest boundary areas. These incidences were mainly recorded in Jhilla and Pirkhali blocks.

From the bodies that have been recovered, it appears that most attacks came from behind or to the side of the victims.

Some steps which could be taken to stop the tiger-human conflict inside the forest include limiting the number of fishermen and honey collectors and regulating the area of operations by reducing the area of felling coupes the length of the felling season. The time of entry into the forest is also a factor as attacks occur mainly in the early morning and afternoon, so fishermen and honey collectors are asked not to venture into the small creeks during this period. Deterrents such as human dummies and masks have been tried but no detailed studies have been made to assess the actual impact of these measures. However, there are no reports of people wearing masks on the back of their head being attacked by tigers.



Face masks on the back of the head may help to ward off tiger attacks. (Photo:K.K. Roy, PTI 219-1699 (R))

The government pays compensation of Rs.20,000 per person killed and Rs.10,000 for permanent disability and all cost of treatment for injured persons. These amounts are expected to increase in the near future.

Tiger-human conflicts outside the forest areas

Tigers in Sundarban often stray into neighboring villages because these areas are often located on reclaimed forest land; also, in some places the boundary between the forest and agricultural land is not distinct. Some areas have small patches of mangrove forest (e.g. the Jharkhali areas adjacent to Pirkhali block) so tigers can mistakenly wander into these areas. In many places such as Samsernagar and Kalitala villages, only a small river serves as the boundary between the forest area of Arbesi-I and the villages, and during low tide it completely dries up and tigers can easily walk across the river bed to catch easy prey of cattle, goats, cows, etc. Tigresses have even been

reported to have their litters inside the paddy fields.

These instances of tigers straying are usually temporary and the animal will go back into the forest after a few hours. However, sometimes the animals get trapped in cow sheds and cannot get out. The villagers will try to drive the tiger back into the forest by making loud noises and starting fires, but sometimes this causes the animal to go deeper into the village.

Tigers that have temporarily strayed into villages are mainly dealt with by trapping the animals in a cage baited with a dead goat. In some cases the trapped tiger does not even eat the bait in the cage with it.

After proper care and examination, the trapped tiger is shifted to a transportation cage because the trapping cage is too big and heavy and has also been soiled by the bait.

Strayed tiger in transportation cage.



Tiger is medically examined before its release in the forest area. Food and water is given to the animals and any necessary treatment is also done. The selection of the release site is important. It should have sufficient water and prey and also be near a big tree to put the transportation cage under. The tiger is released when the cage door is opened by a rope pulled by someone who has climbed up into the tree.

Tigers that are confined in villages must be

chemically immobilized in order to return them to the forest. Ketamine hydrochloride is administered by dart gun or pistol. The dosage and distance has been standardized for the tigers of Sundarbans. Chemical immobilization needs high technical expertise, precision, courage, patience and decision-making ability. Regular training sessions are organized for selected staff in the tranquilization of straying animals.

Preventative measures against tiger straying

include nylon net fencing erected along the boundary of the forest area and also Goran-genwa (*Ceriops* sp, *Excoecaria* sp.) vegetative barriers. These fencings are not very costly (approximately Rs.35,000 per km). Both types of fencing will last for about three years. Goran-genwa fencing is not encouraged nowadays because it requires the felling of goran-genwa trees in large numbers.

Fencing is very effective and tigers will not cross them, but it is not possible to put fencing in creeks and rivers. Sometimes the fencings are damaged by local people as they enter the forest areas to collect fish, honey, etc.

Another preventative measure is the installation of solar lights at the boundary of the villages to deter the tigers.

Generating awareness among the people is also important when dealing with straying tigers

because the tigers cannot be safely relocated in the forest without the help of the people. Regular meetings, film shows, workshops and camps are organized to promote awareness.

Conclusion

Tiger-human conflicts are a big problem in the Sundarbans areas but can be successfully handled by measures such as the erection of fencing, trapping of straying animals and other management decisions that reduce the pressure on the forest.

Awareness coupled with eco-development works will also help tackle the problem of tiger strayings. Alternative livelihood programs could also further reduce the pressure on the forest and thus reduce the tiger-human conflicts.

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Erecting Garan-Gewa vegetative fencing to keep out tigers.



STUDIES ON INDIAN WILD BUFFALO (*Bubalus bubalis* L.) IN UDANTI WILDLIFE SANCTUARY, INDIA

by P.C. Kotwal and Rajendra Prasad Mishra

Introduction

The Indian wild buffalo (*Bubalus bubalis* L.) is listed as an endangered species by IUCN's **Red Data Book**. It is included in Appendix III of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), which means that there is a complete ban on its trade. It is also classified in Schedule I of the Wildlife (Protection) Act, 1972 of India, which means it has been given top priority for conservation. The wild buffalo was declared the 'state animal' of Chhattisgarh State (India) in July 2001. It is the third largest land mammal in India, after the elephant and rhino. The wild buffalo belongs to the family Bovidae, sub-family Bovinae.

Udanti Wildlife Sanctuary supports the best potential habitat for Indian wild buffalo in central India. Declared a wildlife sanctuary in 1985 with an area of 237.27 km², geographically it is located between longitudes 82°11'10" to 82°24'10"E and latitudes 19°55'30" to 20°11'15"N. The sanctuary is strategically situated on the interstate border of Chhattisgarh and Orissa State. The forests of the sanctuary are tropical moist and tropical dry deciduous types with Sal and mixed species (Champion and Seth, 1968). The area of the Sal forest is about 34% and that of miscellaneous forest is 61.55%. Teak (natural and plantations) occupies 4.4% of the area in the sanctuary. The flora and fauna components are rich.

The climate is monsoonal with three distinct seasons viz. rainy (July to October), winter (November to February) and summer (March to June). The average annual rainfall is more than 1,200 mm. Maximum temperatures reach 44°C during summer and drop to a minimum of 7°C during the winter season. The elevation is 350 m above mean sea level. There are four types of

terrain conditions: plain (6%), moderate slopes (42%), steep slopes (51.7%) and plateau (3%).

Wild Buffalo in Udanti Wildlife Sanctuary

In the last few decades a large number of wild buffalo were found in Udanti and Bhairamgarh Wildlife Sanctuary and Indravati National Park in central India. Inverarity (1895) observed a large number of animals in the Sal forest of central India. Several workers have studied wild buffalo (e.g. Daniel & Grubh, 1966; Divekar, 1975; Divekar *et al.*, 1983; Divekar and Bhushan, 1988; Ranjitsinh *et al.*, 2000) in central India. Detailed systematic research on wild buffalo in Udanti Wildlife Sanctuary was carried out by Mishra (2001) from 1998-2001.

The wild buffalo is a magnificent black animal with a huge body. The shoulder height ranges between 1.3 -1.8 m. The average weight of the animal ranges from 600 to 900 kg. It possesses massive horns measuring (average) over 1 meter. The horns tend to be triangular in cross-section. The parietals form a wide zone at the roof of the cranium and are separated from the frontals. The horns emerge from the head towards the posterior. These are crescent-shaped and smaller (130-140 cm) in males and longer (130-150 cm) in females. The hair on the back of the body goes forward from the rump to nape; the ears are small and not fringed. The skin has few sweat glands and relatively fewer hairs. The animal has wide hooves with joints, which are very flexible for walking in mud. It has short legs and cannot run fast. The body color of the male is darker than the female, while young ones are almost brown. Female wild buffalos have bigger horns than the males and a majestic figure, however, the girth and span of the horns of females are less than among the males. The animals live in herds (except for solitary bulls).

Table 1: Present distribution and population of Indian wild buffalo (*Bubalus bubalis* L.) in India

Name of National Park/ Wildlife Sanctuary	Total Area (km ²)	Name of State	Estimated wild buffalo population
¹ Kaziranga National Park	430.00	Assam	1,666
² Manas Tiger Reserve	2,840.00	Assam	100
³ Pabha Wildlife Sanctuary	49.00	Assam	25
⁴ Indravati National Park & Tiger Reserve	1,258.00	Chhattisgarh	25-30
⁵ Bhairamgarh Wildlife Sanctuary	136.38	Chhattisgarh	10
⁶ Udanti Wildlife Sanctuary	237.27	Chhattisgarh	35-40

Data source:

¹wild buffalo census in Kaziranga, *The Rhino Foundation for Nature in NE India, Newsletter No.3, Jun 2001*

²Dr. G. Chetri, *Research Officer, Manas Tiger Reserve. Personal communication, February 2000*

³Published report

⁴Status survey report, team of BNHS, *Wildlife Institute of India, M.K. Ranjitsinh*

⁵Status survey report, team of BNHS, *Wildlife Institute of India, M.K. Ranjitsinh*

⁶Mishra, 2001

Materials and Methods

Wild buffalos are shy animals and spend most of their time in dense forests, particularly during the day. Therefore, observations on animals were made directly while the habitat of the sanctuary was studied by direct and indirect observations. The study period covered a period of three years from 1998 to 2001. Systematic temporal observations were repeated three times during each season. Most of the observations were made from temporary machans (observation towers) constructed in trees. Some observations were also made from watchtowers (erected by the Forest Department for tourists) and near waterholes (mostly ponds). Machans were constructed at selected places near the drinking, feeding and resting places of wild buffalo. The animals were observed with the help of 7x50 and 20x50 binoculars. Many of the observations were made while moving on foot. The major part of the study was done by direct observations. All possible areas of the wild buffalo habitat in the sanctuary were surveyed. Several herds were observed in forest beats (near ponds).

Observations

Udanti Wildlife Sanctuary is the best potential habitat for wild buffalo. Twenty-seven animals were observed in six herds in the sanctuary during the study period. The maximum number

of animals was observed during the summer season near water bodies, particularly near ponds. One herd consisted of eight animals (2 males, 3 females, 2 young and 1 calf). This was a relatively big herd in the sanctuary. A total of 78 animals were recorded in Udanti Wildlife Sanctuary during 2000.

The wild buffalo's home range in the sanctuary was calculated through remote sensing data and direct field observations. Six forest beats within 26 compartments are quite favorable as home ranges for wild buffalos, covering 63.77 km² out of the sanctuaries total area of 237.27 km².

The spatio-temporal and diurnal activities of wild buffalo were observed. A solitary bull was also observed in the sanctuary during the summer season. It had a small tail (about 50 cm) with a huge body (about 1,100 kg) and big, thick horns. It used to move freely on the forest road in the early morning and near water bodies in the evening during the summer season. Various sizes of hoof marks of wild buffalo were critically observed and measured. The average size was 21.2 cm long and 19.3 cm wide among mature males and 20.4 cm long and 18.3 cm wide among mature females. The hoof marks of young animals were about 17.1 cm long and 15 cm wide. The hooves of yearlings measured 14 cm long and 12.5 wide, while the hooves of calves were 9 cm long and 7.5 cm wide (Mishra, 2001).

There are five types of water sources in the sanctuary viz. river, pond, anicut, jhiria and nullah bed. Udanti and Indravan rivers are seasonal sources of water while a few ponds provide perennial water sources. There are 18 ponds in the valley and plains which retain seasonal water, but only about 4 of them retain water throughout the year. The animals generally use ponds for drinking/wallowing purposes, particularly during the summer

season.

Seasonal Activities of Wild Buffalo

Seasonal and daily movements of wild buffalo were observed during the study period in different locations. The animals were generally more active in grazing during the evening to late night.

Table 2: Seasonal/diurnal activities of wild buffalo in Udanti Wildlife Sanctuary (in hours)

Season	Grazing/Browsing				Resting/Chewing				Water Bodies	
	Grassland		Forest		Grassland		Forest			
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Summer	1	5	6.5	1	----	4	4	----	1.5	1
Rainy	1	6	5	1	1	4	3	----	2	1
Winter	1	6	5	1	1	1	3	5	1	----

The animals always live in herds consisting of males, females, yearlings and calves. Their activities in respect of grazing, resting, etc. were similar but sometimes different in respect of grazing/browsing, resting/chewing. The winter season is the more favorable season for wild buffalo because there are a lot of green grasses available for grazing and adequate waterholes for drinking and wallowing. The animals rest after grazing and chew the cud. They sometimes move to nearby crop fields for grazing. Crops like paddy (*Oryza sativa*), kulthi (*Dolichos biflorus*), urad (*Vicia mungo*) and sarsoo (*Brassica campestris*) are grown in the area during the winter season and these are favored crops of wild buffalo. The cow buffalos remain more active than the males in grazing. Wild buffalo prefer grazing over browsing but frequent browsing was also observed during the summer season because of less availability of grasses.

Grass is the main fodder of wild buffalo but they also browse on saplings of various tree species. A large variety of grasses occur in the sanctuary mostly during the rainy season. Therefore, the buffalos do not need to browse in this season,

while they prefer grazing and browsing during the winter and summer seasons due to less availability of grasses than in the rainy season. They browse on saplings of *Shorea robusta*, *Pterocarpus marsupium*, *Bridelia retusa*, etc. Grass species like *Heteropogon contortus* are commonly available in the sanctuary area but wild buffalo prefers only premature tillers. The mature tillers bear spiny awns and are therefore not grazed. Other important grasses like *Andropogon pumillus*, *Apluda mutica*, *Aristida setacea*, *Digitaria granularis*, *Eragrostis pilosa*, *Imperata cylindrica*, *Panicum* sp., *Saccarum* sp., *Themeda* sp. are commonly found in the sanctuary area. The leguminous species are scanty. Species of *Desmodium*, *Flemingia* and *Indigofera* occur in the area. Many species of forbes (herbaceous species other than grasses and legumes) occur in the sanctuary area. Some animals feed on dry grass species like *Heteropogon contortus* (when the spiny awns are shed) in mid-June. By the onset of the rains, some perennial species of grasses sprout and become green and suitable for grazing by animals. The wild buffalos frequently browse on the bush and tree species because annual grasses dry up during the summer season. The calves

grazed on the green and short grasses near the waterhole. The females are more active than the males for grazing, while yearlings and calves do not prefer grazing in the sunlight. The yearlings and calves were always found with the herd and spent more than 50 percent of the time grazing.

Problems

Biotic disturbances are the main decimating factors affecting wild buffalos in Udanti Wildlife Sanctuary. Human settlements, encroachments, and cattle grazing cause major disturbances for the wild buffalo and its habitat. Most of the human population is settled in the home range of wild buffalo. Large numbers of people and livestock depend on the sanctuary area. There are 18 villages with a total human population of 4,457 and 3,424 domestic cattle in the sanctuary. Competition occurs between wild buffalos and domestic cattle for fodder and water.

Most of the human population is dependent on non-timber forest products (NTFPs) as sources of income from the sanctuary; therefore, man and wild buffalo conflicts are common in the sanctuary. Wild buffalos have killed some people while they were collecting NTFPs, while traveling on forest roads and in agricultural areas during the night hours.

Forest fires are another major decimating factor of the habitat of wild buffalo. More than 60% of the forest area in the sanctuary is burnt every year during the summer season. It was also observed that local people use more than 4,200 tons of fuelwood every year in the sanctuary.

There are many packs of wild dogs in the sanctuary that attack the calves of wild buffalo, which are easy prey, and many are killed during the winter season. This is also another important cause of reduction of the wild buffalo population in the sanctuary.

Suggestions for Management of Wild Buffalo in Udanti Wildlife Sanctuary

Maintaining a pure race of wild buffalo is essential. It is of the utmost necessity to protect the wild buffalo from genetic swarming from

domestic buffalo; therefore, the sanctuary should be declared out of bounds for the domestic buffalo to avoid this.

The local people should keep a limited number of livestock and they should be stall-fed rather than allowed to graze freely in the forest. Only the required number of cattle should be kept and they should either be grazed in a separate area or stall-fed.

The wildlife management should employ a participatory approach involving the local people in activities such as protection, fire-fighting, maintenance of waterholes, roads, etc.

Food, water and shelter are important welfare factors for wild animals. The existing grasslands in the sanctuary should be maintained by timely and periodic removal of weeds and controlled burning. The number of waterholes for exclusive use by wild buffalos should be increased.

The sanctuary area has no proper zoning of core and buffer areas. The prime habitat of wild buffalo and other wild animals is towards the southwest of the sanctuary. The home range area should be declared as the core area of the sanctuary. If appropriate conservation measures are immediately implemented, the species could have a good chance of survival in the sanctuary.

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PRELIMINARY SURVEY ON HERPETOFAUNA OF BLACKBUCK NATIONAL PARK, GUJARAT, INDIA

by Raju Vyas

Introduction

Blackbuck National Park, Velavadar (BNP) is one of the important protected areas in India. It is situated on the west coast of the gulf of Khambhat and borders the northern part of Bhavnagar District on the western coast of India, lying between 22°00'-22°05'N latitudes and 72°00'-72°08'E longitudes. This park is internationally known for having the largest concentration of Blackbuck (*Antelope cervicapra rajputanae*). It is also well-known for a few important avian species that visit the area during the winter months, especially the largest roosting population of Harriers (*Circus* sp.), and during the monsoon it is a breeding ground of the Lesser florican (*Sypheotides indica*). Biogeographically, the area falls under

4-B Gujarat-Rajwada biotic province in the semi-arid zone (Rodgers and Panwar, 1988).

This grassland area was earlier one of the game reserves of the ex-princely state of Bhavnagar and after independence the State Forest Department declared a 1,788.88 ha area as BNP in 1976. In 1980, an additional 1,622.23 ha were added to the park, and in 2001 another 40 ha of land on the periphery of the park were added. Today, the total area under the National Park is 3,452 ha.

Scientific information on the herpetofauna of BNP is not available in the literature except for Anon (1997) and Vyas (2001), who provided a list of reptiles. A rapid assessment was made of the herpetofauna in the first week of October

2000 and during July and August of 2001. A total of 20 days were spent for the survey with the objective of listing the amphibians and reptiles inhabiting the area.

Study Area

Blackbuck National Park is situated at a low elevation averaging 2 m above mean sea level. It forms a part of the soil drainage merging into the Gulf of Khambat.

The climate of the park is tropical oceanic. Three seasons can be distinguished in the park, with almost all the precipitation occurring in the monsoon from the latter half of June until mid-September. The area has a very low rainfall with an annual average of 400-450 mm. Sporadic showers may occur in October, but normally October is a transition period of the monsoon into winter. The temperature ranges from 1° to 38° C in winter, which extends from November to February. Showers rarely occur during the winter months. In January, due to the high moisture content of the sea breeze, a low fog occurs during the early morning hours. Dew is a common feature during the early morning throughout winter and sporadically in summer. Day temperatures normally range between 37° to 45° C, but can rise higher than 48° C in summer, which extends from March to mid-June. Hot winds sweep the hard-baked earth and dust storms, whirlwinds and dust devils are common. The park is prone to drought and floods.

According to Singh (2001), BNP can be divided into four major habitats: grassland, babul forest with shrubland, saline land and tidal/mudflats. About 60.9% (2,078 ha) of the area of the park is grassland dominated by *Dicanthium annulatum* and *Sporobolus* sp. grass species, 15% (509 ha) of the area is shrubland dominated by *Prosopis*, *Capparis*, *Zizyphus*, *Acacia* and *Salvadora*, and the remaining 25% (825 ha) is saline land and mudflats dominated by *Suaeda* sp.

Methodology

A rapid assessment made in the BNP to list the amphibians and reptiles was carried out as

follows:

- 1) The entire area was surveyed by low speed vehicle with an intensive search in 4.5 x 4.5 meters of habitat on both sides of the roads at 1 km intervals.
- 2) All major and important seasonal water bodies, including man-made drinking tanks, were searched for amphibian species.
- 3) In addition, secondary information about different species of amphibians and reptiles was gathered from the local people of the surrounding villages, forest personnel and wildlife enthusiasts through interviews and showing color pictures of the species to them.

All collected specimens were examined and carefully identified by using the diagnostic keys given by Smith (1935, 1943) and Daniel (1963a, 1963b and 1975) and Daniel (1997) and the nomenclatures adopted here are those of Das (1994) and Datta (1997) for reptiles and amphibians, respectively.

Results

A total seven species of amphibians belonging to three families and six genera have been recorded from the park. All species of frogs and toads occur only in the rainy season, especially in the temporary water pools and roadside puddles and ditches. The Indian skipper frog (*Euphlyctis cyanophlyctis*) and Cricket frog (*Limnonectes limnocheris*) are relatively abundant. The Common Asian toad (*Bufo melanostictus*), Marbled toad (*Bufo stomaticus*) and Indian bull frog (*Hoplobatrachus tigerinus*) commonly occur throughout the entire park. However, the Short-headed burrowing frog (*Tomopterna breviceps*) and the Ornate narrow-mouthed frog (*Microhyla ornata*) are found only in the restricted area of the park, around the forest guest house and in the area between Velavadar and Kanatalaw villages.

A total of 18 species of reptiles were recorded from the park, belonging to 10 families and 15 genera, including a species of turtle, 7 species of lizards and 10 species of snakes. The Indian flap-shell turtle was found in temporary water pools and puddles during the rainy season. The Northern house gecko or Yellow green house

gecko (*Hemidactylus flaviviridis*) occurs in and around the forest staff quarters and the guesthouse. Brook's house gecko, common garden lizard, rat snake and spectacled cobra are relatively common in the park. Records of Lined supple skink (*Lygosoma lineata*), Lesser agama (*Brachysaura minor*) and Yellow spotted wolf snake (*Lycodon flavomaculatus*) show the importance of the park. The Western Ghat species of skink *L. lineata* inhabits the semi-arid area of the park. The study also indicates that the requirements of the species's habitats are quite broad, ranging from evergreen forests to dry deciduous forests and semi-arid grasslands.

Threats

During the study the authors recorded two types of threats to the herpetofauna in the park. One is the Trans pass vehicular road: 07 (Velavadar to Adhelai) + 0.2 km (coastal highway), two roads passing the park. A large number of reptiles and amphibians die under the wheels of automotive vehicles, especially during the monsoon. The second threat is from habitat alteration. It was observed that the entire grassland is endangered by the thorny invasion of *Prosopis chilensis* at the rate of 2% per annum, which is indirectly a threat to the herpetofauna and also has a direct negative impact on the Blackbuck's habitat.

Acknowledgments

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Table 1: List of Amphibians of Blackbuck National Park, Gujarat, India

Family/Species name
<p>Bufonidae Common Asian toad (<i>Bufo melanostictus</i>) Marbled toad (<i>Bufo stomaticus</i>)</p> <p>Microhylidae Ornate narrow-mouthed frog (<i>Microhyla ornata</i>)</p> <p>Ranidae Indian skipping frog (<i>Euphlyctis cyanophlyctis</i>) Indian bullfrog (<i>Hoplobatrachus tigerinus</i>) Cricket frog [<i>Fejervarya</i> (= <i>Limnonectes</i>) <i>limnocharis</i>] Short-headed burrowing frog [<i>Sphaerotheca</i> (= <i>Tomopterna</i>) <i>breviceps</i>]</p>

Table 2: List of Reptiles recorded from Blackbuck National Park, Gujarat, India

Family/Species name
<p>Trinychidae Indian flapshell turtle (<i>Lissemys punctata</i>)</p> <p>Gekkonidae Brook's house gecko (<i>Hemidactylus brookii</i>) Yellow-green house gecko (<i>Hemidactylus flaviviridis</i>)</p> <p>Agamidae Common garden lizard (<i>Calotes versicolor</i>) Lesser agama (<i>Brachysaura minor</i>)</p> <p>Scincidae Supple skink (<i>Lygosoma lineata</i>) Common keeled grass skink (<i>Mabuya carinata</i>)</p> <p>Varanidae Bengal monitor (<i>Varanus bengalensis</i>)</p> <p>Typhlopidae Brahminy worm snake (<i>Ramphotyphlops braminus</i>)</p> <p>Boidae Common sand boa (<i>Eryx conica</i>) Red sand boa (<i>Eryx johnii</i>)</p> <p>Colubridae Common wolf snake (<i>Lycodon aulicus</i>) Yellow-spotted wolf snake (<i>Lycodon flavomaculatus</i>) Pakistani ribbon snake (<i>Psammophis leithii</i>) Indian rat snake (<i>Ptyas mucosus</i>)</p> <p>Elapidae Common Indian krait (<i>Bungarus caeruleus</i>) Spectacled cobra (<i>Naja naja</i>)</p> <p>Viperidae Saw scaled viper (<i>Echis carinata</i>)</p>

DUDHWA NATIONAL PARK - SUCCESS STORY OF CONSERVATION OF GREAT INDIAN ONE-HORNED RHINOCEROS

by Mahesh N. Sanzgiri

Compared to India's world famous Corbett National Park of Uttar Pradesh, little is known about beautiful Dudhwa National Park. Located in Lakhimpur Kheri District in Uttar Pradesh, it is one of the well-managed national parks of India. The park is located in the foothills of the Himalayas adjoining the border of Nepal's Sukla Phanta and Bardia Wildlife Reserves. The nearest airport is at Lucknow, some 260 km away.

Dudhwa is known for its large herds of swamp deer (barasingha), which can contain up to 300-400 heads. It is also home to the last surviving breeding population of Bengal Florican, which number about 70 here. And the once thought to be extinct hispid hare was rediscovered in Dudhwa National Park in 1979.

Dudhwa was first declared as a wildlife sanctuary in 1965 and then a national park in 1977. It was given the status of tiger reserve in 1987-88. Dudhwa Tiger Reserve has a total area of 884 km², out of which 680 km² comprises Dudhwa National Park and 204 km² is part of adjoining Kishanpur National Park.

Dudhwa has a typical swampy topography with grassland vegetation and sal forests. In addition to tiger, swamp deer and great Indian one-horned rhinoceros, the other main wild animal species found in the park include leopard, hog deer, spotted deer, sambar, blue bull, sloth bear and wild boar. Other small animal species include jackal, otter, civet cat, jungle cat, leopard cat, fishing cat and black-necked hare.

In the forest streams and rivers are found marsh crocodiles, frogs, toads, turtles and tortoises. Among the reptiles pythons and monitor lizards are common. Also found are beautiful but highly poisonous snakes like the banded krait and cobra.

The avifauna includes owls (forest eagle owl,

brown fish owl, great Indian horned owl, dusky horned owl, tawny fish owl, brown wood owl, Scops owl, jungle owlet), vultures, storks, partridges and peafowl.

In 1984-85 the first experiment of translocating great Indian one-horned rhinoceros from Kaziranga National Park in Assam, India and from Royal Chitwan National Park of Nepal to Dudhwa National Park was carried out. Two males and five females were introduced successfully in a fenced area of about 24 km² in Dudhwa Forest. No visitors were allowed into the fenced area in those days.

Due to the efforts of the Forest Department, today Dudhwa Tiger Reserve has a healthy population of 18 Great Indian One-Horned Rhinoceros that is thriving even with pressure from tiger predation on the calves.

In 1979, the first scientific census was conducted in Dudhwa National Park and found 50 tigers. Today there are 102 tigers present in the reserve. This indicates a healthy forest since the tiger is the apex of all the types of animals found in the forest.

Herds of wild elephants enter Dudhwa during the harvesting season in August-September from the adjoining forests of Nepal, especially from Bardia Wildlife Sanctuary and Sukla Phanta Wildlife Reserve, and remain in Dudhwa Tiger Reserve until the end of April. During this time tourists enjoy seeing wild elephants in Dudhwa. Dudhwa is truly a heaven for wild animal lovers and bird watchers.

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ENDANGERED BIRDS OF DUNGARPUR HILLS (S. RAJASTHAN, INDIA)

by M.M. Saxena

Dungarpur is a remote district in South Rajasthan (23°20'-24°1'N; 73°21'-74°23'E) with a hilly landscape and a predominantly tribal population. The highest hillock present in the northwest region is c. 572 m above mean sea level. The region has a dry climate with an average annual minimum and maximum temperature range between 4°C and 38°C respectively. The average annual rainfall is in the region of 728.9 mm, about 96% of which falls during the monsoon season, particularly in the month of July. The hills have a thin cover of dry deciduous forest, which constitutes 15.85% of the total land area of the district. The major vegetation includes *Tectona grandis*, *Acacia catechu*, *A. nilotica*, *Dendrocalamus* sp., *Bambusa* sp. *Dalbergia sissoo*, *Zyzyphus* sp., *Azadiracta indica*, *Mangifera indica*, *Maduca indica*, *Butea monospora*, *Diospyrus melanoxylon*, *Phoenix sylvestris*, *Alianthus excelsa*, *Prosopis cineraria* and *Pongamia pinnata*.

The tribal population, which comprises 65.8% of area, basically has a forest-based lifestyle and economy. Thus, there is an ever-increasing population pressure on the forest resources of the region. Once rich, the area has lost its forest wealth drastically over the past few years due to various factors including human interference, population pressure, changing landuse patterns and repeated droughts.

Since birds constitute an important component of the wildlife in any region and are often sensitive to any transformations in the ecosystem, it was felt necessary to study the avifauna of the region, including the status of endangered species. A year-round survey of the Dungarpur hills by the author revealed 73 bird species belonging to 35 families. The endangered status of different species was adjudged on the basis of their present inclusion in the schedules of the Wildlife (Protection) Act,

1972 of India.

The Wildlife (Protection) Act, 1972 as amended in 1982, 1986, 1991 and 1993 has 7 chapters, 66 sections and 6 schedules. The Act provides a necessary tool to protect the wildlife wealth of the country and prevent damage to it. The rating of the Schedules I to V are in accordance with the risk of survival to the wild fauna enlisted in them. Animals included in Schedule I of the Act are provided with total protection from hunting, trade and commerce. As per Section 9 of the Act: "No person shall hunt wild animals specified in Schedules I, II, III and IV, except as provided under Section 11 and Section 12". Schedule VI was added to include specified plant species to be protected.

The present account deals with the bird species of Dungarpur hills that are protected under the Act as enlisted in the different schedules. Of the total 73 avian records made from the region, 44 species have been declared protected, constituting 60.27% of the fauna. Only one species, the Common Peafowl (*Pavo cristatus*) has been placed in Schedule I, while 42 species are in Schedule IV and one, the House Crow (*Corvus splendens*), is in Schedule V of the Act.

The only phasianid bird recorded is the Common Peafowl, which is also quite rare in the region. Members of the family Phasianidae include pheasants, partridges and quails, etc., which are popular game birds and a valuable food resource for man. These terrestrial birds are poor fliers and fall easy victim to hunters and perhaps this is the reason for their general absence in the area. However, in the rest of the State, especially in the northwest region, peafowl and partridges display a high degree of occurrence.

There are certain birds recorded from the region whose status seems to be doubtful in the

schedules of the Act. In particular these include Common Grey Hornbill (*Tockus birostris*), Koel (*Endynamys scolopacea*) and Crow-Pheasant or Coucal (*Centropus sinensis*).

Nine species of hornbills are recorded from the country, out of which six are protected under Schedule I, Part III under entries 4, 4-c, 4-F and 9, while the other three species are not found in any of the schedules. Common Grey Hornbill is indeed not that common and is rather rare as per sightings. This enormous billed bird, being a game bird of choice, is under threat from local tribal poachers and needs protection.

While cuckoos (Cuculidae) are protected under Schedule IV, Koel and Crow-Pheasant of the same family are not named specifically, leaving them to a doubtful status. It is felt that wherever the common group name is followed by the family name in parenthesis, it needs to be clarified whether all the members of the said family are protected or only ones with the given common name. Such explanations would help enforcing the Act in a more defined manner.

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Table 1: Endangered bird fauna of Dungarpur hills (S. Rajasthan) as protected under different schedules of the Wildlife (Protection) Act, 1972

Family and Common Name	Scientific Name	Schedule
FAMILY: PODICIPEDIDAE		
Little Grebe or Dabchick	<i>Podiceps ruficollis</i>	IV
FAMILY: PHALACROCORACIDAE		
Darter	<i>Anhinga rufa</i>	IV
Cormorant	<i>Phalacrocorax carbo</i>	IV
FAMILY: ARDEIDAE		
Grey Heron	<i>Ardea cinerea</i>	IV
Pond Heron or Paddybird	<i>Ardeola grayii</i>	IV
Cattle Egret	<i>Bulbulcus ibis</i>	IV
Smaller Egret	<i>Ergetta intermedia</i>	IV
Little Egret	<i>Ergetta garzetta</i>	IV
Large Egret	<i>Ardea alba</i>	IV
FAMILY: CICONIIDAE		
Adjutant	<i>Leptoptilos dubius</i>	IV
Openbill Stork	<i>Anastomus oscitans</i>	IV
White Stork	<i>Ciconia ciconia</i>	IV
Whitenecked Stork	<i>Ciconia episcopus</i>	IV
Blacknecked Stork	<i>Ephippiorhynchus asiaticus</i>	IV
FAMILY: THRESKIORNITHIDAE		
Glossy Ibis	<i>Plegadis falcinellus</i>	IV
White Ibis	<i>Threskiornis aethiopica</i>	IV
FAMILY: PHOENICOPTERIDAE		
Flamingo	<i>Phoenicopterus roseus</i>	IV
FAMILY: ANATIDAE		
Pintail	<i>Anas acuta</i>	IV
Common Pochard	<i>Aythya ferina</i>	IV
White-eyed Pochard or Ferruginous Duck	<i>Aythya nyroca</i>	IV
FAMILY: PHASIANIDAE		
Common Peafowl	<i>Pavo cristatus</i>	I

FAMILY: GRUIDAE		
Sarus Crane	<i>Grus antigone</i>	IV
FAMILY: RALLIDAE		
Coot	<i>Fulica atra</i>	IV
FAMILY: RECURVIROSTRIDAE		
Blackwinged Stilt	<i>Himantopus himantopus</i>	IV
FAMILY: CHARADRIIDAE		
Little Ringed Plover	<i>Charadrius dubius</i>	IV
Wood Sandpiper	<i>Tringa glareola</i>	IV
FAMILY: COLUMBIDAE		
Indian Ring Dove	<i>Streptopelia decaocto</i>	IV
FAMILY: PSITTACIDAE		
Roseringed Parakeet	<i>Psittacula krameri</i>	IV
FAMILY: STRIGIDAE		
Spotted Owlet	<i>Athene brama</i>	IV
FAMILY: PELECANIDAE		
Rosy or White Pelican	<i>Pelecanus onocrotalus</i>	IV
FAMILY: ALCEDINIDAE		
Lesser Pied Kingfisher	<i>Ceryle rudis</i>	IV
Whitebreasted Kingfisher	<i>Halcyon smyrnensis</i>	IV
FAMILY: CORACIIDAE		
Indian Roller	<i>Coracias benghalensis</i>	IV
FAMILY: DICRURIDAE		
Black Drongo or King Crow	<i>Dicrurus adsimilis</i>	IV
FAMILY: STURNIDAE		
Common Myna	<i>Acridotheres tristis</i>	IV
Blackheaded or Brahminy Myna	<i>Sturnus pagodarum</i>	IV
FAMILY: CORVIDAE		
House Crow	<i>Corvus splendens</i>	V
Indian Tree Pie	<i>Dendrocitta vagabunda</i>	IV
FAMILY: PYCNONOTIDAE		
Redvented Bulbul	<i>Pycnonotus cafer</i>	IV
FAMILY: MUSCICAPIDAE		
Large Grey Babbler	<i>Turdoides malcolmi</i>	IV
Little Pied Flycatcher	<i>Muscicapa westermanni</i>	IV
FAMILY: MOTACILLIDAE		
Tree Pipit	<i>Anthus trivialis</i>	IV
FAMILY: NECTARINIIDAE		
Purple Sunbird	<i>Nectarinia asiatica</i>	IV
FAMILY: PLOCEIDAE		
Baya	<i>Ploceus philippinus</i>	IV

OBSERVATIONS ON CHRONOMETRIC APTITUDE OF A FEW BIRDS IN SIKKIM

by Ajeya Jha and Vanya Jha

Introduction

The knowledge that many birds and animals exhibit a strong sense of time is as old as human memory. Even today in many countries the arrival or departure of migratory birds has a significant bearing on agricultural activities. Modern science defines such phenomena as biological clocks. Biological clocks are physiological systems that enable organisms to live in harmony with the rhythms of nature such as the cycle of day and night. Such biological timers exist for almost every kind of periodicity throughout the plant and animal world. Of these, the most important are circadian or daily rhythms. Research suggests that in many animals a single gene may underlie the mechanism of the biological clock.

Sikkim is the second smallest state of India located between 27°5'N to 28°9'N and 87°59'E to 88°56'E, with an area of 7,096 km². The Lepchas, Sikkim's oldest inhabitants, are known to exploit the chronometric aptitude of birds to determine their annual and daily activities. Morning bird-calls have been traditionally utilized by them to express and represent time. Three important bird calls in this respect are of the following species:

- C Indian Spotted dove: its call is an oft repeated Krookruk-Krukroo-Krookru-Krukroo-Krookru;
- C Red Jungle Fowl: its call is quite similar to that of a domestic fowl, but it is a bit shriller. In the morning they have been known to answer one another over long distances.
- C Himalayan Whistling Thrush: it has a strong, fine whistling song of a remarkable range, blending effortlessly with the river sound.

To examine the authenticity of this Lepcha conviction, a few observations were made on the morning calls of these birds. The records are

presented in the attached table.

A few important points in this context should be noted:

- C The birds observed are not migratory birds.
- C During the whole observation period the weather was normal with no rains or storms.
- C Heavy clouds covered the sky on a couple of days but had no impact as such on the timing of the bird-calls.
- C There is a strong possibility that the observations pertain to individual birds (and not species as such) as there was a conscious attempt to confine the observations to individual calls.
- C From the observation it appears that the biological clock of an individual bird is not directly affected by an astronomical clock (sunrise time in this instance).
- C However, a slight influence of change in sunrise time is perceptible.
- C Light is usually the most important lead to maintain such biological clocks but animals are known to use rhythmic variations in temperature or other sensory inputs to readjust their internal timers. During the present observation, however, temperatures were not recorded and it was based entirely on sunrise time.
- C Certain other birds such as the Great Hornbill are also reported to possess a very fine sense of chronometer time and travel over regular routes to and from their roosting places day after day with great punctuality.
- C Birds given to sailing, such as vultures, have also been reported to begin and end their daily gliding with a great degree of punctuality.
- C Lepchas say that all birds do not share the same level of chronometric perfection.
- C According to the Lepchas, insects like butterflies, bees and crickets also have a sensitive chronometric aptitude.
- C The twelve time intervals identified by

Lepchas include *Hik Van* - i.e. the time when fowls go to sleep. This falls between Tsuk ker - the time when the whole disc of the sun disappears - and So fyo - the time when the brightness of the western horizon after the sunset disappears.

- C The Lepcha calendar - beginning of months - is decided by the arrival or departure of migratory birds, the blooming of different flowers and sounds of insects, and even by the migration of fish.

Conclusion

The chronometric aptitude of organisms have been known for a long time and scientific observations in this respect have been meticulous. However, few species-based studies have been conducted. This study was more or

less a casual observation as it was done more to authenticate an anthropological belief of the Lepchas. It would be interesting, for example, to find out the compulsions of a few species of birds for showing a better and/or more accurate sense of chronometer.

The author would be thankful to receive more information on similar observations and experiences of other ornithologists/naturalists in the field.

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Table 1: Times of the first calls of Red-jungle fowl, Indian spotted dove and Himalayan Whistling Thrush

(2000)	Sunrise time	Red-jungle fowl	Indian spotted dove	Himalayan whistling thrush
5 Nov	05.44	04.46	05.27	05.41
6 Nov	05.44	04.48	05.29	05.42
9 Nov	05.46	04.46	05.30	05.39
10 Nov	05.46	04.49	05.28	05.42
11 Nov	05.47	04.47	05.25	05.43
14 Nov	05.50	04.50	05.30	05.43
15 Nov	05.51	04.48	05.28	05.45
17 Nov	05.52	04.47	05.31	05.42
18 Nov	05.53	04.46	05.30	05.44
20 Nov	05.54	04.47	05.27	05.42
21 Nov	05.54	04.50	05.33	05.43
22 Nov	05.55	04.49	05.31	05.41
23 Nov	05.55	04.49	05.32	05.42
24 Nov	05.56	04.50	05.36	05.43
25 Nov	05.57	04.48	05.35	05.44
26 Nov	05.57	04.51	05.34	05.43
1 Dec	05.59	04.52	05.36	05.45
3 Dec	06.01	04.50	05.36	05.43
4 Dec	06.02	04.49	05.38	05.42
5 Dec	06.03	04.52	05.36	05.44
6 Dec	06.03	04.53	05.38	05.43
8 Dec	06.05	04.53	05.39	05.44
9 Dec	06.06	04.51	05.40	05.45
10 Dec	06.07	04.52	05.39	05.43

POPULATION STATUS OF WHITE-HEADED LANGUR (*Trachypithecus leucocephalus*) IN GUANGXI, CHINA

by Zhaoyuan Li, Zimin Liu, Yi Wei, Elizabeth Rogers and Gang Hu

Introduction

Considering the present rapid human population growth and habitat loss through human disturbance, the monitoring of changes in populations of rare species is becoming an increasingly important aspect of conservation management. The highly endangered white-headed langur (*Trachypithecus leucocephalus*) is now restricted to forests on karst limestone hills in southwest Guangxi, China, between latitudes 107°00'-108°00'E and longitudes 22°10'-22°40'N.

The langur population has been isolated by habitat fragmentation into four sub-populations: 1) Bapen in Fusui County (74 km²); 2) Luobai in Chongzuo County (80 km²); and 3) Longgang Reserves in Ningming and Longzhou Counties (20.8 km²). These langurs were traditionally hunted for medicinal use, which had reduced their world population size to as little as 400 by the early 1980s (Wu, 1983). They have been the target of a species rescue plan by the IUCN-SSC and the American Zoo and Aquarium Association. Hunting of the species has been prohibited since the early 1980s and the langur population had recovered to about 700 by 1987 (Wu, pers. comm.), of which 339 were found in Bapen Reserve, 80 in Luobai Reserve and about 280 in Longgang Reserve. A study by another research group headed by W.S. Pan was conducted in Luobai Reserve between 1997-1999. According to Pan's report, there are 210 langurs in Luobai Reserve now.

For the past ten years, local governments in Fusui have been pursuing high economic growth without giving enough attention to the poor productivity of the soil or the environmental effects of over-exploitation. In Bapen reserve, access for vehicles transporting crops was

improved around 1991, which intensified land use and caused further habitat loss. In the Bapen Reserve central study site (532 ha), from December 1997 to July 1998, a total area of 3.77 ha was opened to cultivation and thus was no longer available to langurs. In the ten years between 1988 and 1998, changes in the arable land use in the central study area have resulted in the loss to langurs of 115 ha of valley land (the flat ground between hills) because of conversion to year-round human use. Only 13.3% of the available valley land in the study area was completely unused or had been abandoned. Furthermore, tree felling and herb collection are common occurrences and not prohibited, which also influences the habitat (Wilcove *et al.*, 1986; Lovejoy *et al.*, 1986). Therefore, habitat loss has become a major conservation issue as it is putting increasing pressure on the survival of the langurs.

The present study presents survey data on white-headed langurs obtained between 1996 and 1998 in Bapen and Longgang Reserves, which together contain most of their world population. The surveys were the initial stage of a detailed study of langur socioecology based on one hill-group in Bapen Reserve (Li, 2000). Comparisons are made with earlier data in an attempt to assess the current status of the population and to provide a basis for future conservation recommendations.

Study Animals and Sites

White-headed langurs are slightly sexually dimorphic, with males a little larger than females (Li & Ma, 1980). The pelage from shoulders to head and on the proximal part of the tail is white, with the rest of the body being largely black. Individuals can be distinguished by differing proportions of the white pelage on

the head and proximal tail, and the sexual skin color can be used to identify the sexes. Hair coloration changes with age: newborns (1st month) are reddish-brown; infants (up to one year old) are brown; and the hair lightens into yellow to light grey in juveniles (2-3 years old). Black and white patches appear in adults (>3 years). The hair becomes a dull brown when the langurs reach old age (>10 years in males, >8 years in females). It is possible that the white-headed langur is a variant of François' langur (*Trachypithecus francoisi*) and its taxonomy is disputed; however, the two forms currently have an allopatric distribution.

Langur groups are normally composed of an adult male, several adult females and their offspring. Such a bisexual group is usually cohesive and activities are synchronized. When two groups meet each other, one moves away so the inter-group distance is normally \$150m. There are two peaks of feeding activity, between 08.00-10.00 and 15.30-18.30 (Li, 1993). During feeding periods, langurs can be detected from the noises they make when picking leaves and leaping between trees or branches. Observation of active animals is relatively easy because of the sparse distribution of vegetation on the hill cliffs. Indirect signs of langur presence (feces and urine) were also used in the censuses. These were found deposited on the rocks of cliff ledges and at cave entrances, and could be identified as fresh or old even when viewed through binoculars.

Two study sites were selected because of their different levels of human disturbance, i.e. Bapen Reserve and Longgang Reserve. Bapen Reserve is situated at the northern edge of the tropical zone (107°46'-108°03'E and 22°25'-22°31'N) with a karst topography ranging from 110-359 m above sea level. This reserve includes four hill-groups: GP (10 km²); GF (6 km²); and LGS+QN (21 km² + 12 km²), together corresponding to Patch 1 in Fig. 1B; and MZ (25 km², Patch 2, Fig 1B). Because of cultivations, road-building and human settlements, the langur population has been restricted to these hill-groups, with the gaps between them varying from 100m to 2km in distance. The hill-group LGS+QN was divided into two areas because of its topography: hills in LGS were mostly

interconnected, but those in QN were relatively scattered so that the habitat was highly fragmented. Reserve staff patrolled LGS and QN on an average of once a month and MZ about once a year. They never patrolled GP and GF, because it was thought that there were no langurs in these two hill-groups. The area used for the detailed study of langur socioecology in Bapen was 532 ha in area and located in the central part of hill-group LGS at 107°52'E and 22°27'N.

Longgang Reserve is to the southwest of Bapen Reserve (sub-population 4, Fig. 1B), at 107°01'-107°08'E, 22°13'-22°20'N, with elevations ranging from 106-518 m above sea level. Hills were closely interconnected. Agricultural activities were conducted in only a few valleys in peripheral areas. Reserve borders were arbitrarily defined, except for the Mingjiang River to the west, which was the main communication channel to the outside world. There are no roads, few trails and no villages inside the reserve, so this langur habitat has not been fragmented.

Methods

To estimate primate population density, distance sampling by line transects is widely used (e.g. SCNP, 1981; Brockelman & Ali, 1987; Rabinowitz, 1993; Buckland *et al.*, 1993; Sutherland, 1996). This method, however, requires stringent criteria, such as that transect locations are randomly predetermined and sampled (Rabinowitz, 1993), which were very difficult to meet in this study because of the inaccessible cliff habitat.

We carried out population surveys in Bapen (including hill-groups GP, LGS, QN, GF & MZ, Fig.2) and Longgang Reserves from December 1996 to April 1997. In Bapen, where visual scanning of the hill-groups was possible throughout the area, a total population count was attempted. Hills were surveyed from all accessible trails in all hill-groups. Observers paced along trails, stopping every 100-200m to search the hills for 30 minutes through binoculars and by listening. When langurs were encountered, the following data was recorded: locality, detection time, duration of observation,

height of group on the cliff, activity, age-sex composition of group. Censuses were repeated five times along each trail in LGS and MZ, three times in QN and once each in GP and GF, covering a total visually accessible area of 67 km² (91% of the total area) in Bapen. The area censused was calculated in two dimensions from 1:10000 maps, without taking contours into account. In Longgang Reserve, the census was repeated three times along five existing trails in the central part of the reserve, where staff members patrolled regularly. A total area of 3.7 km² was surveyed in Longgang Reserve, where visibility was much reduced in comparison to Bapen. Sighting distances and angles to the langur groups were measured at every stopping point using a range finder and compass. These were used to calculate the width of the survey line by triangulation, and an overall mean width was derived from these data. The transect length was measured on maps.

Population density (D_2) was calculated from group density (D_1 = number of identified groups/area surveyed) x mean group size. All areas were sampled throughout the langurs' active periods starting at 07.30 and finishing at 18.00. Langur groups were recorded as being different if they were separated by ≥ 150 m. If closer together initially, they were regarded as different groups if they subsequently moved apart. When two records were made from the same area on different days, and the group size was the same, they were assumed to be the same group if any differences occurred only in neighboring age classes (because some

individuals have intermediate coloring).

The above field techniques were also used in previous investigations (Wu, 1983; Lu & Huang, 1993), which allowed a comparison between data collected in this study and those in previous reports.

Results and Discussion

Population survey in Bapen Reserve

A total of 136 langurs were encountered, out of which 129 langurs were living in 19 groups (Tables 1,2), plus a pair of young males and five solitary old males. Of the five hill-groups in Bapen (Fig.1), GP was the only one in which no langurs or indirect signs of their presence were detected. Two calls were heard in GF, but no fresh, indirect signs were found. These two records (and hence GF itself) were excluded from the analysis because, when heard from a distance, the vocalizations of two bird species (Crow pheasant coucal, *Centropus sinensis* and Lesser crow pheasant coucal, *C. toulou*) sounded so similar to langur calls that observers could not easily distinguish them without seeing the actual animals. Hill-group QN was close to LGS (Fig.1), but only one solitary male was found there. Thus, LGS contained the main population pool of langurs in Bapen (Table 1). If uncensused valleys and those unused by langurs in LGS are excluded, adjusted densities are higher (D_1 = 0.95 groups/km², D_2 = 6.57 individuals/km²).

Table 1: Distribution of langur groups encountered during the survey in Bapen Reserve

Hill-group	Gr. No.	No. Indv.	Gr. Size	D_1^* (km ²)	D_2^{**} (km ²)
QN	[1]	[1]	x	x	0.08
LGS	18[+2]	123[+2]	6.83	0.86	6.94
MZ	1[+4]	6[+4]	6.00	0.04	0.40
GF	(2, heard)				
GP	0	0	0	0	0
Total	19	136			

Note: Numbers in the square brackets are the numbers of solitary langurs in QN and MZ and the male pair in LGS; * D_1 is group density; ** D_2 is population density. Total areas were used for these density calculations.

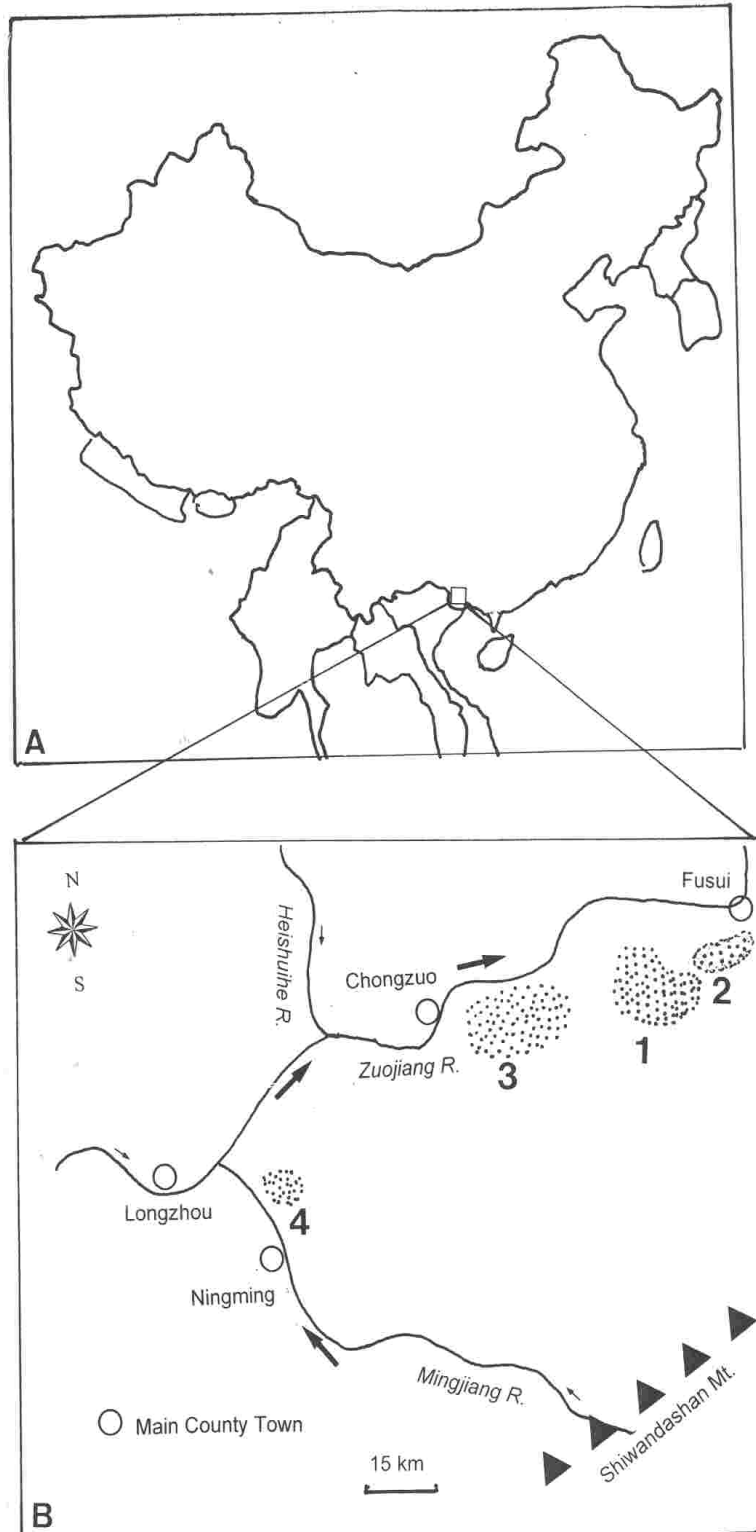


Figure 1

(A) Map of China showing the area of occurrence of the white-headed langur, *Trachypithecus leucocephalus*. (B) Distribution of world sub-populations of *T. leucocephalus*. Each patch represents a complex of limestone hills. (Patches 1&2, hill groups LGS & MZ in Bapen Reserve; 3, Luobai Reserve; 4, Longgang Reserve.)

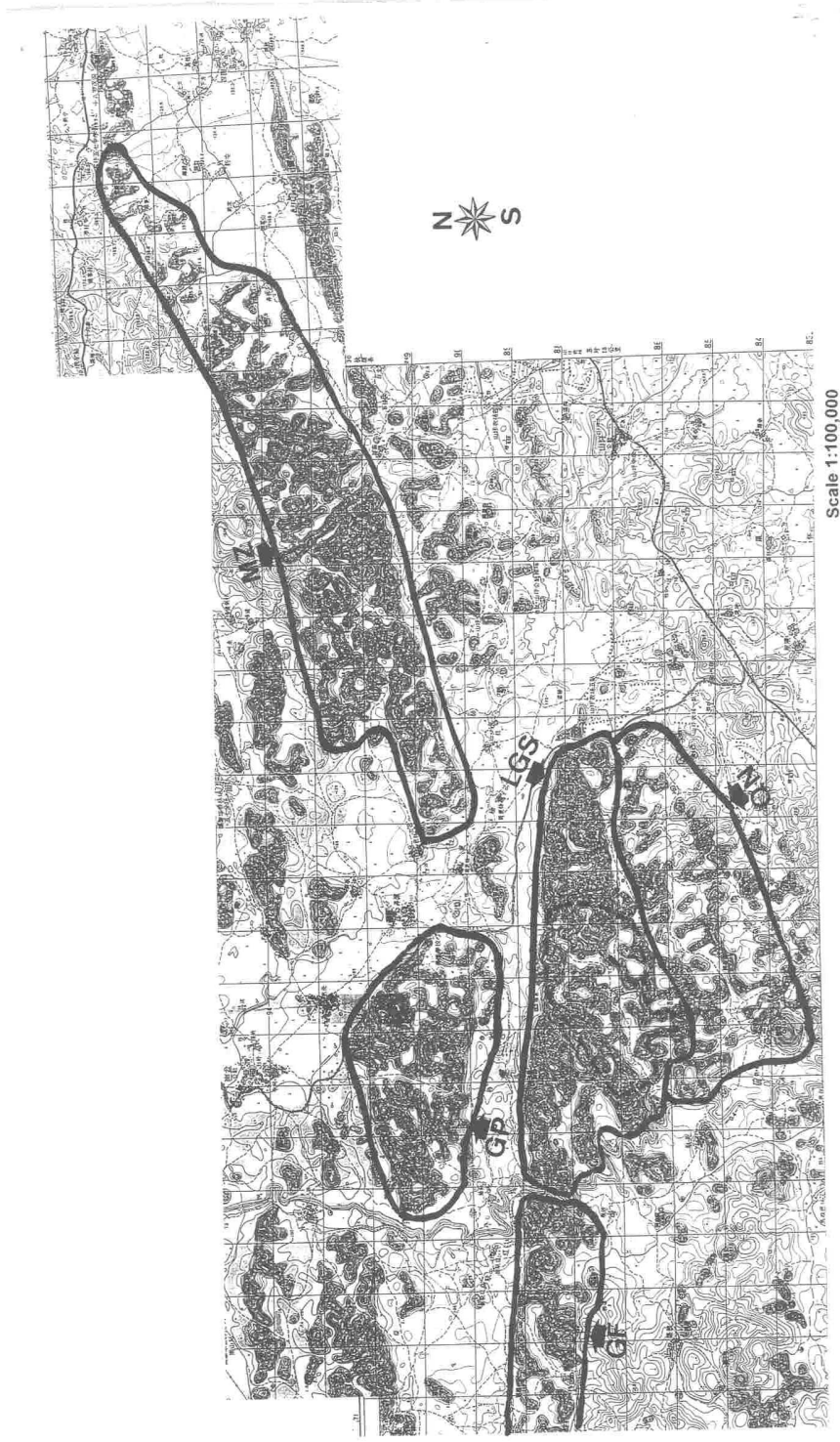


Figure 2
The distribution of hill-groups in Bapen Reserve. Their areas (km²), as measured on 1/10000 scale maps, were: LGS, 21; QN, 12; GF, 6 (ca. 1 km² of hills not shown); GP, 10; MZ, 25.

Population survey in Longgang Reserve

A total of 73 langurs were encountered in 8 groups (Table 3) in a survey area of 3.7 km². Mean group size was 9.12 individuals/group, $D_1 = 2.16$ groups/km² and $D_2 = 19.71$ individuals/km². The survey area was located in the center of the reserve where the population density was probably highest (Fig.2), so any extrapolation from these figures to give an estimate of population size for the whole reserve would be misleading. According to L.R. Lu (pers.comm.), no langurs were encountered outside the central area during a 3-day survey in May 1998.

According to data from this study and those published in the public media, the world population size of white-headed langurs was no more than 500 individuals, with 73 or a little more in Longgang Reserve, 136 in Bapen Reserve and about 210 in Luobai Reserve.

Changes in langur populations over time

In comparison with previous studies (Li, 1993; Wu, 1983; Lu & Huang, 1993), the langur population of Bapen Reserve appears to have declined over the past ten years (Table 4). In Table 4, the data collected in 1989 and 1990 cannot be compared because of different field techniques, but the 1990 data are directly comparable with the 1997 data. The population in LGS, which has been shown to contain the main population pool of langurs in Bapen (Table 1), has changed in three parameters: the number of encounters decreased by 24.7% ($[(166-125) \times 100 / 166]$), group density decreased by 14% ($[(0.99-0.86) \times 100 / 0.99]$) and the population density dropped by 26% ($[(8-5.9) \times 100 / 8]$).

Local extinction of white-headed langurs in Bapen Reserve has been taking place for a long time. According to seven villagers aged 75-85 years, their parents had seen langurs in GP when they were young. Thus, langurs may have disappeared from hill-group GP a century ago. In GF, they still occurred there in the early 1970s, but seem to have disappeared since then. In MZ, three langur groups were encountered in 1992 (Li, unpubl. data), but only one was seen in this study. Compared with GP and GF, the

population declines in LGS and MZ seem to have happened only recently.

The population decline of white-headed langurs in Bapen Reserve can be attributed to habitat loss, habitat degradation and poaching. Extinction in GP might have been related to habitat destruction, because large amounts of dense bamboo were found there, which is an indicator of serious habitat disturbance in the past. In LGS, observations indicated that, in addition to habitat loss, habitat degradation resulting from tree felling and herb collection may be an important factor in the decline in the langur population (Li, 2000). The reason for the extinction in GF is not clear, but hunting contributed at least partly to the disappearance of langurs from this hill-group and from MZ. According to three villagers, they were hunting langurs moving out to GF from LGS during and before our field work, and three of the four police records of poaching were from MZ.

In Longgang Reserve, there were about 300 langurs in 1987 (Guangxi Forestry Department, 1993). Because of the vagueness of this number, and especially because the technique used to obtain it is not known, further historical comparison is impossible. However, the mean group size, group density and population density (Table 3) were all highest in Longgang, suggesting that this reserve provides habitat of a higher quality than even the most undisturbed areas in Bapen.

Habitat preference

White-headed langurs were more likely to occupy steep terrain where limestone hills were interconnected. This is supported by the high population density in Longgang Reserve, where high ridges separated valleys from each other, and made these valleys inaccessible to humans. A comparison between hill-groups LGS and QN in Bapen Reserve (Fig.2) provides further evidence. LGS and QN received approximately equal attention from patrolling reserve staff, so hunting pressure was probably the same in the two areas. The human population density was lower in QN (70.8/km², 850 villagers farming in an area of 12 km²) than in LGS (114.3/km², 2,400 people farming in 21 km²). QN was so

close to LGS that langurs could easily traverse the distance between them. The topography was the most obvious difference – QN was composed largely of well-separated hills, whereas most hills in LGS were interconnected, so the langur habitat was more continuous there. Extreme habitat fragmentation, as seen in QN, will increase the edge effects such as higher temperatures and lower humidity, and may make the habitat no longer suitable for rare species (Janzen, 1986; Lovejoy *et al.*, 1986; Wilcove *et al.*, 1986). Thus, the differences in population density between hill-groups censused in this study indicated that white-headed langurs preferred large areas of continuous habitat (as in LGS) over fragmented habitat (as in QN). Furthermore, during behavioral observations, it was found that the langurs did not use small habitat fragments (Li, 2000).

Future of the white-headed langur

This study shows that the population of white-headed langurs has been declining in Bapen Reserve since 1990. If it continues to decline at this rate, the population will become extinct in the foreseeable future. To avoid this, hunting must be completely prohibited, especially around LGS where the main population pool is located. In addition, the following measures should be initiated:

- a) prohibition of further vegetation clearance in the reserve;
- b) regulation of tree felling and herb collection to halt habitat degradation;
- c) purchase of cultivated land in the reserve through collaboration with conservation organizations so that the vegetation can recover and connecting corridors can be created; and
- d) reduction of the demand for land by encouraging farmers to grow higher value crops.

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Table 2: Langur groups encountered during the population survey in Bapen Reserve

Group No.	Adults	Subadults	Juveniles	Infants	Total
1	4	1	1	2	8
2	3		2		5
3	M=1,F=2	3	1		7
4	3	1		2	6
5	3	3	1	3	10
6	M=1,F=2			2	5
7	M=1,F=4			4	9
8	12	2	1	1	16
9	1	3	1	1	6
10	2	1	2		5
11	4 or 6	4			4
12	4	1	1		6
13	4		1		5
14	5	2		1	8
15	3	1	1		5
16	M=1,F=2		2 or 6	2	5
17	3	1			4
18	7	3		2	12
19	M=1,F=2				3
Total**	71 (or 75)	26 (or 22)	12 (or 14)	20 (or 18)	129

*Note: Some animals were intermediate between 2 age phases. **The male pair and the five solitary males (N=7) were not included in this table.

Table 3: Langur groups encountered during the population survey in Longgang Reserve

Gr.No.	Adult*	Subadult	Juvenile	Infant	Total	Gr.Size	D ₁ **	D ₂ **
1	5				5			
2	6	2	1	2	11			
3	4			1	5			
4	5				5			
5	8	2	2	3	15			
6	6				6			
7	15			2	17			
8	9				9			
Total	58	4	3	8	73	9.12	2.16	19.73

* Note: The sexes were not distinguished due to the poor visibility and the limited time available for the work in Longgang Reserve. **D₁ is group density and D₂ population density.

Table 4: Changes in the white-headed langur population in Bapen Reserve over time

Year	In Bapen				In LGS (21 km ²)			Source
	No. groups	Group size	D ₁	D ₂	No. groups	D ₁	D ₂	
1987	339	7.3±3.0	0.39	3.48				MC Wu, unpub.data Li (1993b)
1989					149	0.63	4.2	
1990					166	0.99	8	Lu & Huang (1993)
1997	136	6.79	0.21	1.49	125	0.86	5.9	Present study

Note: *D₁ is group density and D₂ is population density, km²

STATUS OF WILD ELEPHANTS IN THE FORESTS OF ORISSA, INDIA

by Debabrata Swain

Introduction

Orissa extends between 17°49'N to 22°34'N latitudes and 81°27'E to 87°29'E longitudes on the eastern seaboard of India. Out of the 30 civil districts of Orissa, elephants are confined to the hilly rugged terrain of 18 districts, namely: Mayurbhanj, Balasore, Kendujhar, Jajpur, Sundargarh, Deogarh, Sambalpur, Angul, Nayagarh, Boudh, Cuttack, Dhenkanal, Khurda, Kalhandi, Kandhamala, Rayagada, Gajapati and Ganjam, where human development is slow and tardy. According to the

continuity of forest land, the entire elephant habitat of Orissa is divided into the following parts (Swain, 2000), viz. i) Similipal and adjoining area; ii) Kuldiha and adjoining area; iii) Hadgarh and adjoining area; iv) South Kendujhar and adjoining area; v) North Kendujhar and adjoining area; vi) Bamra Hills and adjoining area; vii) Sat-Kosia-Baisipalli and adjoining area; viii) Kapilas and adjoining area; ix) Karlapat and adjoining area; x) Kotgarh and adjoining area; xi) Chandrapur and adjoining area; xii) Bhanjanagar and adjoining area; xiii) Lakhari Valley and adjoining area; and xiv)

Mahendragiri and adjoining area.

Study and Methods

Elephant censuses were carried out in Orissa in 1979 and 1999. The censuses were based on waterhole counts. In the 1999 census the elephants were counted as they visited waterholes in May, when water sources were not numerous. The census party consisted of a leader (invariably a Forester) and two Forest Guards plus at least two local people. They kept watch for four days, day and night, on the water sources from watchtowers or temporary machans at a safe distance so the elephants would not be disturbed while coming to the water source.

The census party recorded the date and time of the elephants sighted. While recording such information they also noted the size of the herd and details about the elephant, e.g. whether male/female, adult/sub-adult/calf and any identifying marks. Before the commencement of the actual census process, all the staff of each forest division having elephants were given training in counting elephants. The census data was then collected from each party and initially processed at each range headquarters to calculate the exact population of elephants by identifying each herd. Duplicate counts of elephant herds were removed after comparing each data set and a thorough discussion among the leaders of all census parties in the range.

Next, the census data from the ranges in each division were collected and collated at the division level to eliminate duplicate counts of herds that have inter-forest ranges. The data was again analyzed at the Circle level (consisting of four to five divisions) and finally at the State level.

Results

The census results of 1979 and 1999 are given in Table 1. There were increases in the elephant populations in Kuldiha, South Kendujhar, North Kendujhar, Bamra Hills, Satakosia-Baisipalli, Kapilas and Chandaka. The elephant populations decreased in Similipal, Hadgarh, Karlapat, Kotgarh, Chandrapur, Bhanjanagar,

Lakhari Valley and Mahendragiri. The greatest elephant population decrease was in Chandrapur, which recorded 122 elephants in 1979 but only 18 in 1999 – an 85% decrease in population. The effective population size in the different elephant habitats of Orissa as per the 1999 census was calculated using the formula: $Ne = 4 (Mb \times Fb) / (Mb + Fb)$, where Ne = effective population size; Mb = number of breeding males; Fb = number of breeding females; and N = total elephant population. The results are given in Table 2, where it can be seen that out of the fifteen elephant habitats only Similipal, Bamra Hills and Satakosia-Baisipalli had an effective population of 500, and of the other twelve none had an effective population of 50.

Discussion

The River Mahanadi flows west-east, dividing Orissa into two parts commonly known as North and South Orissa. In 1979, there were 1,369 elephants in North Orissa and 675 in South Orissa. In 1999, there were 1,560 and 267 elephants in North and South Orissa respectively. This shows a substantial increase in the elephant population of North Orissa and the opposite case in South Orissa. However, it is intriguing that there was a decrease in the elephant population in Similipal, even though the habitat is the best protected area in the State. Similipal was declared a Sanctuary as early as 1979 and to give further protection to the flora and fauna of this unique tract the core area of the Sanctuary was proposed to be declared as a National Park in two phases (1980 and 1986). In June 1994, the Government of India notified Similipal forests as a Biosphere Reserve for preserving the biological diversity of the area. And on top of this, to give protection to tigers, Project Tiger began operating in Similipal in 1973, which saw the tiger population increase from 17 in 1973 to 98 in 1999.

The decrease in the elephant population of Similipal is due to the migration of elephants to the less protected areas of Hadgarh, Kuldiha and South Kendujhar where they face death due to poaching, mining operations and in retaliation for crop raiding. In fact, Kuldiha Sanctuary, along with Hadgarh and South Kendujhar

habitats, are subjected to tremendous human interference in addition to poaching, as evidenced by the fact that during the period 1981-1993 13 elephant deaths were reported, out of which 3 were believed to be natural, 6 due to poachers and 4 of uncertain causes. (Swain, 1996).

There is rampant shifting cultivation going on in the elephant habitats of Chandrapur, Bhanjanagar, Mahandragiri, Lakhari Valley and Karlapat and this, as well as adverse climatic factors like low rainfall, is the undoing for elephants in these habitats where there is a substantial decrease in the elephants of South Orissa.

In fact, the area south of the River Mahanadi was never a congenial habitat for elephants. Cobden Ramsay (1910) reported that a few animals occasionally strayed across the Mahanadi into the ex-State of Boudh, but they never moved further south. He also mentioned that it was in 1907 that elephants first appeared in the ex-State of Kalahandi (presently in the Karlapat habitat). The migration of elephants from north to south was because of developmental activities initiated by rich princely states like Mayurbhanj in the north during the end of the 19th century and early 20th century. The main source of revenue of Mayurbhanj State was the extraction of timber from forests and to facilitate this railway lines were laid deep into the elephant habitat of Similipal. Now the trend has reversed and elephants are migrating from South Orissa to North Orissa because of shifting cultivation and low rainfall in the south and better protection in the north.

The Future

Franklin (1980) has suggested that simply to maintain short-term fitness (i.e. to prevent serious inbreeding and its deleterious effects), the minimum effective population size (in the genetic sense) should be around 50. He (and also Soulé (1980)) further recommended that to maintain sufficient genetic variability for adaptation to changing environmental conditions, the minimum effective population size should be around 500. From the effective

population estimates given in Table 2, it can be seen that none of the populations are equal to 500 and hence, in the long run all these populations are destined to be wiped out. In the short run, i.e. in the next one to two elephant generations (20-40 years) the elephants in 12 habitats in the State that have effective populations of less than 50 will be wiped out. Thus, if the fragmentation of habitats continues and if no migration of elephants from one habitat to another is allowed, the elephants of Orissa stand to become extinct in the next one hundred years. It is, therefore, imperative that corridors among different habitats be re-established and maintained so that elephant migration from one habitat to another is possible so as to maintain sufficient genetic variability and to counter inbreeding depression.

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Table 1: Elephant populations (By Habitat) in Orissa, India

Habitat	Area (km ²)	1979	1999	Decrease (-) or Increase (+)	% of Decrease or Increase
Similipal	2900	648	524	-24	-19
Kuldiha	283	22	41	+19	+86
Hadgarh	191	19	16	-3	-16
S. Kendujhar	725	43	56	+13	+30
N. Kendujhar	931	60	97	+37	+62
Bamra Hills	1614	237	407	+170	+72
Satkosia-Baisipalli	1382	299	340	+41	+14
Kapilas	220	92	94	+2	+2
Chandaka	190	57	83	+26	+46
Karlapat	148	33	13	-20	-61
Kotgarh	800	81	28	-53	-65
Chandrapur	186	122	18	-104	-85
Bhanjanagar	997	134	32	-102	-76
Lakhari Valley	543	177	70	-107	-60
Mahendragiri	57	20	08	-12	-60

Table 2: Effective population size of different elephant habitats of Orissa, India (Census-1999)

$$N_e = 4 (M_b \times F_b) / (M_b + F_b)$$

Habitat	Fb	Mb	N	Ne
Similipal	200	62	524	189
Kuldiha	16	04	41	18
Hadgarh	04	03	16	08
S. Kendujhar	18	10	56	26
N. Kendujhar	31	18	97	46
Bamra Hills	149	55	407	161
S. Baisipalli	115	55	340	149
Kapilas	34	18	94	38
Chandaka	30	12	83	34
Karlapat	05	02	13	06
Kotgarh	08	06	28	14
Chandrapur	05	04	18	09
Bhanjanagar	11	05	32	14
Lakhari Valley	29	06	70	20
Mahendragiri	03	01	08	03
TOTAL	659	257	1827	733

FOREST NEWS

Vol.XVII:No.2

WORLD'S FORESTRY OFFICIALS MEET IN ROME

The sixteenth session of the Committee on Forestry (COFO) convened 10-14 March 2003 in Rome. Delegates from 113 member countries participated in the session, along with observers from the Holy See, 8 UN agencies and 23 intergovernmental and international NGOs.

The COFO agenda focused on the State of the World's Forests 2003 (SOFO), the role of the Regional Forestry Commissions in implementing the IPF/IFF proposals for action, forests and freshwater, national forest programmes, the Forestry Outlook Study for Africa, and FAO's current and planned forestry programs and activities. The session included numerous side meetings, which convened in simultaneous gatherings each afternoon.

Of particular relevance for the Asia-Pacific region were the following COFO decisions and recommendations.

Role of the Regional Forestry Commissions in implementing the IPF/IFF proposals for action and recommendations of the Regional Commissions

The Committee:

- C agreed that FAO Regional Forestry Commissions are important mechanisms to support member countries in implementing sustainable forest management (including the IPF/IFF proposals for action);
- C recommended that Regional Forestry Commissions strengthen their links with other regional organizations and processes working in forestry, wildlife, and related areas, and that private sector and non-governmental organizations be more

involved in the activities of the commissions;

- C recommended that Regional Forestry Commissions facilitate the assessment and implementation of IPF/IFF proposals for action and other internationally agreed actions;
- C suggested establishing a small roster of persons in each region who are familiar with the IPF/IFF proposals for action, to assist countries in assessing and prioritizing the proposals, and to provide information on sources of funding;
- C encouraged FAO and other members of the Collaborative Partnership on Forests to help fund such an approach for assisting countries in prioritizing the IPF/IFF proposals for action;
- C recommended that Regional Forestry Commissions be used to facilitate the flow of information between UNFF and member countries; and
- C welcomed the report of a panel composed of a representative of each Regional Forestry Commission, which provided a summary of recommendations and perspectives from each commission [The Asia-Pacific Forestry Commission was represented on the panel by Navaan-Yunden Oyundar (Mongolia)].

Forests and freshwater

The Committee:

- C recommended that FAO facilitate better national and international coordination related to fresh water management;
- C supported the inclusion of a new entity on water and forests in the FAO Medium Term Plan 2004-09;

- C encouraged FAO to support processes that maximize stakeholder contributions in developing and implementing policies, programs, and strategies that integrate land use and water management with sustainable forest management, and address conflict issues;
- C urged FAO to foster inter-sectoral dialogue and cooperation to achieve sustainable management of water resources; and
- C recommended that FAO explore ways to report on the linkages between forests and water in the FAO Global Forest Resources Assessment.

National forest programmes

The Committee:

- C noted the multi-sectoral and participatory nature of national forest programmes and recognized the contributions that they can make to sustainable development, food security and poverty alleviation;
- C agreed that national forest programmes are important tools to implement commitments related to the World Food Summit: *five years later*, the World Summit on Sustainable Development and outcomes of other international discussions;
- C recommended that national forest programmes cover all types of forests and trees outside forests;
- C recommended that countries seek to make their national forest programmes and national plans related to other natural resources mutually supportive;
- C recommended that FAO continue to support national forest programme processes;
- C urged additional donors to support the National Forest Programme Facility; and
- C requested FAO to assist member countries in updating and reporting country efforts on national forest programmes, recognizing the need for verifiable goals and milestones.

Review of FAO programs in the forestry sector

The Committee:

- C recommended that FAO continue to give high priority to forest resources assessments,

emphasizing the importance of strengthening national capacities to collect and analyze information about forests, and the need to improve compatibility among national, regional and international assessments;

- C endorsed the need for an updated global FRA report in 2005;
- C encouraged FAO to continue collaborating with other organizations to streamline reporting, build synergies and strengthen national capacities in collecting and analyzing forestry information;
- C recommended that FAO continue to give high priority to supporting forestry education, extension and research;
- C encouraged FAO to continue its active role in harmonizing forest-related definitions;
- C endorsed the importance of regional approaches in addressing forest issues;
- C recommended that FAO continue its work on criteria and indicators for sustainable forest management; model and demonstration forests; participatory forestry; forest fire control; wildlife management; forest biological diversity; forests and climate change; support to national forest programmes; the links between forests, forestry and poverty alleviation; trade and sustainable forest management; and assistance to countries to prevent and control forest pests and diseases;
- C commended FAO for its support to the United Nations Forum on Forests and its leadership in the Collaborative Partnership on Forests and recommended to continue and strengthen these roles;
- C recommended that FAO increase its efforts to raise the awareness of its achievements in the Field Programme;
- C recommended that FAO work to simplify the procedures and reduce the timeframe required for providing support to member countries; and
- C noted the World Congress of the International Union of the Forest Research Organizations (IUFRO) to be held in Australia in August 2005, and the offers of Australia and the Republic of Korea to host the World Forestry Congress in 2009.

Defining work objectives for FAO in forestry

The Committee:

- C broadly agreed with the program of work as outlined in the Medium Term Plan 2004-09;
- C supported the additions to the work program on forests and water; forest and climate change; and forests, food security and poverty alleviation;
- C recommended that FAO continue to focus on its core mandates, including forest information, forest resource assessments, and harmonizing of forest-related definitions;
- C encouraged FAO to work with UNEP, UNCCD, and other partners to provide technical support to low forest cover

countries (LFCCs) for the sustainable management of forests and trees outside forests, rehabilitation of degraded lands, and desertification control;

- C recommended that FAO support efforts to improve wildlife management and valuation of non-wood forest products and services;
- C encouraged FAO to continue serving as a neutral forum for discussing issues related to forest certification;
- C recommended that FAO support countries' efforts in forest law enforcement; and
- C recommended that FAO give increased emphasis to socially and ecologically based fire management, including at regional levels.

DOES YOUR NATIONAL FOREST PROGRAMME NEED A BOOST?

A new initiative called the National Forest Programme Facility (in short, Facility) has been launched recently by FAO and several leading international partners. It was set up as a direct response to the resolutions of the Intergovernmental Panel on Forests (IPF), the Intergovernmental Forum on Forests (IFF) and the United Nations Forum on Forestry (UNFF).

The Facility is hosted by FAO and operates under the guidance of a Donor Support Group and a Steering Committee which includes representatives of funding partners, beneficiary countries, FAO, the World Bank, research institutions, non-governmental organizations, foundations and the private sector. Facility support to countries and FAO assistance to national forest programmes (nfps) are complementary.

The Facility will provide direct country-level support to assist in the development and implementation of nfps. Facility support has two main objectives: first, it is directed towards

developing national capacity to compile and exchange forestry information, with particular emphasis on addressing poverty alleviation and governance issues. A second objective of the Facility is to stimulate the engagement of the civil society in forestry, and ensure the active participation of a broad range of stakeholders in the nfp process.

Facility support is available under a 3-year partnership with developing countries. Support under such partnerships will be adjusted according to country needs and circumstances; on average, it is expected to be in the range of US\$300,000 per country, spread over 3 years.

Strategy and beneficiaries

Direct country-level support by the Facility aims at making nfps key instruments to:

- C integrate sustainable forest management into poverty reduction strategies and other broad intersectoral processes at the national level;
- C build a consensus at the national level on

how to address issues relevant to forests and trees, in the overall context of sustainable development; and

- C integrate commitments made at the international level (e.g. CBD, UNFCCC and UNCCD) into national forest policy and planning.

Facility support focuses especially on knowledge sharing and capacity strengthening, to ensure the informed participation of a broad range of stakeholders in the process that should lead to a national forest plan, its effective implementation, and its continuous update. Within countries, potential beneficiaries are any stakeholders with an interest in active participation in the nfp process, including national and local government agencies, NGOs, community-based organizations and non-profit civil society groups.

Process

The process for direct country-level support includes two phases:

- C concluding Partnership Agreements between the Facility and interested countries;
- C providing grants to nfp stakeholders within partner countries through Facility Grant contracts.

Partnership Agreements

Partnership Agreements define the framework for the Facility-sponsored activities and explain the current in-country situation before Facility involvement. The content of a Partnership Agreement reflects the political commitment of the partner country to further its nfp process, and its willingness to address specific themes with Facility support. The Partnership Agreement also includes an indicative annual budget, for a period of three years, to support the proposed activities. The level of this budget will depend on the proposed activities and will be adjusted to country circumstances.

Facility Grants

Once a Partnership Agreement is established between the Facility and a country, grants can be provided to nfp stakeholders to:

- C strengthen the capacity of the stakeholders in the nfp process;
- C support civil society participation in the nfp process;
- C promote cross-sectoral dialogue between the forestry sector and other sectors;
- C develop capacities for policy formulation, implementation and review; and
- C promote transparency, accountability, availability and access to information/knowledge in relation to the nfp process.

Funds provided through Facility grants are expected to be spent mainly on:

- C workshops, fora and in-service training;
- C policy analysis and other specific studies;
- C information sharing and knowledge management initiatives.

Procedures

Countries interested in Facility support need to prepare as a first step a Concept Note. The note should describe the current status of the country's nfp, who the stakeholders are and how they contribute to the process. Furthermore, it should identify the bottlenecks and problems facing the nfp process and how they can be eased with Facility support. Based on Concept Notes received, the Steering Committee of the Facility will identify, in early May 2003, the first priority countries with which the Facility will establish Partnership Agreements in mid-2003. Further identification of priority countries will take place in November 2003, and subsequently twice a year.

For more information on the Facility, on how to prepare the Concept Note, or eligibility criteria, please contact one of the following persons:

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WHAT'S HAPPENING WITH FAO REGIONAL FORESTRY PROJECTS?

Forestry Research Support Programme for Asia and the Pacific (FORSPA)

The Government of Netherlands Trust Fund Project supporting FORSPA (GCP/RAS/163/NET) officially drew to a close in December 2002 after six years of operation (including its first phase, FORSPA operated for more than 10 years). Selected priority activities are continuing through June 2003, with funding from the FAO/Netherlands Partnership Programme.

Regional Model Forest Project (RMFP)

The FAO-Government of Japan Regional Model Forest Project (GCP/RAS/177/JPN) that was launched in February 2000, ended on 15 February 2003. The project had supported model forest approaches to forest management in China, Myanmar, the Philippines and Thailand. On 20 February 2003, FAO signed an agreement with the International Development Research Centre (IDRC) of Canada to implement a 12-month initiative (GCP/RAS/195/CAN) to prepare for the establishment of a Regional Model Forest Centre for Asia and the Pacific (RMFC-AP). Under the agreement, limited targeted support will also be provided to the Lin'an (China), Ulot (Philippines) and Ngao (Thailand) Model Forests that were established under the RMFP, and efforts to strengthen the model forest network in Asia will continue.

EC-FAO Partnership Programme

The EC-FAO Partnership Programme (GCP/RAS/173/EC) on *Information and Analysis for Sustainable Forest Management: Linking National and International Efforts in South Asia and Southeast Asia*, will come to a close at the end of May 2003. Since its inception in early 2000, the Programme has supported numerous activities on problem-oriented data gathering and updating of information, thematic studies directed at methodological approaches related to data

collection, forest policy reviews, and strengthening of capacities for forestry statistics collection and analysis.

Enhancing Forest Management through Improved Forest Harvesting

A grant received from the USDA Forest Service is supporting activities directed at improving management of natural forests in Lao P.D.R., Mongolia and the Philippines. An additional activity will prepare an in-depth review of progress made towards implementing the *Code of Practice for Forest Harvesting in Asia-Pacific* and achieving sustainable forest management in the region, with particular emphasis on ASEAN countries.

Enhancing Sustainable Forest Harvesting in Asia

A new FAO-Government of Japan Regional Project (GCP/RAS/192/JPN) will be initiated in the near future. The project will support activities directed at improving forest harvesting in Lao P.D.R., Myanmar and Viet Nam. The project will assist in developing and/or improving national codes of practice for forest harvesting, in preparing reduced impact logging (RIL) guidelines, and in building capacity of stakeholders engaged in forest harvesting practices. The project will focus on transferring available technologies and sharing experiences related to RIL and training in forest harvesting.

The two latter projects will build on the *Code of Practice for Forest Harvesting in Asia-Pacific* and will be consistent with the *Regional Strategy for Implementing the Code of Practice for Forest Harvesting in Asia-Pacific* and the *Regional Training Strategy*. Emphasis will be given to improved management and sustainable utilization of natural forests and plantations for the benefit of local people and national development.

MAKING THE MOST OF SCARCE RESOURCES FOR EFFECTIVE FORESTRY RESEARCH

Report of an international workshop organized by: FORSPA/FAO, APAFRI, Sri Lanka Forest Department, IUFRO/SPDC, USDA Forest Service, The Nature Conservancy and CIFOR

Inadequate resources – be it money, people, ideas or institutions – is a common constraint faced by most national forest research institutes (NFRIs) in the Asia-Pacific region. However, this might be a great opportunity because, as the old saying goes, "Necessity is the mother of invention." Currently, support for public sector research is on the decline, but NFRIs across the Asia-Pacific region are being asked to do more with less. Moreover, the traditional public sector monopoly of forestry research is beginning to be perceived as an obsolete institutional model for tackling forest problems.

These trends and realities formed the background for the regional workshop "Making the Most of Scarce Resources for Effective Forestry Research," held in Colombo, Sri Lanka from 2-4 December 2002. The workshop was attended by 32 participants from national research institutions in the Asia-Pacific region, as well as representatives from NGOs, private sector organizations, and regional and international partners.

In his introduction, Dr. S. Appanah (FORSPA/FAO) cautioned that NFRIs must adapt to conditions of scarcity, or face decline and marginalization. It is imperative that NFRIs remake themselves and come up with more innovative ways of getting results. There are three broad fronts where improvements can be made: i) improving the efficiency and accountability of research; ii) forging linkages with other research partners; and iii) mobilizing additional resources for research.

Workshop participants were asked to distill their experiences, and come up with proven, workable strategies for managing research with scarce resources. Topics discussed included the following:

- the role of R&D in a changing world, and why the demand for "traditional" research is declining;
- how NFRIs can transform from traditional institutions to service enterprises and knowledge brokers;
- donors' priorities and how to attract financing for forestry research in a competitive environment;
- how research can make a greater impact through effective strategies like good planning, priority setting, designing high impact projects and mobilizing resources;
- how a stakeholder-driven approach can improve the quality and impact of forestry research in developing countries;
- how to bring in the private sector to support research;
- how new and developing technologies (such as remote sensing and GIS) can help achieve more with judicious investment in appropriate hardware, software and training;
- encouraging innovative research and improved marketing of services and technologies;
- how research-oriented NGOs are extending the borderlines of research and advocacy to bring about results; and
- the contention that resources are, in reality, not scarce, but have substantially shifted from government to business and civil society, and that the reality is abundance and competition; NFRIs should therefore, capture the situation by building partnerships with others, for support, impact, and bringing in of special skills.

The workshop concluded that there are many innovative ways to undertake research, and that NFRIs will have to remake themselves to be effective in the current climate.

MAN-MADE FORESTS: USING INDIGENOUS AND EXOTIC SPECIES IN VIETNAM

One of the objectives of Vietnam's Five Million Hectares Reforestation Programme (5MHRP) is to improve the livelihoods of rural communities by involving them in the forestry sector. The 5MHRP has proposed farm forestry schemes to bring degraded land into production and conserve forests; however, the concept of farm forestry is not fully developed. Additionally, there is still much controversy about whether indigenous or exotic species should be promoted.

To bring more clarity and understanding to these issues, FAO, FORSPA and the Vietnamese Ministry of Agriculture and Rural Development organized a national workshop in Hoa Binh, Vietnam, 9-11 December 2002, on "Man-made Forests: Using Indigenous and Exotic Species in Vietnam."

The workshop discussed the status of native and exotic tree plantations in Vietnam, the constraints and challenges of planting native species, and the economic viability of timber plantations in the country. Despite the sentimentality expressed for native species, it became clear that for industrial timber production, exotics possess the

prerequisites for large-scale plantations. Where farm forests and multiple products other than timber are preferred, some native species also offer considerable potential.

Another firm conclusion emerging from the workshop is that there is already adequate technological information for supporting plantation development. The major constraints are not related to the trees – rather, they are people-related issues. These include the lack of good policies, inadequate land and tree tenure, ineffective incentives, weak financing mechanisms, poor marketing support, long distances to mills, and lack of financial viability. There was agreement that Vietnam should review these people-related issues before initiating plantation programs of any kind. The workshop recommended setting up two working groups: i) to put together the knowledge of the potential species, the produce and the benefits of farm forests; and ii) to undertake a review of the policies, socio-economic issues, and institutional limitations that are hindering farm forest development in Vietnam.

PROMOTING AWARENESS OF CERTIFICATION AND LOCAL AUDITING SYSTEMS

Report of a workshop organized by: FORSPA, APAFRI, Fujian Province Forest Department and the Chinese Academy of Forestry

Fifty-three participants, including heads of research departments, forestry department chiefs, senior policy and planning officials, and senior field staff of government and private forestry agencies attended a national workshop on "Forest

Management Certification and the Design of Local Auditing Systems for China," in Zhong Zhao, 9-12 September 2002. The objectives of the workshop were to increase knowledge on the certification process, develop local auditing

systems, and examine the organization, finances and institutional needs for introducing certification.

Presentations included the following:

- a review of forest management;
- sustainable forest management and criteria & indicators under the ITTO Framework in tropical China;
- status and trends of forest management certification;
- the Chain of Custody initiative;
- sustainable forest management and forest certification practices in the province of Fujian; and

- introduction to the Changtai Yanxi Sustainable Forest Management Unit.

Evaluation methods for developing local criteria and indicators, assessable verifiers for each indicator, and the audit form were also introduced.

A field exercise was conducted to introduce the audit process, which included document examination, field inspection, interviews with forest managers, and preparation of a final report with a scoring system. The workshop also identified additional work needed for developing comprehensive local auditing systems.

NON-TIMBER FOREST PRODUCTS AND TRIBAL COMMUNITY DEVELOPMENT

A workshop on “Non-timber Forest Products and Tribal Community Development” was held in New Delhi, India, on 12-13 November 2002. The workshop was organized by FORSPA and the Ashoka Trust for Research in Ecology and the Environment. The objective of the workshop was to bring together researchers, managers, policy makers and NGO representatives to:

- C review recent initiatives related to tribal development and sustainable management of non-timber forest products (NTFPs);
- C identify additional research needed to develop the appropriate policies, financial incentives and technology for enabling tribal communities' economic development through the utilization of NTFPs; and
- C chart a strategy to bring about the required changes.

The workshop covered trade and marketing of NTFPs, their role in tribal development, legal issues relating to community-based forest management, community empowerment and the role of foresters. Working group discussions were held on empowerment and capacity building, and

implementation and extension of R&D.

The salient conclusions of the workshop were as follows:

- C the forestry sector has an important role to play in alleviating the extreme poverty among the tribal people and other forest fringe-dwellers;
- C natural resources management should integrate traditional knowledge, using the existing social framework;
- C management of NTFPs must be linked to viable markets, with communities empowered and trained to undertake management and marketing of NTFPs; and
- C inter-agency cooperation is essential to alleviate poverty among the indigenous people – only in rare situations can the forestry sector achieve poverty-reduction goals alone.

The group recommended follow-up action to identify research areas and to create an enabling environment to support communities in managing NTFPs sustainably.

PARTICIPATORY APPROACHES IN CONSERVATION AND MANAGEMENT OF MANGROVE FORESTS

The participatory management practices advocated by the Joint Forest Management schemes in India have yet to be introduced into management of the country's mangrove forests. To extend the benefits of participatory management to mangrove forests, the M.S. Swaminathan Foundation has initiated a program of awareness and training.

Nearly 60 participants from the Forest Departments, NGOs, and research and academic institutions from West Bengal, Orissa, Andhra Pradesh, Tamil Nadu and Karnataka participated in a workshop on "People's Participatory Approaches in Conservation and Management of Mangrove Forest Resources," held in Kakinada, India, 16-19 December 2002. The workshop was organized by FAO (FORSPA) and the M.S. Swaminathan Foundation.

The objectives of the workshop were to enhance the capacity of different stakeholders in the latest methodologies of the participatory approaches. Presentations focused on: the problems and constraints in the formulation of forest

conservation councils; the role of women in conservation of natural resources; land-based alternatives for reducing dependency on forest resources; participatory approaches; sustaining village-level forest conservation councils; application of GIS; and mangrove restoration methodologies.

The main conclusions of the workshop were:

- C Village-level Forest Conservation Councils have the potential to undertake important conservation work, and should be given additional information and incentives to carry out such work.
- C To be sustainable, the participatory approaches need to be motivation-oriented rather than incentive-oriented.

The 4-day workshop included a one-day field visit to mangrove restoration areas in Coringa Wildlife Sanctuary near Kakinada, where technical aspects of mangrove restoration and conservation were demonstrated.

FORTHCOMING CONFERENCE ON INVASIVE SPECIES

The Asia-Pacific Forest Invasive Species Conference will be held in Kunming, China, 17-22 August 2003.

The key objectives of the conference include increasing awareness of the threats of invasive species to forests and forest products, sharing experiences and knowledge related to dealing with invasive species issues, and developing proposals for regional cooperation and action in addressing invasive species problems. The conference will identify key knowledge and information gaps

regarding invasive species in forests and possible solutions to address those needs.

The conference will include a range of keynote and technical presentations covering aspects such as global perspectives on invasive species, pest risk assessments and pathways, and ecological and economic impacts of invasive species. A range of specialist presentations addressing country experiences with specific invasive species incursions will describe state-of-the-art response mechanisms. The conference will also include

interactive sessions with panel discussions and breakout discussion groups. It is planned that the conference will work towards the establishment of an Asia-Pacific Forest Invasive Species Network.

The conference is open to all interested participants. It will be of particular importance to people working in policy, research and operations relating to forest biosecurity, quarantine and protection, including government officials, scientists, industry representatives and private

sector companies with significant forestry trading operations in the Asia-Pacific region.

The conference will incorporate two field trips – to examine weevil infestations in Yunnan Stone Forest and to Lijiang to inspect pine shoot tip problems. Both these sites are UNESCO World Heritage Sites.

For more information, please contact Patrick Durst: patrick.durst@fao.org

LESSONS LEARNED FROM MODEL FORESTS

The 4th Regional Model Forest Workshop on Experiences and Lessons Learnt from Developing Model Forests, and “What Next?” was held in Ormoc City, Philippines from 25-28 November 2002. The workshop was organized and co-sponsored by the FAO-Government of Japan Regional Model Forest Project (RMFP), in collaboration with the Forest Management Bureau (Philippines) and the International Model Forest Network Secretariat (IMFNS), Canada.

Over 45 representatives from the four RMFP countries, and from various agencies and partner organizations participated in the workshop. Field visits were made to model forest sites in the Ulot Model Forest, in Samar.

Observations

- C The fundamental premise of the model forest approach (i.e. voluntary partnerships among all stakeholders) is a workable concept and is a sensible way to integrate the multiple dimensions of natural resource management.
- C Lessons learnt from the Lin’an Model Forest (LMF), China, included:
 - O The LMF Co-operation Committee is an effective forum for identifying priority issues, determining responses to priority issues, meeting the needs of partners and resolving conflicts.
 - O Partnership development takes time but effective partnerships can avoid making wrong decisions, and can promote social equity.

- O Core partners are the engines of model forest development, and voluntary contributions from key individuals (champions) are very important for successful development of model forests.
- O Model forest development should include income-generating activities.
- O Training is needed to increase local capacity, and should be based on an analysis of training needs.
- C Lessons learnt from the Paukkaung Model Forest (Myanmar) included:
 - O Coordination and collaboration among partners should be continually strengthened.
 - O Voluntary service should be actively promoted.
 - O Field demonstration is important to convince farmers of the value of new practices.
 - O Partnership development requires considerable and sustained training and support.
 - O Food security depends on ecological balance and environmental stability.
- C Lessons learnt from the Ulot Model Forest (Philippines) included:
 - O Technical assistance and financial support help ensure the active participation of stakeholders.
 - O The process of developing and using C&I can strengthen partnerships.
 - O Participation of farmers in identifying and testing indicators that are available,

- measurable, and easy to gather, provides a sense of ownership and awareness of the importance of C&I in monitoring progress towards SFM.
- Sharing information on model forest concepts, processes and activities among stakeholders can generate enthusiasm and enhance participation.
- Building partnerships is a long and continuing process, but a rewarding endeavor.
- C Lessons learnt from the Ngao Model Forest (Thailand) included:
 - Public awareness and participation have helped improve forest protection.
 - Partnership development takes time and effort, but is worth doing.
 - Livelihood improvement of local communities resulted in positive impacts on forest management.
 - Cooperation and coordination among stakeholders have been relatively effective and should be strengthened.
- C Lessons learnt from the Berau Forest Management Project (Indonesia) included:
 - A new concession system combining commercial considerations with social, equity and sustainability considerations, is urgently needed.
 - The model forest approach should be adopted to assist in the change from concession-based forest management to a more equitable system.
 - A national secretariat is needed to promote the model forest approach more effectively.
- C Lessons learnt by the IMFNS included:
 - Country-level support is critical and changes in government need to be anticipated as both policy and personnel can be lost with administration changes.
 - The national government is a major benefactor for model forest development, but must also be seen as a major beneficiary.
 - SFM must provide tangible benefits to local people and communities.
 - Documentation and quantification of impacts are critical, although many impacts are difficult to quantify.
 - Model forests can be exceptionally cost-

- effective mechanisms for achieving SFM.
- As the International Model Forest Network has grown it has become evident that more effective support could be provided by grouping country-led model forests regionally and assisting/linking them through a regional Secretariat with clearly established roles from site, to country, to region, to global levels.
- C In view of the positive findings of the RMFP terminal evaluation mission, efforts are being made to identify and secure funding for a follow-up regional model forest support programme.
- C FAO and IMFNS are discussing arrangements to support preparation for a regional model forest center for Asia-Pacific.

Recommendations

1. The experiences, knowledge and lessons learnt from the RMFP and other model and demonstration forests should be actively shared with other countries and agencies.
2. The relevance, usefulness and contribution of the model forest concept to SFM should be actively promoted.
3. RMFP countries should continue implementing their own “What Next?” plans, even on limited basis.
4. RMFP countries should develop strategies to identify and secure additional funds from government agencies and international organizations/major partners for the implementation of their model forest activities.
5. RMFP countries should mainstream the model forest approach at the personal, job and institutional levels.
6. Countries should consider the EU-funded, UNDP-managed Small Grants Programme as a source of funding for some of their model forest activities.
7. Indonesia should be included in the proposed Model Forest Network for Asia-Pacific.
8. More efforts should be made to ‘internationalize’ the model forest approach to enhance its acceptability amongst donors.
9. FAO, IMFNS and other interested agencies should secure resources to establish a regional model forest center/secretariat.

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

INDONESIA ESTABLISHING ENVIRONMENT COURT

The Indonesian government is recruiting and training a dozen judges and prosecutors to allow them to try environmental cases, including illegal logging. In announcing the measure, State Minister for the Environment, Nabel Makarim, also hit out at weak and confusing laws that contribute to illegal logging, and identified “rat alliances” of organized national and regional criminal groups as being important backers of illegal logging.

– *Jakarta Post* –

MALAYSIAN FURNITURE EXPORTS TOP \$1.4 BILLION

The Malaysian Minister for Primary Industries, Datuk Seri Dr. Lim Keng Yaik, estimated that Malaysian furniture exports for 2002 were valued at more than 5 billion ringgits (US\$1.4 billion). Dr. Yaik says Malaysian furniture exporters have diversified markets and reduced their dependence on the US market.

– *ITTO Market Information Service* –

WORLD’S LARGEST DOOR PLANT FOR CHINA

The Meixin Group will build the world’s largest door plant in Chongqing, China. The plant will have an annual capacity of 5 million doors, valued at US\$500 million.

– *ITTO Market Information Service* –

RUBBERWOOD FOR MDF IN THAILAND

The Vanachai Group, one of Asia’s largest producers of particle board, plans to build a new medium-density fiberboard (MDF) plant and a new particle board plant in Surat Thani, Thailand. The Vanachai Group uses rubberwood as the

primary input to its MDF manufacture. Assisting Vanachai is a ban on the export of rubberwood sawn timber from Thailand, which has created a domestic supply surplus and forced down raw material prices.

– *Bangkok Post* –

PROTESTS AGAINST THE BAN

Rubber planters are protesting the ban on exporting rubberwood sawnwood, claiming it is reducing returns to rubber growers and may force the closure of sawmills that process rubberwood, affecting the jobs of thousands of workers. The protestors say the government policy shows a lack of understanding of dynamics in the rubberwood market.

– *ITTO Market Information Service* –

GLOBAL WITNESS DISMISSED

The Royal Government of Cambodia has indicated plans to dismiss Global Witness, a UK-based environmental organization, as an official Independent Monitor of forestry activities in the country. Global Witness had been working as part of a UNDP/FAO project monitoring illegal logging in Cambodia. The announcement came after allegations from Global Witness that Cambodian police used unnecessary force to break up a protest over forestry management plans. Global Witness claimed a protester died following the break up. The Cambodian government rejects claims that excessive force was used to disperse the protesters.

– *Associated Press* –

REBELS THREATEN FORESTS IN NEPAL

The Maoist insurgency in Nepal is affecting the forestry sector, with conservation efforts being hampered by the destruction of infrastructure, the withdrawal of donor projects, and an inability by

forest officers to carry out normal duties. The Ministry of Forestry and Soil Conservation says that 20 forest area offices and 280 range posts have been destroyed by the Maoists. Several donor-funded forestry projects in western areas of Nepal have been abandoned. The Ministry fears illegal logging may be degrading significant areas of forests while guards and rangers are unable to undertake patrols due to the dangers posed by the rebels.

– *Yahoo News* –

MAHOGANY GETS MORE CITES PROTECTION

The Convention on International Trade in Endangered Species (CITES) has imposed stricter controls on the mahogany trade from Latin America to shield the species from extinction in the wild due to over harvesting. Countries that export natural forest mahogany timber and veneer will be given one year to comply with the new requirements. These requirements do not apply to countries in the Asia-Pacific region, where mahogany is an introduced species.

– *Forests.org* –

STORM DAMAGE IN HOKKAIDO

A major typhoon struck eastern Hokkaido in October 2002, causing widespread forest damage. As much as 300,000 cubic meters of standing timber may have been windthrown. The logging road system was also affected by landslides, and heavy snowfalls hampered recovery operations.

– *ITTO Market Information Service* –

DEPT-FOR-NATURE-SWAP

The Philippines has signed a dept-for-nature-swap agreement with the United States. Under the agreement, the US will write off US\$8.2 million per annum in interest payments on loans. In return, the Philippines is required to invest the interest savings in forest conservation programmes.

CHINA'S CROPLAND CONVERSION PROGRAMME

The Cropland Conversion Programme expanded from its pilot phase to full implementation in 2002 with ambitious targets. For 2002, the programme called for 2.27 million hectares of cropland to be converted to grass or forest, and an additional 2.7 million hectares of "wasteland" to be afforested or planted with grass.

– *CCICED Newsletter* –

NEW INDONESIAN FORESTRY AGENCY

Senior officials from the Ministry of Forestry and the Ministry of Trade and Industry will preside over a newly-formed *Agency for Forest-based Industry Affairs and Sustainable Raw Materials*. The Agency will address key problems plaguing the Indonesian forestry sector including curbing illegal logging, boosting exports, resolving raw material shortages and reviewing means to protect forests and the environment.

– *ITTO Market Information Service* –

CRACKDOWN ON ILLEGAL LABOR

A recent government crackdown on illegal foreign labor in Malaysia has had a significant impact on the Malaysian woodworking sector. Many smaller mills have been deprived of their workforce and are facing an acute labor shortage. Particularly badly affected are rubberwood sawmilling contractors who, reportedly, are heavily dependent on foreign labor.

– *ITTO Market Information Service* –

LOG IMPORT BAN IN MALAYSIA

The Malaysia government has placed a ban on all log imports from Indonesia. The ban is in support of a move by the Indonesian government in October 2001 to ban the export of logs as a measure to combat illegal logging. Malaysia's ban does not extend to logs from other countries.

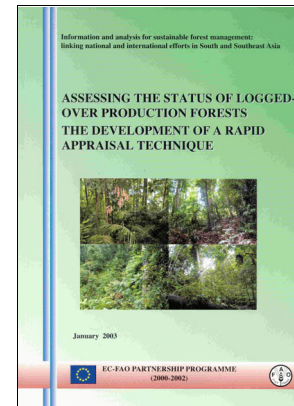
– *ITTO Market Information Service* –

ASSESSING THE STATUS OF LOGGED-OVER PRODUCTION FORESTS THE DEVELOPMENT OF A RAPID APPRAISAL TECHNIQUE

EC-FAO Partnership Programme - January 2003

A major challenge in satisfying the demand for wood by the forest-based industries is to estimate the future availability of forest resources and to calculate the volume of roundwood that might be produced from forest areas. Most countries in the Asia-Pacific region assess the extent of their forest resources on a regular basis. However, the knowledge of the status of the logged-over areas is often limited and the assumptions that previously logged forests will be ready for re-entry are not based on adequate knowledge of volumes and stand composition. This is a major concern as the forest-based industries rely on a continuous flow of raw material. Assessing the status of logged-over forests in terms of expected volumes, species composition and timber qualities is thus a high priority.

The study presents a rapid appraisal technique for assessing the status of logged-over forests in Peninsular Malaysia. Based on recent experiences it reviewed existing methodologies and developed a practical approach applicable for the prevailing conditions in Peninsular Malaysia. The appraisal technique is based on the Canopy Density Mapping and Monitoring Model, which uses



Landsat imagery and assesses the forest status according to different forest canopy density classes. The study area where the model was applied had been logged between the mid-1970s and mid-1980s. The results of the work indicate that the forest consists mainly of young regeneration and that many areas will not be regenerated sufficiently within the cutting cycle of 30 years. Furthermore, the model can be applied easily with minimal training.

PRIVATE SECTOR FOREST PLANTATION DEVELOPMENT IN PENINSULAR MALAYSIA

EC-FAO Partnership Programme - February 2003

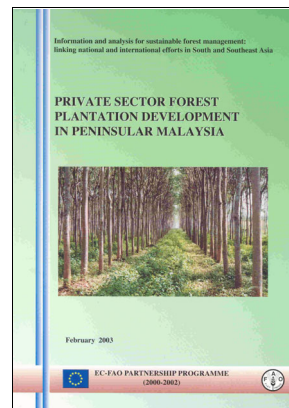
In many Asian countries, information on forest plantations resembles Swiss cheese. It is full of holes with the biggest holes constituting the areas established and managed by the private sector. The main reason for the existence of such holes is that most forest departments concentrate their

efforts on collecting data and presenting information on public sector plantations. Until recently this approach was perhaps justified. However, a global shift toward privatization has led to increasing investments in plantation development by the private sector and in relative

terms the plantation area administered and/or managed by the State is shrinking.

This report provides valuable insights into private sector involvement in forest plantation development in Peninsular Malaysia as well as a survey approach that can easily be replicated in other countries. With the assistance of state forestry officials and representatives of other state agencies, each state was combed systematically and all the existing forest plantations, established by small- and large-scale investors, were documented. The principal method applied was interviews, which allowed for the collection of a variety of data, including opportunities for and impediments to further plantings. Since 1982, more than 23,000 hectares have been established, although since 1998, when the financial crisis

began to bite in Malaysia and wood prices declined, interest in growing trees has weakened significantly.



EVALUATION OF FOREST AND NATURAL RESOURCES DATA AND INFORMATION FLOW IN THE PHILIPPINES

EC-FAO Partnership Programme - March 2003

Making appropriate and timely decisions is important in managing any resource. To make the right decision requires inputs and information, which are, unfortunately, sometimes inaccurate, incomplete or outdated. As a result, many decisions do not lead to the desired results. In forestry, the lack of reliable information is often lamented, although it is usually not known whether data exist or whether they just have not been unearthed. Although it is recognized that the flow of data and information from field offices to decision-makers is vital, more resources are spent on collecting more data and generating more information than on trying to improve data and information flows.

The study evaluated the data and information flows within the operational mechanisms of the Department of Environment and Natural Resources (DENR) in the Philippines. Although the authors conclude that the reporting system is followed studiously, they also find that there are not standard procedures for data collection, retrieval and overall management. This sometimes leads to difficulties in accessing data, duplication of efforts and unnecessary delays. Recommendations include the establishment of a database following a standard protocol, closer coordination between local government units and the DENR and the development of a geographic information system that supports the analysis and presentation of spatial data.

FAO ASIA-PACIFIC FORESTRY CALENDAR

14-15 April 2003. **Assisted Natural Regeneration of Tropical Forests of Southeast Asia.** Kuala Lumpur, Malaysia. Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

21-23 April 2003. **Rehabilitation of Degraded Forests and Lands.** Kuala Lumpur, Malaysia. Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

28-30 April 2003. **Non-Timber Forest Products Management.** Bangalore, India. Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

May 2003. **Forests for Poverty Reduction: Can Community Forestry Make Money?** Beijing, China. Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

5-7 May 2003. **Forests for Poverty Reduction: What Potential with Ecological Services and Carbon Trade?** Kuala Lumpur, Malaysia. Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

20-22 May 2003. **Consultation on Proposed Establishment of Regional Model Forest Centre for Asia-Pacific.** Hua Hin, Thailand. Contact: Coordinator, FAO/IMFNS Regional Model Forest Bridging Initiative (RMF/BI), GCP/RAS/195/CAN, c/o FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4220; Fax: (66-2) 697-4432; E-mail: hontat.tang@fao.org

26 May - 3 June 2003. **Third United Nations Forum on Forests (UNFF).** Geneva, Switzerland. Contact: Secretariat of the United Nations Forum on Forests, DC2-2286, 2 UN Plaza, New York, NY 10017, USA; Tel: +1-212-963-3160/3401; Fax: +1-917-367-3186; E-mail: unff@un.org

17-22 August 2003. **Asia-Pacific Forest Invasive Species Conference.** Kunming, China. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4139; Fax: (66-2) 697-4445; E-mail: patrick.durst@fao.org

21-28 September 2003. **XII World Forestry Congress.** Québec City, Canada. Contact: Secretariat General, XII World Forestry Congress 2003, P.O. Box 7275, Québec City, Canada G1G 5E5; E-mail: sec-gen@wfc2003.org

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This issue of FOREST NEWS was compiled by Patrick B. Durst, Senior Forestry Officer, FAO/RAP.*

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1. *Leucaena Psyllid in the Asia Pacific Region: Implications for its Management in Africa* (RAPA Publication 1994/13)
2. *Asia-Pacific Tropical Forestry: Ecological Disaster or Sustainable Growth?* (RAPA Publication 1994/18)
3. *Workshop Report: Reform of the Forestry Sector: Towards a Market Orientation in China, Laos, Mongolia, Myanmar, and Vietnam* (RAPA Publication 1995/4)
4. *Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific* (RAP Publication 1995/13)
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6. *Non-Wood Forest Products in Bhutan* (RAP Publication 1996/6)
7. *Asia-Pacific Agroforestry Profiles: Second Edition* (APAN Field Doc. No.4/RAP Publication 1996/20)
8. *The Khao Kho Story: Reclaiming the Barren Hills of Thailand's Central Highlands* (RAP Publication 1996/27)
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13. *Directory of Selected Tropical Forestry Journals and Newsletters (2nd Edition)* RAP Publication 1997/17 - FORSPA Publication No.19/1997.
14. *Forest Dependent Survival Strategies of Tribal Women: Implications for Joint Forest Management in Andhra Pradesh, India* (RAP Publication 1997/24)
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19. *Asia-Pacific Forestry Towards 2010 - Executive Summary: The Asia-Pacific Forestry Sector Outlook Study* (RAP Publication 1998/22)
20. *Asia-Pacific Forestry Towards 2010 - Report of the Asia-Pacific Forestry Sector Outlook Study*
21. *Regional Strategy for Implementing the Code of Practice for Forest Harvesting in Asia-Pacific*
22. *Trees Commonly Cultivated in Southeast Asia - An Illustrated Field Guide 2nd Edition.* (RAP Publication 1999/13)
23. *Decentralization and Devolution of Forest Management in Asia and the Pacific* (RAP Publication 2000/1 - RECOFTC Report No.18)
24. *Asia-Pacific Forestry Commission Fifty Years* (RAP Publication 2000/2)
25. *Development of National-level Criteria and Indicators for the Sustainable Management of Dry Forests in Asia: Workshop Report* (RAP Publication 2000/07); *Background Papers* (RAP Publication 2000/08)
26. *Forests Out of Bounds: Impacts and Effectiveness of Logging Bans in Natural Forests in Asia-Pacific* (RAP Publication 2001/08); *Executive Summary* (RAP Publication 2001/10)
27. *Regional Training Strategy: Supporting the Implementation of the Code of Practice for Forest Harvesting in Asia-Pacific* (RAP Publication 2001/15)
28. *Trash or Treasure? Logging and Mill Residues in Asia and the Pacific* (RAP Publication 2001/16)
29. *Proceedings of the International Conference on Timber Plantation Development*
30. *Monograph on benzoin (Balsamic resin from *Styrax* species)* (RAP Publication: 2001/21)
31. *Applying Reduced Impact Logging to Advance Sustainable Forest Management* (RAP Publication: 2002/14)
32. *Report of the Asia-Pacific Forestry Commission 19th Session* (RAP Publication: 2002/21 FO/APFC/2002/REP)
33. *Communities in Flames: Proceedings of an International Conference on Community Involvement in Fire Management* (RAP Publication: 2002/25)
34. *Giants On Our Hands* (RAP Publication: 2002/30)

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