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*Featuring*

# FOREST NEWS

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# Contents

## TIGERPAPER

Mongolian argali population, Spring 2009.....	1
Kaziranga - making way for the tiger reserve.....	5
Habitat ecology of Himalayan serow in Annapurna Conservation Area of Nepal.....	12
New site reports of four-horned antelope.....	20
Diversity of lower vertebrates in Kuno Wildlife Sanctuary, proposed second home for Asiatic lions.....	23
Wetland management strategies in Bangladesh.....	26
Occurrence of albino macaque in desert town of Bikaner.....	28
Mudumalai Wildlife Sanctuary and National Park.....	31

## FOREST NEWS

Forest development: a vital balance - Report from the XIII World Forestry Congress.....	1
Bhutan to welcome 23rd Session of the Asia-Pacific Forestry Commission.....	4
Codes of practice for forest harvesting -- monitoring and evaluation.....	6
Charting paths for regional collaboration.....	8
The youth are our future - FAO invests in them!.....	9
Commonwealth Forestry Association honors FAO forestry expert.....	11
UN-REDD picking up speed in South East Asia.....	12
Third Executive Forest Policy Short Course: Enhancing forest policy in the Greater Mekong Region.....	14
Asia-Pacific Forestry Chips and Clips.....	16
FAO Asia-Pacific Forestry Calendar.....	16



## TIGERPAPER



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**Front cover:** Argali-Nov98-Ik Nartin Mongolia (Photo: Michael Frisina)

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Argali herd-Nov98-Ik Nartin Mongolia (Photo: Michael Frisina)

## MONGOLIAN ARGALI POPULATION, SPRING 2009

by Michael R. Frisina and Baigalmaa Purevsuren

Argali (*Ovis ammon*) wild sheep occur throughout central Asia, including Mongolia's steppe, undulating desert, and rugged mountainous landscapes (Valdez, 1982, Geist, 1991, Mitchell and Frisina, 2007). Although their ranges are not well defined and some overlap may occur, Shackleton and Lovari (1997) are among those who recognize two subspecies of argali as occurring in Mongolia: the Altai argali (*O. a. ammon*) of western Mongolia and the Gobi argali (*O. a. darwini*) of the Gobi Desert in southern Mongolia. Both are listed as rare by the Mongolian Government (MNEM, 1997) and are included in the United States Fish and Wildlife Service list of endangered and threatened wildlife and plants (USFWS, 1997). In addition, they are listed as vulnerable and endangered by IUCN (2000) and are in Appendix II of CITES (USFWS, 2001).

Mongolia, a central Asian landlocked country, encompasses about 1,656,000 km<sup>2</sup>, of which approximately 25% is potential argali habitat (ASM, 1990). Limited international sport hunting has been permitted since 1968. The current Mongolian hunting law, established in 1995 and administered by the Mongolian Ministry for Nature and the Environment, regulates the commercial use of wildlife. Hunting fees are an important source of foreign currency in a badly depressed economy (MNEM, 1995, Wingard and Purevdolgor, 2001).

Argali populations are believed to have declined in Mongolia and throughout central Asia during the last century (Harper, 1945; Mallon, 1985; Heptner *et al.*, 1989; Mallon *et al.*, 1997; Reading *et al.*, 1997). Specific and comparable country-wide population

status and trend information for this species, a fundamental requirement for conservation (Wegge, 1997), is lacking. The most recent monitoring of Mongolian argali populations was conducted in 2002 and a population estimate of 20,226 was reported (Frisina *et al.*, 2007). About 7 years have passed since the last reported surveys were conducted, so checks for production and population status at 8 locations were made during April 2009. These data were collected as a precursor to a range-wide survey to be conducted during late fall 2009.

### Methods

Methods used for locating, surveying, and classifying argali follow protocols described by Frisina *et al.* (2007). From April 24 through April 28, we collected argali observations at 8 locations (Table 1, Figure 1). We originally intended to include sampling sites in the West Zone (Figure 1), but difficult weather conditions made observing argali in the Altai impossible during the allotted field time. The West Zone will be surveyed during the 2009 fall survey. Most recent taxonomies by scientists classify argali at locations covered by this report as *Ovis ammon darwini*. Some trophy hunting records consider those sheep in locations 1, 4, 5, 6, 7, and 8 as the Hangai trophy type (Mitchell and Frisina, 2007).

### Conclusions

During the April 2009 survey, 5 days were spent observing argali (4/23, 4/24, 4/25, 4/27, 4/28). A total of 1,159 argali were observed (Table 1), which amounts to about 232 argali observed per observation day. While this information does not establish a trend, it does indicate that argali were abundant at the 8 areas surveyed. The average number of argali observed per observation site for the 8 sites surveyed was 145 (range 42-286, SD = 93.6). The range-wide survey planned for fall 2009 will be directly comparable to the survey reported by Frisina *et al.* (2007) and will be used to establish trends between 2002 and 2009. Argali are more observable during the November rutting season than in April, when ewes are preparing to give birth and are therefore more secretive and scattered. Thus, data from this survey is not

directly comparable with information reported by Frisina *et al.* (2007).

A total of 608 adult ewes and 285 lambs were observed yielding an observed ratio of 47 lambs per 100 ewes. It is important to keep in mind that the lambs reported here were born in May of 2008; the ratio represents the portion of recruitment that survived the 2008-2009 winter. These lambs will be classified as yearlings once the 2009 lambing season is completed in early June. With that consideration, this ratio of 47 lambs per 100 ewes represents not only good reproduction, but also good overwinter survival of lambs. Frisina *et al.* (2007) reported an observed ratio of 29 lambs per 100 ewes for November 2002 (prior to any winter mortality). The data reported here indicates a significant improvement in lamb production and survival compared to 2002. In a synthesis of information Frisina *et al.* (2002) reported a range of 10 to 63 lambs per 100 ewes observed for earlier surveys, all of which were measured prior to any winter mortality occurring.

A total of 1,150 argali were classified; of these 96 or 8.4% were Class 4 or trophy rams (Table 1.) Of the total 257 rams observed, 187 or 73% were  $\geq 5$  years of age (Class 3 and Class 4), amounting to an observed ratio of about 31 breeding age rams per 100 adult ewes (1 breeding age ram per 3 ewes). These data indicate that adequate numbers of breeding age rams are being maintained in the population for natural reproductive processes to be maintained. The relatively high proportion of trophy males (37% of males observed) and relatively high proportion of Class 3 rams (35% of observed males) indicates a significant portion of rams are surviving into the older age classes. The data also indicates that there are significant numbers of Class 3 rams available to replace Class 4 males as they die of natural causes or are removed from the population through legal harvest. These data indicate that the trophy harvest has not been excessive and that poaching has not significantly inhibited maintenance of adequate numbers of mature rams for breeding or harvest.

It will not be possible to make a definitive judgment on population trends between 2002 and 2009 until we complete the range-wide survey scheduled for this fall. However, the data collected during this

April survey for the North Zone and South & East Zone indicates that things may have improved for the argali since 2002.

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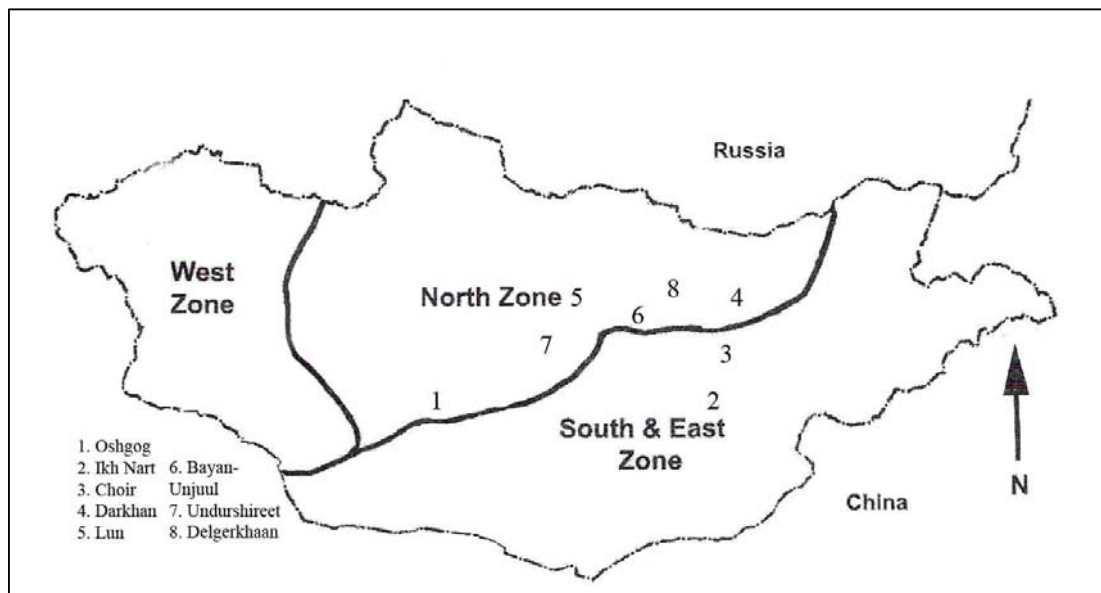
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**Table 1. Argali observations from ground surveys conducted from April 23 through April 28, 2009.**

Location <sup>1</sup>	Rams								
	Total	Female	Lamb	Rams	Uncl.	Class 1	Class 2	Class 3	Class 4
1	216	125	64	18	9	3	7	1	7
2	230	154	56	20	0	1	8	11	0
3	42	26	5	11	0	0	2	2	7
4	95	53	18	24	0	0	0	5	19
5	72	19	13	40	0	5	6	27	2
6	286	132	89	65	0	0	5	19	41
7	173	85	32	56	0	8	10	20	18
8	45	14	8	23	0	8	7	6	2
<b>Totals</b>	1,159	608	285	257	9	25	45	91	96

<sup>1</sup>For locations see Figure 1.

**Figure 1. Locations of argali survey sites visited from April 24 through April 28, 2009. The three zones are from Frisina et al. (2007).**



# KAZIRANGA - MAKING WAY FOR THE TIGER RESERVE

by Pranab Pal

## Introduction

Assam's Kaziranga National Park (KNP) - the abode of the Great one-horned rhinoceros (*Rhinoceros unicornis*) - lies in the flood plains of the Brahmaputra River. It is located between latitudes 26°30'N-26°45'N and longitudes 93°00'E-93°45'E. The average annual rainfall is 1,320mm and temperatures range between a maximum 38°C and minimum 8.9°C. The terrain of this protected area is, by and large, flat with an almost imperceptible slope from east to west and also from north to south. The area in KNP primarily consists of recent composite alluvial flood plains. According to the biogeography province (Rodger, *et al.*, 2000), the northeast Brahmaputra valley cover classification is 9a. Flooding is an annual phenomenon in KNP and many animals, especially deer, lose their lives by drowning. Poaching is also a problem and in addition the wildlife are sometimes hit by vehicles on National Highway 37.

Kaziranga is also home to Wild buffalo (*Bubalus bubalis*), Hog deer (*Axis porcinus*), Indian elephant (*Elephas maximus*), Royal Bengal tiger (*Panthera tigris*), Indian wild boar (*Sus scrofa*), Swamp deer (*Cervus duvauceli*), etc. The park supports more than 35 species of mammals, of which 15 are listed in Schedule I of the Wildlife Protection Act (1972). Its conservation values were formally recognized when it became one of the World Heritage Sites notified by the UNESCO in 1985 (Fig.1). So far, management efforts in KNP have concentrated on centric

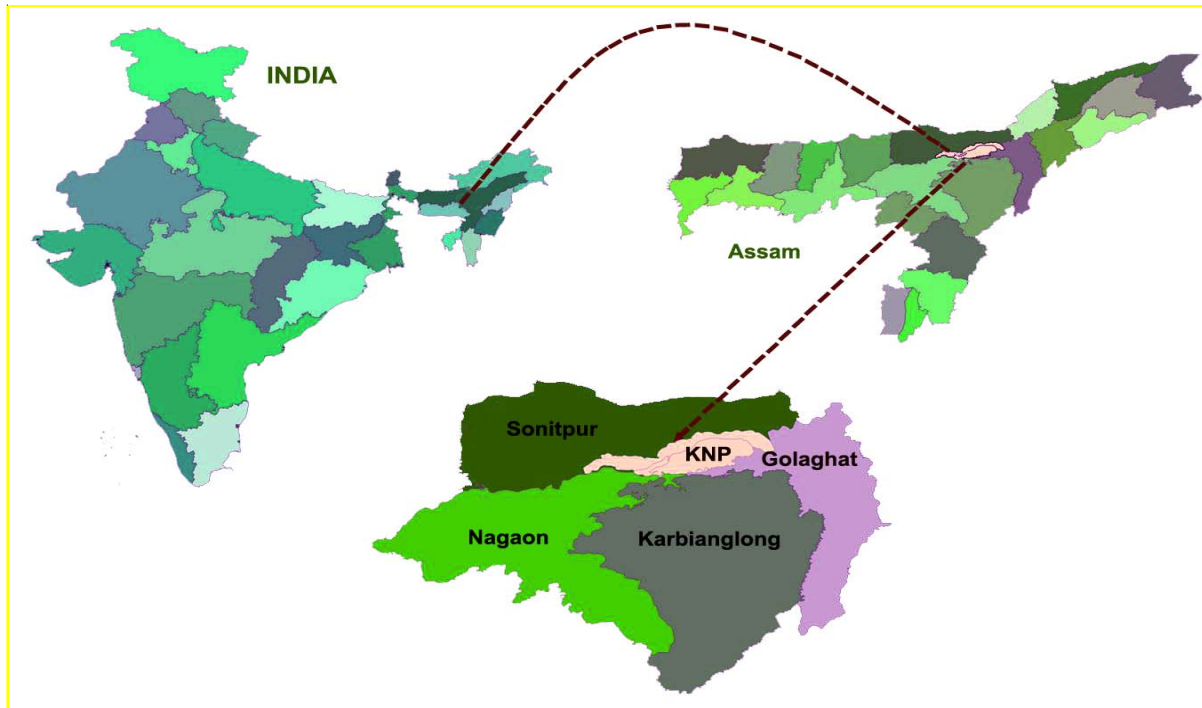
conservation. With an abundant number of wild herbivores and other endangered species, the park management should also direct focus on species like Sambar (*Cervus unicolor*), Barking deer (*Muntiacus muntjak*), Hoolock or White-browed gibbon (*Hylobates hoolock*), Common langur (*Presbytis entellus*), Assamese macaque (*Macaca assamensis*), Leopard (*Panthera pardus*), Sloth bear (*Melursus ursinus*), etc. KNP is famous for its breeding bird fauna and is an important resting and feeding area for migratory birds traveling between the Indian sub-continent and their summer grounds in Siberia and China.

Significantly, Kaziranga also has a high density tiger population and is one of the national tiger reserves established in India. The present study attempts to assess the significance, adequacy and appropriateness of the landscape management-based approach for tiger **Study area.**

KNP encompasses an ideal wildlife habitat with a total area of 429.63 km<sup>2</sup>. But with the gradual opening up of the area on the southern side towards National Highway No.37, the forest cover has been drastically reduced, resulting in loss of natural wild habitat due to human activities around the highway and also in adjoining tea estates. In view of this, the Government has added six additional areas in the park for the movement and dispersal of wild animals through an extended natural habitat (Table 1).

**Table 1: Additional park areas**

Additional areas	Km <sup>2</sup>	Notification (R/F)
1. Burapahar	43.79	28/05/97
2. Sildubi	6.47	10/07/97
3. Panbari	0.69	31/05/85
4. Kanchanjuri	0.89	03/08/88
5. Haldibari	1.15	13/06/85
6. Panpur RF & Brahmapura channel	376.80	07/08/99



**Fig.1 Kaziranga National Park**

The six additional areas cover an area of 429.79 km<sup>2</sup>, thus bringing the enlarged total area of KNP to 859.42 km<sup>2</sup>. In 2007, the Government of India declared KNP as Kaziranga Tiger Reserve (KTR) and added two wildlife sanctuaries: Burachapori Wildlife Sanctuary (44.06 km<sup>2</sup>) and Laokhowa Wildlife Sanctuary (70.13 km<sup>2</sup>), including the 1<sup>st</sup> addition, 6<sup>th</sup> addition and KNP. KTR has now become one of the major tiger reserves among the 39 tiger reserves in India (Fig.2). The Central and State Governments and other conservation organizations have recognized the importance of Kaziranga. The present study aimed to evaluate the adequacy of the landscape approach adopted for tiger conservation in KTR.

### Methodology

During the field study, the methods followed in the study included reconnaissance of the area, review of literature, visits to representative sites of KTR for personal observations and information collected through questionnaires distributed to representatives of the villages and forest officials, Gram Pradhans, frontline staff and laborers, etc. The data was collected to gain

a better understanding of habitat diversity, distribution of wild herbivores/carnivores, past and current management practices, socio-economic dependency and present management issues, conservation efforts, habitat management practices and other developmental activities in the environs of KTR.

### Results

KTR definitely lacks the desired extent of inviolate and buffer areas as per the Government of India (GoI) and National Tiger Conservation Authority (NTCA) guidelines. However, the current available area is able to support an adequate number of tigers, their prey, and co-predators. Practically speaking, the legal status of the national park and wildlife sanctuary for the ingredient areas of KTR is enough for extensive protection and conservation efforts for tigers. In addition, KNP has developed a preferred mechanism for protection of the area and its wildlife from poaching and other illegal actions. However, this type of protection effort should also extend to the two sanctuaries and the additional areas. During the study a socio-economic profile analysis was made to determine the proportion of dependency on the PA and



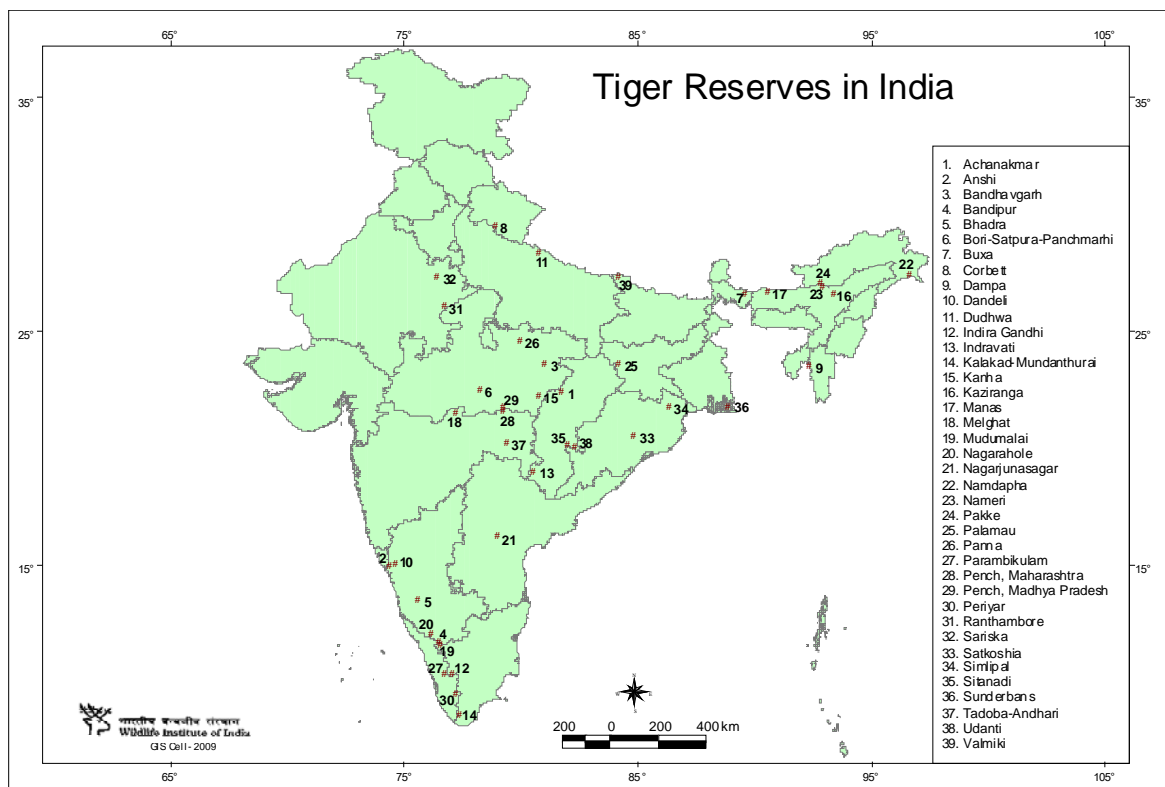


Fig.2

additions for fodder and encroachment in the study area.

### Land cover and habitat diversity

According to satellite imagery (Khushwa, 1997), KNP's ecological diversity comprises woodland (114.01 km<sup>2</sup> - 27.95% of the area), short grass (12.30 km<sup>2</sup> - 3.01%), tall grass (248.85 km<sup>2</sup> - 61.01%), swamps (24.32 km<sup>2</sup> - 5.96%), the Jia Duffalo River (3.96 km<sup>2</sup> covering 0.97%), Mora Duffulo (2.84 km<sup>2</sup> - 70%) and sand (1.62 km<sup>2</sup> - 0.40%). Tigers and their prey seem to be abundant in KTR. Similarly, Water buffalo has population of 1,666 (2007 census); however, gaurs number only 5 (1991 census). The sambar population is 58 (1999 census), Swamp deers - 681 (2005 census), Hog deers - 5,045 (1999 census), Wild boars - 431 (census 1999), Elephants - 1,293 (2008 census). According to the 2009 census data, One-horned rhinoceros has a healthy population of 2,048. KTR is home to 17 species of endangered mammals, 23 species of endangered birds and 10 species of endangered reptiles. Earlier, the core area of the erstwhile NP was devoid of any human

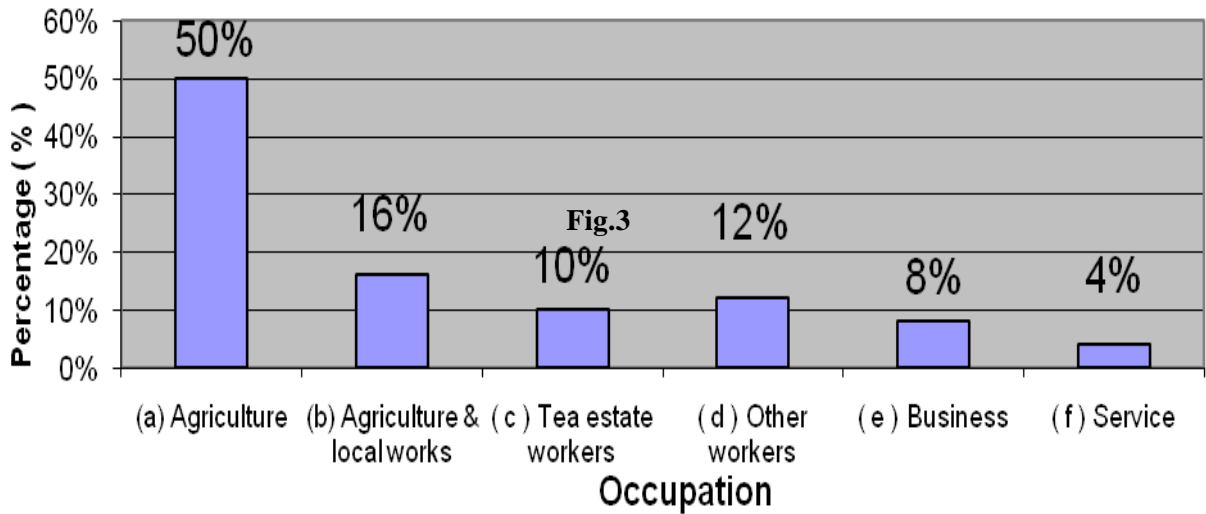
habitation. However, it now hosts 150 village settlements with sufficient area for agriculture (70%), vegetable gardens (15.5%), shifting cultivation (7.7%), and several tea estates in and around KTR as per the Management Plan 2002-12. Significantly, the livelihoods of the people of these villages are mainly agriculture-based and more than 95% of people residing in the southern part within a 5 km periphery of KTR, as well as other villages, are using firewood for cooking. On the other hand, Kaziranga faces many other threats including poaching, domestic livestock grazing, proliferation of invasive species in grasslands and *beels* due to increased human activity. Presently, more than 120 beels are found around the KTR and heavy siltation, pollution and weed invasion are threats to the beel ecosystem. Other disturbances include fast development of tourism-related communications, development of highways, mining in the nearby Karbi Anglong hills, etc. Proposed developmental activities and heavy traffic on the National Highway (NH-37), encroachments around the eastern boundary of the park, resource dependence and socio-economic conditions, growing tourist pressure and the

man-animal conflict are some problems of lesser magnitude.

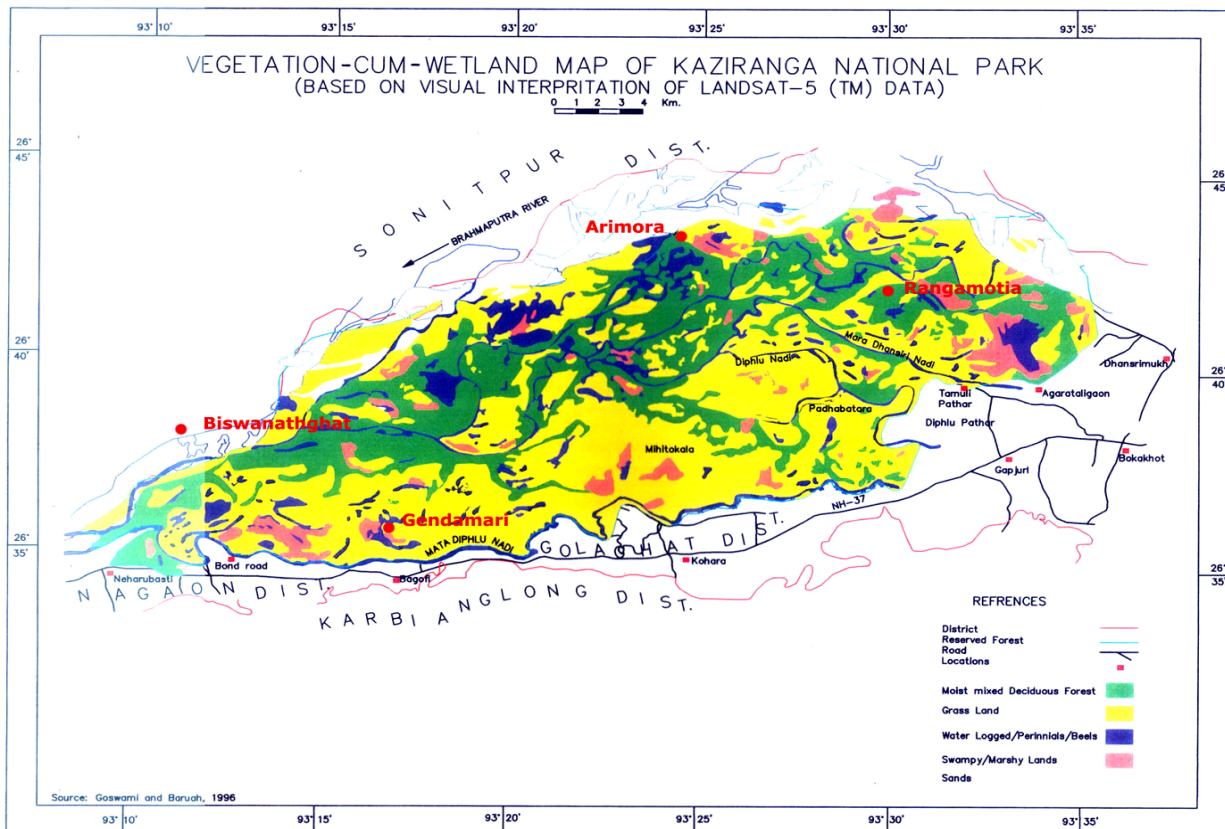
**Table 2: Socio-economic survey**

Socio-economic parameters	Study area
No. of households (Population)	4,435 (23,795)
Family size	6-7
Literacy %	55%
Ratio male:female	1:1.2
Cattle holdings per family	6.5
Land holding (in bigha)	32%
Landless	30%
Land holdings (up to 2 bighas)	38%

### Occupation of the Community



**Fig.4 Vegetation and wetlands of Kaziranga National Park**



### Control of natural habitat

Unfortunately, some species of weeds species like *Mimosa invisa* have infested grassland and *beel* habitats. Invasive species are an emerging problem in KTR. The proliferation of various weeds like *Mikania*, water hyacinth (*Eichhornia crassipes*) and wild rose have spread to some areas of the park, causing ecological degradation of the habitat and are a major problem confronting the park authorities. Some efforts taken by the

park management and other NGOs have been made to control such invasive species.

### Grassland management

The terrain of KTR is flat with a gentle, almost imperceptible slope from east to west. The habitat is such that water bodies and grassland form a significant part of the park's area. Wetlands in KTR cover 7% of the park area with species such as *Saccharum spontaneum*,



*Saccharum elephantinus*, *Imperata cylindrica*, *Erianthus filifolius*, *Narenga porphyrocome*, *Cymbopogon pendulus*, etc. Woodland species include *Albizia procera*, *Bombax ceiba*, *Albizia odorotissima*, *Lucida*, *Latifolia*, *Lagerstroemia parviflora*, *Trewia nudiflora*, *Terminalia belerica*, *Alstonia scholaris*, *Dillenia indica*, *Ficus bengalensis* and *Erythrina indica* (Gokhale *et al.*, 2005) etc.

Annual burning has been practiced to manage grasslands in Kaziranga for quite some time as it provides new forage to wild herbivores. Other areas of concern such as identifying the factors leading to the creation of short grasslands and evolving strategies for reduction of ungulate pressure on Baguri Range also need to be addressed urgently.

Along the river beds and water bodies and marshy areas, short succulent grasses channels to promote Lokosa (*Hemarthia compressa*), *Cynodon dactylon*, *Leersia hexandra*, *Pistia stafwtes*, *Chrysopogon aciculatus*, etc. have been recognized. Designing the shape of the high grounds (earthen mounds) should be done in such a way that they do not affect the drainage pattern and wetlands. Furthermore, recognition of some inviolate areas within the park should be done so that fires and other human interventions can be minimized. The effects of conservation efforts should be compared by periodic monitoring, restoration of water bodies and channels and maintenance of corridors.

### Monitoring of Beels

Though it is a natural phenomenon, heavy siltation is the major threat to KTR's beel ecosystem. Additionally, with the increasing disturbances in the upstream and catchment areas of the rivers running through KTR, siltation has increased in an alarming scale. For effective management of beels, limited desilting operations and monitoring of beds in KTR is necessary for its long term protection. There should be planned and phased desilting in beels, apart from checking it for pollution. There should also be monitoring of beels through use of remote sensing technology to check the ecological linkages and integrity of the beels in the PA with Brahmaputra for its long term sustenance. Pollution of the

beels, if any, similarly needs to be monitored.

### Scientific study & monitoring

KTR officials have already carried out censuses of prominent wild herbivores and carnivores over a period of time and they provide desired trends of distribution and abundance. In 2007, KNP also followed the All India Monitoring of tigers, their prey, co-predators and habitat as prescribed by the National Tiger Conservation Authority (NTCA) for conducting the census. Nonetheless, these efforts need to be continued on a regular basis, at least every two years. Further, the process of monitoring needs to be institutionalized. Population estimates using modern tools is needed, including carrying out monitoring programmes in additional areas and wildlife sanctuaries so as to enable the development of effective strategies for habitat management of endangered wild animals.

### Dependency of local people on the KTR

Proper planning to reduce the current dependency on the natural resources through eco-development planning and inputs and also planning awareness programmes assume importance for the time ahead. Notably, human dependency on KTR forests can be reduced to a large extent by providing fuel efficient *chulas*, pressure cookers, kerosene stoves, and reducing grazing pressure by swapping unproductive cattle with a small number of high milk yielding local cattle breed with facilities for stall feeding and rotational grazing on community pastures. Further, growing fuelwood, fodder, bamboo plantations in community land are also among other options worth considering.

### Human resource management

In view of the pressing necessity for long term and perpetual conservation of tiger and its associated species, it is required that all basic forest areas are brought under an integrated system, under the control of the Field Director, KTR. For this, the control of constituent areas needs to be transferred to the FD, KTR. It should be noted that over the years, the front line staff of KNP have developed the essential skills

required for shelter, census, and tourism-linked activities. On the other hand, they need to be encouraged for eco-development and group consciousness works linking local communities. Similar efforts will be needed for officers and front line staff working in parts of the jungle areas.

## Discussion

It is remarkable that there is neither any village nor human habitation within KTR's core zone. This provides an adequate, unimpaired area for tigers to flourish. KTR is also blessed with a rich ecological bio-diversity comprising woodland, tall grassland, swamps and river stretches, which act as habitats for tiger and its prey and co-predators. Currently, the prey population (wild ungulates) seems to be adequate for the tiger population, even without including gaur and sambar, whose numbers are small here. Other prey species include water buffaloes, swamp deer and hog deer, which need to be conserved as they form the main prey base for tigers. Elephant and rhino calves are occasionally preyed on by tiger. As a result, the proportionate populations of tiger, gaur, sambar and hog deer need to be estimated to understand the prey-predator interaction. The current revision and examination of available research data on tiger ecology (by WII and NTCA-2008) points out that the minimum population of tigresses of breeding age needed to maintain a viable population of 70 – 100 tigers (in and around core areas) requires an inviolate space of 800 – 1000 km<sup>2</sup>. Based on 2000 census data, Kaziranga has a population of 86 tigers, which translates into a 800 to 1000 km<sup>2</sup> area having effective habitat for this tiger population. In view of the above, Kaziranga Tiger Reserve needs more areas for the population of tigers as they not only need inviolate space, but also require viable populations of other wild animals (co-predators, prey) and habitat for other meta-populations (Jhala, 2008). Tiger populations in the intervening lands between KTR and the buffer area need to have connections and adequate forest/ grassland cover to enable dispersal and genetic exchange to take place. Therefore, buffer areas with forest connectivity are imperative for tiger dynamics, since such areas further the life

spans of young adults, transients and older members of the population. The immature adults periodically replace the resident ageing males and females from the source population area. Since KTR serves as a source population of tigers, nearby sink areas need to be identified. To facilitate tourism-related activities in KTR and to minimize poaching activities by neighboring villagers, it is necessary to involve the local people of southern villages (Pal, 2005) and tea estates in tourism activities and in the management efforts for tigers to reduce socio-economic dependency on the tiger reserve. Local civil communities should be involved in Kaziranga Tiger Reserve for conservation action.

## Conclusion

KTR has a high density tiger population. With a large quantity of prey and co-predators, Kaziranga has emerged as a significant site for tiger conservation in recent times. However, in order to maintain an effective tiger habitat, more buffer areas need to be added. The reserve has also been threatened by excessive floods, loss of beels, siltation, invasive species, poaching, etc. A perspective plan is needed to protect KTR from these primary threats. The KTR Management Authority also needs to identify corridors to connect constituent areas and the meta-population.

Reducing the main dependency on specific natural resources and encroachment on the tiger reserve by local communities through appropriate eco-development measures and awareness-raising is a priority conservation action for KTR's Management Authority. The implication of research and monitoring for such a complex and dynamic eco-system cannot be over-emphasized. In addition, it is necessary to strengthen the organization and management in new additions to the reserve and buffer areas. Incorporated landscape development and management of core, buffer, additional areas and passage alongside sightseeing activities, while adopting the new guiding principle issued by NTCA for the Tiger Protection Plan, are also of supreme importance. Likewise, the contribution of local communities and other stakeholders is vital to the success of such planning efforts.

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## ***HABITAT ECOLOGY OF HIMALAYAN SEROW (*Capricornis sumatraensis ssp. thar*) IN ANNAPURNA CONSERVATION AREA OF NEPAL***

by Achyut Aryal

### Introduction

Himalayan serow (*Capricornis sumatraensis ssp. thar*) is a threatened animal, listed by CITES in Appendix I and classed as "Vulnerable" by IUCN's **Red Data Book** (IUCN, 2004). It has been given legal protection in other countries as well (Fox & Johnsingh, 1997; Green, 1987b; Shackleton, 1997; Wollenhaupt *et al.*, 1997).

Himalayan serow, locally called "thar" (in the study area), belongs to the family Bovidae and subfamily Caprinae. In appearance, the serow resembles a ghoral. The serow is a solitary animal (Nowak &

Paradiso, 1983; Prater, 1993; Schaller, 1977); however, sometimes as many as seven individuals have been seen in a herd (Prater, 1993; Nowak & Paradiso, 1983). It has a large head, thick neck, short limbs, long mule-like ears and a coarse coat of dark hair. It looks like a cross between a cow, a pig, a donkey and a goat. Both sexes are similar in appearance and are of about equal size (Schaller, 1977). An adult male serow measures about 100 to 110 cm at its shoulders and weighs about 91 kg on average in its adulthood. Its head and body length measure 140-180 cm. The horns are 15-25 cm long and 13-15 cm in girth and are present in both sexes. The horns are black, conical,



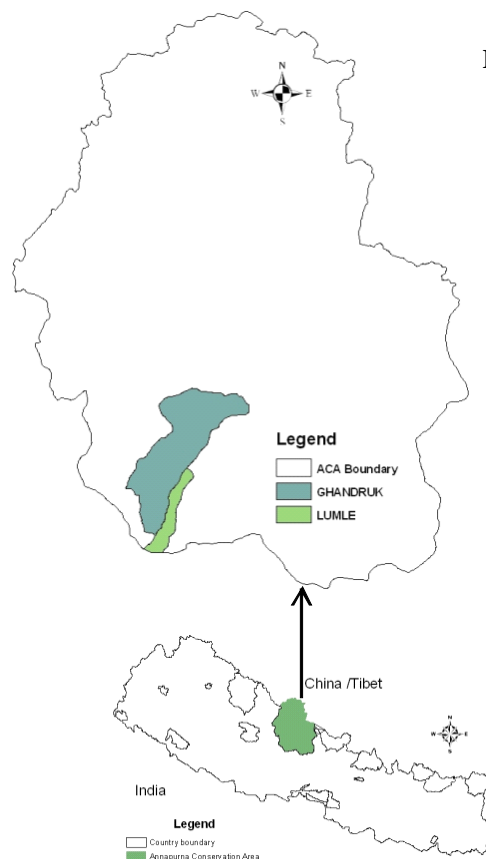


Figure 1: Study area

sharply pointed and directed backwards. The serow has inguinal glands and enlarged pre-orbital glands. It inhabits steep, rugged, inaccessible and densely forested areas of the Himalayas. Serow prefers damp and thickly wooded gorges and occurs at altitudes between 1,500-4,000 m (Prater, 1993; Schaller, 1977).

The serow is oriental in origin (Schaller, 1977). The geographic range is bordered by Jammu and Kashmir (India) in the west and extends to Japan in the far north east (Shackleton & Lovari, 1997; Schaller, 1977). Japanese serow is found in Honshu, Shikoku and Kyushu Islands of Japan (Maruyama *et al.*, 1997). The Formosan serow occurs in 16 provinces in Taiwan (Lue, 1997). The Mainland serow is found in China, Myanmar, Thailand, Malaysia, Sumatra, Cambodia, Laos, Vietnam, Bangladesh, India, Bhutan and Nepal (Nowak & Paradiso, 1983; Prater, 1993; Schaller, 1977; Shackleton & Lovari, 1997).

The main aim of this research was to determine present status of the serow in southern belt of the Annapurna Conservation Area (ACA) of Nepal.

This study focused on the habitat preference of serow in Ghandruk and Landruk forest areas of ACA Nepal.

### Study area

Annapurna Conservation Area, the first conservation area and the largest protected area in Nepal, has adopted a new approach and concept in protected area management. The ACA covers a landmass of 7,629 km<sup>2</sup>, ranging from sub-tropical regions to altitudes of 8,000 m within a short horizontal distance of less than 35 km. The ACA harbors a recorded total of 1,226 species of plants, 38 species of orchids, 9 species of rhododendrons, 101 species of mammals 474 species of birds, 39 species of reptiles and 22 species of amphibians (ACAP, 2002).

The study was carried out in Ghandruk, Landruk and some parts of Lwang Ghalle VDCs of the southern belt of ACA, covering a total area of 206 km<sup>2</sup>. Due to the combined effects of climatic and topographic variation, this area comprises a wide range of bio-climatic zones, hosting a rich

biological diversity. The region exhibits vegetation from sub-tropical forest to alpine grassland. Shrestha & Ale (2001) partially listed about 108 species of trees and shrubs from this region. *Rhododendron arboreum* is the most common species; four species of *Rhododendron* have been recorded (Poudel, 2003). This region is home to about 48 mammal species and 210 bird species (Shrestha & Ale, 2001). Out of 5 Caprinae species in the country, 3 are present in this area, i.e., *Hemitragus jemlahicus* (Himalayan tahr), *Nemorhaedus goral* (Goral) and *Capricornis sumatraensis* (Serow). Five species of cat, including clouded leopard and common leopard, are found in this region (Shrestha & Ale, 2001).

### Material and methods

A preliminary survey was carried out to locate potential areas for serow before the actual field work started. This was done through questionnaires targeted at local concerned and knowledgeable people such as villagers, herders, local leaders, and ACA staffs. Local people were involved with all the aspects of the project with the belief that they could learn new techniques and share important information with us. The study was carried out in between January- December 2007.

#### *Habitat preference, use, availability*

Hall *et al.* (1997) defined habitat use as “the way an animal uses (or ‘consumes’ in a generic sense) a collection of physical and biological components (i.e., resources) in a habitat.” Hall *et al.* (1997) defined habitat availability as the accessibility and procurability of physical and biological components of a habitat by animals. This is in contrast to the abundance of these resources, which refers only to their quantity in the habitat, irrespective of the organisms present (Weins, 1984). Hall *et al.* (1997) defined the terms habitat use and habitat availability to analyze the habitat preferences of serow.

Random sampling was used to collect habitat parameters from the field. When the author encountered signs of serow (e.g., pellets, hair, resting places, footmarks) he was able to lay out plots which were assumed as habitat use (U) plots; other parameters were also taken from the plots.

Sample plot sizes for plants were used as suggested by Schemnitz (1980): 10m x 10m for tree layer, 4m x 4m for all woody undergrowth to 3m in height, and 1m x 1m for the herb layer in composite plots. Other parameters noted such as altitude, slopes, canopy cover, ground cover, land features (cave, cliff, rock, etc.) were also recorded in plots. Simultaneously, habitat availability plots were taken in a random direction and random distance (100 to 200m) and other parameters were noted as for the habitat use plots. Any signs of serow found in the field were recorded as the ‘habitat use’ plot. Altogether, 187 plots were randomly taken from the survey area.

#### *Ivlev's electivity index (I)*

Ivlev's electivity index was used to determine the habitat preference of the serow. Ivlev's index varies from -1.0 to +1.0 with positive values indicating preference, negative values avoidance, and 0 values indicating random use. Habitat use (U) and habitat availability (A) were used to analyze the habitat preferences of serow (Hall *et al.*, 1997). Following Ivlev's electivity index (I) (hereafter Ivlev's Value (IV)) the following formula was used to calculate the habitat preference of serow:

$I \text{ or } IV = (U\% - A\%) / (U\% + A\%)$  (Ivlev, 1964; Krebs, 1989).

Altogether 187 plots (U plot=97; A plot=90) were set up in the survey area. Habitat preferences of the different habitat parameters such as altitude, slope, trees, shrubs, herbs species were analyzed. The plants species which had positive Ivlev's Value (IV) indicated preference, those which had a negative IV were avoided, and those with a 0 IV were used as random use plants. The ANOVA test was used to analyze the significance of preference of different habitat parameters with the null hypothesis: all habitats are used in proportion to their availability. Two data factors were used for ANOVA test, i.e., availability and use.

#### *Importance Value Index (IVI)*

The IVI of a tree species was calculated by the addition of relative density, relative frequency and relative dominance (Dinerstein, 1979).

$IVI = \text{relative density} + \text{relative frequency} + \text{relative dominance}$ .

## Results and discussion

### *Habitat Preference (Habitat Use and Habitat Availability)*

#### Altitude preference

Himalayan serow mostly prefers to live at 2,500 to 3,500 m altitude. There was less evidence to demonstrate the occupation of altitudes lower than 2,500 m, which was illustrated by the fact that Ivlev's value was only 0.064, meaning very low preference and near to random use. Altitude preference increased with increases in altitude from 2,500 to 3,500m, and then a sudden decreased preference for altitudes from 3,500 to 4,000m. Altitudes ranging from 2,500 to 4,000m was mostly used for feeding and shelters; the animals preferred higher altitudes as safe places from predators. There was zero Ivlev's value for the 4,000 m altitude, which indicates that serows randomly use this altitude. Serows totally avoided altitudes above 4,000m. There was significant difference in use of different altitudes proportional to available habitat (ANIVA,,  $P < 0.05$ ).

#### Slope preference

Serows generally prefer gentle to steep sloped areas (20% to 40%). With the increase in slope, Ivlev's value also increases from 0.1 to 0.3; in contrast, plains or flat sloped areas (10% to 20%) are avoided by the serow (Ivlev's value  $< 0.0$ ). Steeply sloped areas are used by the serow as resting places, while gentle sloped areas are used for grazing purposes. Plain or flat sloped areas up to 20% are mostly used by the villagers' livestock and serow are not often found there (although livestock share space with the serow in all elevations as livestock dung, especially sheep and goat pellets, were found in all areas of the serow habitat). There are significant differences in the use of different slope types proportional to availability (ANOVA,  $P < 0.05$ ).

#### Covers

The Serow uses different cover (living and physical) features of the environment to provide a protective

“screen” from weather, predation, and human hunting. This sheltering cover provides the serow with a security blanket that makes use of the various cover types in its habitat. Dense forests, rocky areas and cliffs are capable of hiding 90% of the serow from the view of a person from a distance of 200 ft or more. Consequently, the serow mostly prefers dense forest (Ivlev's value (IV) - 0.27), and has less preference for cliffs (IV-0.17), rocky areas (IV-0.19), and caves (IV-0.09). Regions classified as streambeds, with no cover or gullies (IV  $< 0.0$ ) are avoided by serow. These areas don't provide them with cover and make it difficult for them to hide from predators due to the open visibility. There was significant difference in the use of different covers proportional to availability and the use of different cover types by serow (ANOVA,  $P < 0.05$ ).

#### Crown cover

Crown cover is used by the serows for hiding and as thermal covers. A thick crown cover helps them maintain their body temperature. Serows use crown cover to protect themselves from both heat and cold. Moderate crown cover (50%-75%) is preferred by serow (IV-0.19). Preference gradually decreases with the decrease in the percentage of crown cover. Sparse to moderate crown cover are preferred for grazing purposes. There is a significant difference in the use of different crown covers proportional to the available crown cover by the serow (ANOVA,  $P < 0.05$ ). There is a positive correlation between crown cover and habitat preference ( $R^2$ -0.44), with preference increasing in the presence of sparse cover to dense covers. Sparse crown cover is totally avoided by serow (IV $<0.0$ ).

#### Ground cover

Most of the signs of serow were found in areas with moderate ground cover (50%-75%) where Ivlev's Value (IV) is the highest. This indicates that serow prefers moderate ground cover. Moderate ground cover is preferred for grazing while dense ground covers help to regulate body temperature and provide places to hide from predators. Very sparse ground cover (0-25%) was totally avoided (IV $<0$ ). There was significant difference in the use of different crown cover proportional to available ground cover by serow (ANOVA,  $P < 0.05$ ).



### Tree, shrub & herb preferences

Serow prefers palatable plants and most often these plants have higher nutrient contents than plants which are avoided. This study does not cover the feeding behavior of serow, but gives an idea about preference of vegetation. A total of 23 tree species, 14 shrubs and 32 herbs were recorded in the serow habitat. Table 1 lists 11 trees species that serows use for feeding and cover (thermal & hiding) The following species were most preferred by the serow: *Michalia champaca*, (IVI-36, I-0.17), *Rhododendron arborium* (IVI-40; IV 0.11), *Ilex dipyrena* (IVI-33; IV-0.16). *Lindera neesiana* (IVI-16, IV-0), *Lyonia ovalifolia* (IVI-12, IV-0) and *Guheli* (IVI-9, IV-0) were moderately important and used randomly by the serow, while other tree species such as *Pinus wallichiana*,

*Phalat*, *kaulo*, *Cinamomum* spp and *Schefflera impressa* were less preferred or avoided. These tree species are valuable in terms of timber production in the area so there is high pressure from the villagers. Every year they harvest these tree species for construction, furniture, etc. Therefore, this resource competition remains one of the largest challenges to managing these tree species for serow. Conservation incentives and awareness programs are essential to encourage local people to plant such valuable tree species on their private lands as well as on community lands in order to reduce the pressure on serow habitats. There was no significant difference in the use of tree species by the serow and all trees species were used in proportion to their availability (ANOVA, P-0.369).

**Table 1: Trees species preference by serow ( $R^2 = 0.22$ )**

Tree Scientific name	IVI	Ivlev's Value	Habitat/tree use
<i>Michalia champaca</i>	36	0.17	Preference
<i>Rhododendron barbatum</i>	15	0.06	Preference
<i>Rhododendron Compalatum</i>	29.21	0.07	Preference
<i>Rhododendron arboriam</i>	40	0.11	Preference
* <i>Phalat</i>	9	-0.14	Avoided
<i>Lindera neesiana</i>	16	0	Random
* <i>kaulo</i>	18	-0.01	Avoided
<i>Ilex dipyrena</i>	33	0.16	Preference
<i>Juniperus sp.</i>	5	0.04	Preference
<i>Picea sp.</i>	14.32	0.06	Preference
<i>Pinus wallichiana</i>	5	-0.03	Avoided
<i>Preroarpua santalinus</i>	11	0.06	Preference
<i>Abies pindrow</i>	8	-0.03	Avoided
<i>Lyonia ovalifolia</i>	12	0	Random
<i>Acer spp</i>	9	0.06	Preference
<i>Schefflera impressa</i>	16	-0.05	Avoided
<i>Cinamomum spp</i>	8.47	-0.2	Avoided
* <i>Guheli</i>	9	0	Random
<i>Engelhardtia spicata</i>	17	-0.3	Avoided
<i>Lindera neesiana</i>	21	0.02	Preference
<i>Quercus lamellose</i>	16	-0.3	Avoided
<i>Q. semecarpofolia</i>	34	0.09	Preference

(continued on p.17)

(continued from p.16)

### Shrubs

A total of 14 shrub species were found in serow habitat, out of which eight shrub species were preferred by serow. Nigalo, *Daphne spp.*, *Mahonia napaulensi*, *Dryopteris filix-mas*, *Momordica sp.*, *Dryopteris wallichiana*, and *Smilax macrophylla* were the most preferred shrub species in serow habitat (Table 2). All shrub species were used in proportion to their availability (ANOVA.,  $P=0.083$ ). These plants were used by serow for food and also have medicinal value.

These plants are non-timber forest products (NTFPs) that the local people use for their subsistence. Nigalo, *Daphne spp.* and *Mahonia spp.* are illegally over-exploited in the serow habitat, sometimes with the approval of the local conservation committee. Conservation of these species is the main concern for *in situ* conservation of serow. Maru and *Rosa spp.* are totally avoided by serow because these plants have an unpleasant smell, while Dyakar is randomly used by serow.

**Table 2: Shrubs species preference by serow ( $R^2 = 0.022$ )**

<i>Shrubs species</i>	<i>Ivlev's Index Value</i>	<i>Preference</i>
<i>Dryopteris filix-mas</i>	0.13	Preference
<i>Berberis spp</i>	-0.5	Avoided
<i>Momordica spp</i>	0.3	Preference
* <i>Maru</i>	-0.12	Avoided
<i>Smilax macrophylla</i>	0	Preference
<i>Berberis aristata</i>	0.09	Preference
* <i>Dyakar</i>	0	Random
<i>Mahonia napaulensis</i>	-0.12	Avoided
<i>Viburnum</i>	0.01	Preference
<i>Daphne spp</i>	0.1	Preference
<i>Dryopteris wallichiana</i>	-0.12	Avoided
<i>Rubus ellipticus</i>	0.12	Preference
<i>Rosa sericea</i>	0.01	Avoided
* <i>Nigalo</i>	0.1	Preference

### Herbs

A total of 32 herb species were recorded in the serow habitat. The following 19 herbs were preferred by serow: Tilko ghans, bankarelo, *Momordica spp.*, *Thalitrium sp.*, *Selinum tenuifolium*, *Hypericum spp.* and *Lichen usnea* were the herb species most preferred by serow. Herb species such as *Leontopodium jacotianum*, *Anemia*, *Anaphalis*, *Adiantum venusium*, and *Centella asiatica* were randomly used for feeding purposes. Eight herb species were totally avoided by serow, including

*Gaultheria trichophylla*, *Chharchakeya*, *Leycesteria formosa*, etc. (Table3). Intense harvesting of herb species by local people from serow habitat was another problem. Most of the herbs have medicinal value, so the local people – especially the poor – illegally collect herb species for their daily livelihood; the herbs are transported to local trade cities such as Pokhara or given to the village's hidden traders.

Serow avoided some herb species so all herb species weren't used in proportion to their availability.

**Table 3: Herb species preference by serow ( $R^2 = 0.0005$ )**

<i>Herbs Scientific name</i>	<i>Ivlev's Index Value</i>	<i>Herb Use Status</i>
<i>Pericampylus glaucus</i>	0.08	Preference
<i>Leontopodium jacotianum</i>	0	Random
* <i>khar</i>	0.05	Preference
<i>Permilia spp.</i>	0.08	Preference
<i>Thalitrium sp.</i>	0.07	Preference
<i>Gaultheria trichophylla</i>	-0.04	Avoided
<i>Aconitum spp.</i>	-0.09	Avoided
<i>Selinum tenuifolium</i>	0.01	Preference
* <i>Chharchakeya</i>	-0.07	Avoided
<i>Primula sp.</i>	0.05	Preference
<i>Hypericum spp</i>	0.03	Preference
<i>Elatostema spp</i>	0.02	Preference
<i>Myrica spp</i>	0	Preference
<i>Leycesteria Formosa</i>	-0.03	Avoided
<i>Ludwigia hyssopifolia</i>	-0.06	Avoided
<i>Themeda triandra</i>	-0.5	Avoided
<i>Aconogonum spp</i>	0.08	Preference
<i>Centalla asiatica</i>	0.07	Preference
<i>Fragaria spp.</i>	0.1	Preference
* <i>Tilko ghans</i>	0.15	Preference
<i>Leucas cephalotes</i>	0.04	Avoided
<i>Anemia</i>	0	Random
<i>Anaphalis</i>	-0.2	Random
<i>Momordica spp</i>	0.02	Preference
* <i>Chiple</i>	0.01	Preference
* <i>thotne</i>	-0.09	Avoided
<i>Adiantum venusium</i>	0	Random
<i>Centella asiatica</i>	0	Random
<i>Reinwardtia indica</i>	0	Preference
<i>Potentilla fulgens</i>	0.14	Preference
<i>Rubia cordifolia</i>	0.02	Preference
<i>Lichen usnea</i>	0.06	Preference

### Conclusions and recommendations

Himalayan serow (*Capricornis sumatraensis* ssp. *thar*) is a threatened, solitary mammal of Asia. This study has generated a baseline for further research on this species.

The population of serows is only concentrated in the southern part of the ACA region, especially in

Ghandruk and Landruk; therefore, the authorities must concentrate on this species for further research and conservation activities. The serow's feeding ecology and co-existing patterns with predators and other ungulates in the area should be priorities for further research.

Generally, governments and researchers focus on wildlife species such as tiger, rhino, bears, snow

leopards, etc, that have high economic and illegal market value. These species have more available funds for their conservation and management through national and international sources compared to the serow. This situation results in a lack of knowledge about the illegal market value of species such as serow, hispid hare, etc. Therefore, concerned agencies and researchers must give equal emphasis to *in situ* conservation of low illegal market value species such as serow, which is a favorite prey species of threatened species like leopards.

The major problems in serow habitats are habitat fragmentation, land use changes, reduction of the serow population, conflicts between serows and predators and villagers, livestock grazing in serow habitat, and poaching. Further research and conservation education are essential to conserve this species.

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## NEW SITE REPORTS OF FOUR-HORNED ANTELOPE *Tetracerus quadricornis* (BLAINVILLE)

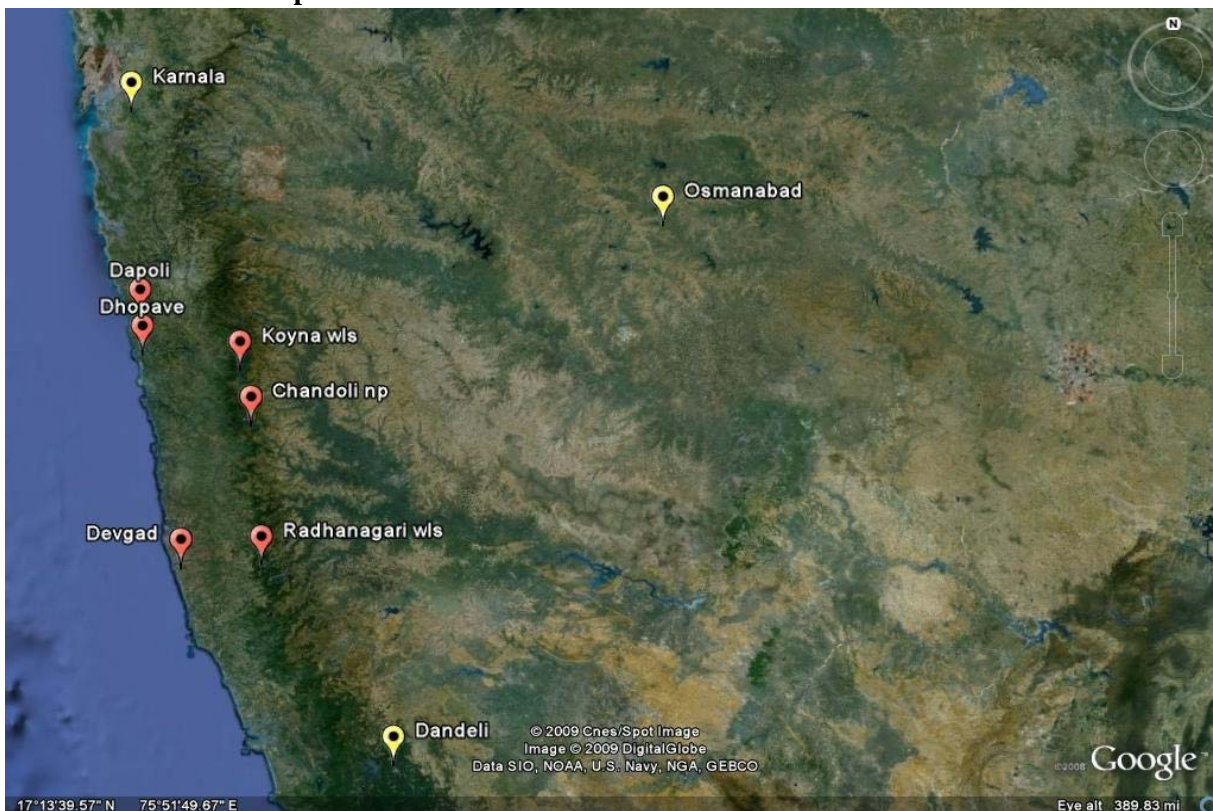
by Vinayak K. Patil and Sanjay G. Bhawe

The four-horned antelope *Tetracerus quadricornis* (Blainville 1816) – FHA hereinafter – is a threatened species endemic to the Indian subcontinent. It is categorized as “Vulnerable” in IUCN’s **Red List** (Mallon, 2008). Its distributional range has considerably shrunk in the last century (Krishna *et al.*, 2009). A recent review by Krishna and co-workers (2009) reports its occurrence in 104 sites in India. Most of the site information in this review was obtained from a mail survey conducted by Rice (1991). A few additional sites are reported here where we have recorded evidence of the animal’s presence. These new sites essentially fill a large gap in the

distributional range of this species (see Fig. 1 and Table 1). Looking at the gap, it is clear that information is not available from southwestern Maharashtra.

The gap is depicted in the map by a triangle made by the three nearest reporting sites, i.e. Karnala Bird Sanctuary in the north, Osmanabad Forest Division in the east and Dandeli Wildlife Sanctuary in the south (Rice, 1991; also see map in Krishna *et al.*, 2009). This is a triangle with all sides measuring approximately 400 km. It is essential to fill in such a huge gap with reliable records. Due to logistical constraints, we could only explore the

**Figure 1. Study area showing part of Maharashtra in Western India from where additional sites of FHA occurrence are reported.**



**Table 1: Details of the additional report sites of FHA.**

Site	District	Co-ordinates	Type of evidence
Dapoli	Ratnagiri	N 17° 44' 46.33'' E 73° 10' 34.05''	Photograph
Dhopave	Ratnagiri	N 17° 32' 57.7'' E 73° 11' 30.0''	Middens
Dajipur	Kolhapur	N 16° 23' 33.7'' E 73° 52' 21.2''	Middens
Koyana	Satara	-	Middens
Chandoli	Sangli	-	Middens
Devgad	Sindhudurg	-	Middens

**Figure 2. A typical FHA midden.**



coastal side of this triangle. Information was collected by visiting sites, communicating with officials and local people, and in one case setting up a camera trap.

The study area lies on the west coast of India in the state of Maharashtra. The coastal strip – known as Konkan – is a rugged terrain with the sea to the west and the precipitous hills of Sahyadri in the east. The region experiences heavy rains during the monsoon season and the natural vegetation is characterized by dry deciduous and moist deciduous forests.

The middens of FHA are a reliable indicator of its presence. A typical midden is shown in Fig. 2. The midden can grow to over 1m in diameter. The pellets are small, usually elongated with point on one end, but sometimes round. The first author has personally confirmed the presence of middens at four sites and has photographic evidence from another site.

There have been no previous reports of this species from the explored region. One reason for this could be the vernacular names of the species. At the uphill locations in Sahyadri, it is known as *Malsanda*. This is a typical name depicting its habit of forming middens on open plateaus. However, this could not be traced in the surveyed literature. At the sites in Konkan region, it is known as *Bhekra* which is easily confused with the local name *Bhekar* for the Barking deer (*Muntiacus muntjak* Zimmerman 1780). In fact, Shull (1952) mentions FHA being called as *Bhekar* by Dangis in Surat-Dangs, which lies directly north of the explored region. Anderson (1887) had noted that FHA was called *Bekra* or *Benkara* in Maharashtra. Thus, as Karanth (1986) has warned, it is very important to carefully avoid confusion between these two species where their ranges overlap. Further, our discussions with the local people at all the new reported sites show that the more common of the two animals is FHA. The animal is also considered a troublesome one as it severely raids the finger millet crop.

This report also documents a typical feeding habit of FHA to which we could not find any previous reference. The review of feeding habits by Krishna *et al.* (2009) also has no mention of this particular

habit, namely feeding on fruits of *Cucumis setosus* – a cucurbit – the seeds of which are passed intact in the pellets. These seeds grow on the middens in large numbers. This was also observed by the first author in central Indian forests. We counted the germination of this fruit at the three middens at Dapoli and recorded 462, 278, and 293 seedlings. This fruit, perhaps, is a rich source of water to the animal in times of water scarcity.

### Acknowledgements

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## DIVERSITY OF LOWER VERTEBRATES IN KUNO WILDLIFE SANCTUARY, MADHYA PRADESH, PROPOSED SECOND HOME FOR ASIATIC LIONS

by Faiyaz A. Khudsar, R.J. Rao, Sita Ram Taigor and Koustubh Sharma

### Introduction

Vertebrates are an indicator of the quality of the environment and are considered necessary to reduce the time and effort required to develop management strategies (Wilcox, 1984; Soule, 1986; Baker & Schonewald-Cox, 1986). The lower vertebrates, especially Pisces and herpetofauna, play a vital role in the energy flow of an ecosystem. This is particularly true for reptiles and amphibians, considering that most of their species serve as both predators and prey, depending upon their size and life stage (Gibbons, 1983). Many species of snakes (e.g. rat snakes, racers, cobras and Russell's viper) prey upon rats and mice and therefore play a crucial role in rodent control. Amphibians are important in forest stream ecosystems and provide more energy to the forest food chain than either birds or mammals. Turtles are efficient scavengers in aquatic systems, removing dead fish, amphibians and other organisms. Frogs consume large quantities of insects, many of which are harmful to humans – especially mosquitoes.

Very few studies have been made of the lower vertebrates in Madhya Pradesh (Saksena and Rao, 2008; Saksena, Sarkar and Tiwari, 1988); however, there is not even baseline data available on the lower vertebrates from Kuno Wildlife Sanctuary, even though it is a proposed second home for Asiatic lions.

This is a first attempt to document the species diversity of lower vertebrates in the Kuno Wildlife Sanctuary, with special reference to fishes, amphibians and reptiles.

### Study area

The extensive habitat diversity, coupled with a dry climate, make Kuno Wildlife Sanctuary a haven

for a wide variety of reptile and amphibian species. The Kuno River bisects the sanctuary into two parts and is a perennial source of water. Kuno Wildlife Sanctuary is located between latitudes 25° 30' - 25° 53' N and longitudes 77° 07' - 77° 26' E, in Sheopur district of Madhya Pradesh. An area of 344.68 km<sup>2</sup> was set aside as Kuno Wildlife Sanctuary in 1981, and an additional area of 924 km<sup>2</sup> of adjoining forest was also brought under a single management unit to create the Kuno Wildlife Division, covering 1,269 km<sup>2</sup>. This whole conservation area is being managed with the objective of receiving some Asiatic lions from Gir National Park and Sanctuary to create a second free-ranging population (Khudsar *et al.*, 2008).

The forest of Kuno Wildlife Sanctuary falls under the Northern Tropical Dry Deciduous Forest type (Champion and Seth, 1968) and is dominated by tree species such as *Anogeissus pendula*, *Anogeissus latifolia*, *Boswellia serrata*, *Acacia catechu* and extensive savannah woodlands (Khudsar *et al.*, 2008).

### Methodology

The present study was carried out during the course of a systematic ecological study involving line transects, road transects and vegetation samplings in the Kuno Wildlife Sanctuary during the period 2003-2006.

All opportunistic observations (anecdotes) of reptiles, amphibians and fishes were recorded. Species of snakes sighted from the neighboring villages were also verified whenever found dead during the summer monsoon. Similarly, fish species from Kuno river were recorded from the catches of the local community and from illegal fishing within the sanctuary, and also verified from the local market.



The works of Daniel (2002), Das (2002) and Jingran (1001) aided in identifying the reptiles, amphibians and fish species.

### Results and discussion

Forty-seven species of fishes belonging to 12 families, five species of amphibians belonging to three families (Table 1) and 21 species of reptiles belonging to 12 families (Table 2), were identified during the three-year study. The majority of the fishes belonged to Family Cyprinidae; this is probably because of the particular characteristics of the Kuno river, which is not a perennial river but holds many deep water pools throughout the year that support the proliferation of important aquatic vegetation including *Hydrilla verticillata*, *Potamogeton* sps. and *Vallisneria spirallis*.

Five species of frogs were recorded, four of which (*Bufo melanostictus*, *Euphylyctes cyanophlyctis*, *Hoplobatrachus tigerinus* and *Polypedates maculatus*) are included in IUCN's **Red Data Book**. It is likely that all frog species were not recorded and there is the possibility of finding more species in Kuno Wildlife Sanctuary.

The dry deciduous forest with rocky terrain of Kuno Wildlife Sanctuary provides excellent habitat for many species of snakes and geckos, along with mugger crocodiles which thrive well in Kuno River. Four species of turtles were seen and all are included in the **Red Data Book**. *Lissemys punctata*, an Indian flap shell turtle has been also placed in the Schedule I, Part ii of the Indian Wildlife (Protection) Act 1972. While walking along the transects there were frequent sightings of the common cat snake.

Among the snakes, there were frequent sightings of Russel's viper, followed by Common krait and Cobra. Muggers were seen almost every day in Kuno River in front of Palpur Forest Rest House, except during the monsoon. Similarly, sightings of Indian flap shell turtle were quite common. Among the fishes, Sor Tengana, Catla, Mrigal, Rohu, Spiny eel and Chalwa were commonly seen and caught.

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**Table 1: List of amphibians observed in Kuno Wildlife Sanctuary**

S. No.	Family	SCIENTIFIC NAME	COMMON NAME	Status under Red data book and WPA 1972
	<b>Bufonidae</b>			
1		<i>Bufo melanostictus</i>	Common toad	LC ver3.1 (2001)
	<b>Ranidae</b>			
2		<i>Euphylictus cyanophlyctis</i>	Skipping frog	LC ver3.1 (2001)
	<b>Rhacophoridae</b>			
3		<i>Limnonectes limnocharis</i>	Indian cricket frog	
4.		<i>Hoplobatrachus tigerinus</i>	Indian bull frog	LC ver3.1 (2001)
5.		<i>Polypedates maculatus</i>	Common tree frog	LC ver3.1 (2001)

**Table 2: List of reptiles observed in Kuno Wildlife Sanctuary**

S. No	Family	Scientific names	Common name	Status under Red data book and WPA 1972
	<b>Crocodylidae</b>			
1		<i>Crocodylus palustris</i>	Mugger	Schedule I Part ii of WPA
	<b>Trionychidae</b>			
2		<i>Aspideretes gangeticus</i>	Indian soft shell turtle	VU A1 d+2d ver. 2.3 (1994)
3		<i>Chitra indica</i>	Narrow-headed soft shell turtle	EN A1cd+2cd ver 2.3 (1994)
4		<i>Lissemys punctata</i>	Indian flap shell turtle	LR/lc ver 2.3 (1994), Schedule I Part ii of WPA
	<b>Bataguridae</b>			
5		<i>Pangshura tentoria</i>	Pink-ringed tent turtle	LR/lc ver 2.3 (1994)
	<b>Gekkonidae</b>			
6		<i>Hemidactylus frenatus</i>	Asian house gecko	
	<b>Agamidae</b>			
7		<i>Calotes versicolor</i>	Common garden lizard	
	<b>Scincidae</b>			
8		<i>Mabuya carinata</i>	Common ground skink	
	<b>Varanidae</b>			
9		<i>Varanus bengalensis</i>	Monitor lizards	Schedule I Part ii of WPA

	<b>Typhlopidae</b>		
10	<i>Ramphotyphlops braminus</i>	Common blind snakes	
	<b>Boidae</b>		
11	<i>Eryx johnii</i>	Red sand boa	
12	<i>Eryx conicus</i>	Common sand boa	
13	<i>Python molurus</i>	Asiatic rock python	LR/nt ver. 2.3 (1994), Schedule I Part ii of WPA
	<b>Colubridae</b>		
14	<i>Ptyas mucosa</i>	Rat snakes	
15	<i>Xenochrophis piscator</i>	Checked keel back	
16	<i>Lycodon aulicus</i>	Wolf snakes	
17	<i>Amphiesma stolatum</i>	Buffstriped keel back	
18	<i>Boiga trigonata</i>	Gamma/common cat snake	
19	<i>Spalerosophis atriceps</i>	Royal snake	
	<b>Elapidae</b>		
20	<i>Naja naja</i>	Spectacled cobra	
	<b>Viperidae</b>		
21	<i>Daboia russelii</i>	Russell's viper	

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## WETLAND MANAGEMENT STRATEGIES IN BANGLADESH

by Subrata Sarker

### Introduction

Wetlands are considered the most biologically diverse of all ecosystems and play an important role in maintaining of biodiversity. They all possess several ecological characteristics that distinguish them from upland or other aquatic ecosystems. Bangladesh, the world largest deltaic region, lies in the northeastern part of South Asia. The total area of wetlands in the country is 7-8

million hectares, which is 50% of total land surface and are an invaluable component of biodiversity in Bangladesh. The wetlands of Bangladesh serve a diverse habitat of various flora and fauna. These flora and fauna have economic importance, also ecological role. People's livelihoods in the wetland areas are largely dependent on the wetlands. But now, wetland areas are degrading because of the increasing population and their activities in wetland areas, such as rice production, shrimp production,

dike making etc. As the environmental condition of the wetlands is degrading, proper management is essential.

### Wetlands of Bangladesh

The majority of country's land was formed by river alluvium from Ganges and the Brahmaputra and their tributaries and possesses a large number of wetland areas which are mainly rivers and streams, fresh water lakes and marshes, flooded cultivated fields, estuaries and mangrove swamp. The major wetlands of Bangladesh are: Ramsagar, Meda beel, Tanguar haor, Aila beel, Dekhar haor, Kuri beel, Erali beel, Dubriar haor, Hakaluki haor, Kawadighi haor, Hali haor, Beel Bhatia, Chatan beel, Ata Danga haor, Kaptai lake, Bogakine lake, Sundarban West, Sundarban South, Sundarban East, Chakaria Sundarbans, Naf estuary, St. Martins island and reef.

### Laws for wetland management in Bangladesh

No specific laws exist for the management of wetlands in Bangladesh. There are, however, some sectoral laws. These include the following:

- The Forest Act 1927(amended) : Prohibits hunting, shooting and fishing in the reserved forest
- Bangladesh Wild life (preservation) (amended) Act 1974: Prohibits hunting, killing and capturing of animals designated as protected.
- East Bengal Protection and Conservation of Fish Act,1950 amended (in 1982): Provides protection and conservation of fish in the inland waters of Bangladesh.
- The East Bengal State Acquisition and Tenancy Act.1950: Transferred ownership of Jalmahals from the landlords to the government.
- The Haor Development Board Ordinance, 1977: Prepare projects and schemes for development of the haors and other similar low-laying and depressed areas.
- Informal organizations and capabilities:
  - The State Acquisition and Tenancy Act, 1950
  - The Acquisition of Waste Land Act, 1950
  - The Culture Waste Land Ordinance, 1959
  - The Forest Act, 1927
  - The Canal Act, 1927
  - The Irrigation Act, 1864

- The Environment Pollution Control Ordinance, 1977
- The Inland Shipping Ordinance, 1976
- The Inland Water Transport Authority Ordinance, 1958
- The Land Reform Board Act, 1989
- The Agricultural Pest Ordinance, 1962
- The Embankment and Drainage Act, 1952
- The Penal Code, 1860
- The Non Agricultural Tenancy Act, 1947

### Institutions for management of wetlands

1. Ministry of Environment and Forest.
2. Ministry of Land.
3. Forest Department.
4. Department of Environment.
5. Department of Fisheries.
6. Bangladesh Water Development Board (BWDB).
7. The Space Research and Remote Sensing Organization.
8. Flood Plain Co-ordination Organization (FPCO).
9. Non Governmental Organization.

### Threats to wetlands of Bangladesh

The following are some major challenges concerning sound wetland management in the country:

- Construction of dikes in the wetlands to protect rice crops.
- Poverty of the people.
- Conflicts between local people.
- Illegal fishing and over-fishing.
- Poor and insufficient management facilities.
- Lack of knowledge about the value of wetlands.
- Absence of proper monitoring body.
- Pollution from domestic waste.
- Cutting of aquatic vegetation.
- Commercial logging.

### Conclusions and recommendations

As wetlands are degrading due to enormous population pressure, it is now essential to conserve the country's wetlands. The government needs to manage wetlands through an adaptive collaborative management system and should immediately



consider the following in order to achieve sustainable managerial system:

- Implementation of alternating income generating activities for poor people.
- Reducing or preventing human intrusion.
- Controlling local pollutants.
- Controlling non-native and invasive species.
- Formulation of separate institutional body and policy for managing of wetlands.
- Restoration of degraded wetlands.
- Proper inventory of wetland resources.
- Sustainable utilization of wetland resources.

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## OCCURRENCE OF ALBINO MACAQUE IN THE DESERT TOWN OF BIKANER, RAJASTHAN

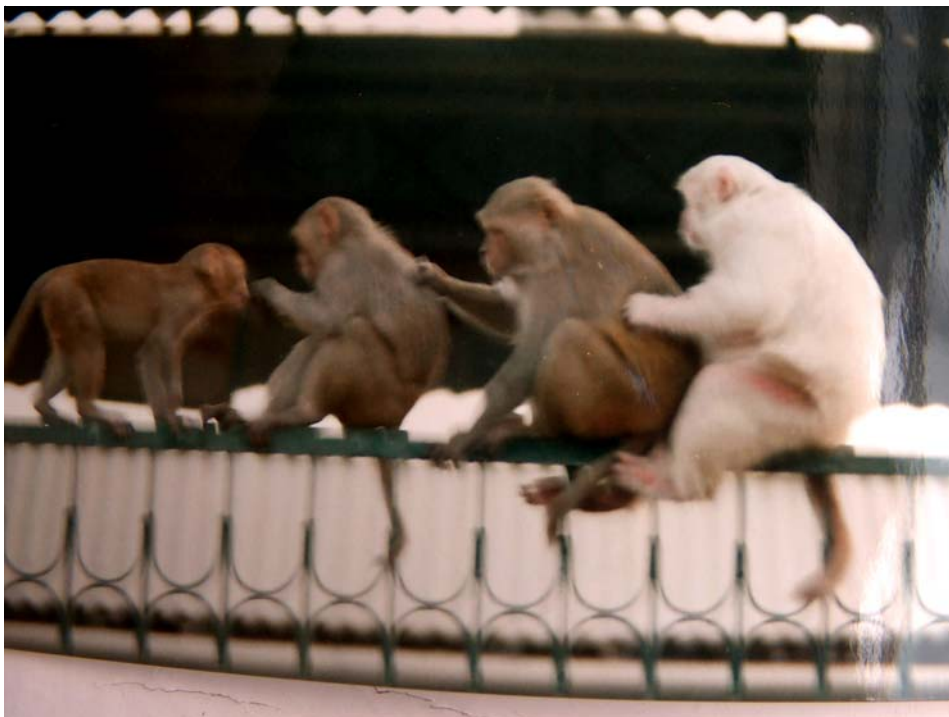
by Partap Singh and S.M. Mohnot

The Rhesus macaque (*Macaca mulatta*) is the most widely distributed macaque found in north and central India. Because of its abundance and wide distribution it is one of the most studied primates of India. However, its distribution in north India is discontinuous (Krishnan, 1972). From a geological standpoint, Rajasthan is a very interesting state. The Aravallis diagonally bisect the state into western arid and eastern semi-arid regions. *Macaca mulatta* is well distributed in wooded parts of Aravallis and eastern semi-arid region. The Thar Desert is situated on the eastern side of Aravallis. This mountain range is the eastern limit of this monkey and they are not found in the Thar Desert. Bikaner city (28° 01' N & 73° 22' E) is situated in the north-western part of the Thar Desert.

Although a natural population of *Macaca mulatta* does not exist in Bikaner district of Thar, they are trying to establish themselves in Bikaner city. Six rhesus macaques (2 adult males, 2 adult females and 2 subadult males) have been found in the town, and have been monitored for the last year. Quite interestingly, one of the female macaques is albino. This albino female is locally known as "Angrej Bandri" (white female monkey). According to the local residents, this albino rhesus has been living in the area for the last five years. She was the first to come to the area and later one male and one female joined her, whose origins are not known. Interestingly, the albino female was reported to have reproduced three times, but none of her newborns survived. It was observed that she would



**Fig. 1: The albino female macaque**



**Fig. 2: The albino macaque with other members**

carry the dead infant for 15-20 days and abandon the corpse only after it became mummified. She has been quite aggressive – often snatching eatables from the passengers at the Bikaner railway station, which she mostly frequents because of the availability of food and shelter. The railway station is the roosting site of the group. *M. mulatta* is well known for its aggressive behaviour (Valerio *et. al.*, 1969). The albino monkey was observed biting passengers and staff working with the railways. Railway authorities have tried to drive off the group from the roosting site, but they will return to the same place after a day or two. *M. mulatta* is essentially herbivorous and its natural food consists of leaves and fruits (Roonwal and Mohnot, 1977). Because of the scarcity of fruiting trees and vegetation, this group is mainly subsisting on peanuts, roasted Bengal grams, bananas and other fruits provided by the local people, leftover fruits and vegetables, and eatables pilfered from train passengers. This albino monkey shows some unusual activity patterns and avoids intense solar radiations, which is a usual characteristic of the desert.

Albinism is not rare among mammals in nature. Many albino mammals in nature and captivity have been reported, including Chinkara (*Gazella g. bennatti*) (Mohnot, 2009, pers. comm.), Common mongoose (Tehsin and Chawra, 1994), Nilgai (Ranjitsingh, 1987), Sloth bear (Bharos, 1988), Rat-tailed bat (Bhati, 1988), Palm civet, Palm squirrel (Sharma, 2004) and many others. Albinism is a genetic disorder and is caused by a single mutation which prevents the formation of the pigment melanin. The albino mutation actually stops the formation of tyrosine - an enzyme that changes tyrosine into a compound that eventually gives rise to melanin. Like any typical albino mammal, this albino macaque has white hair and pink eyes. The lack of pigment in the retinal pigment epithelium is responsible for poor vision among mammals. Because of the lack of melanin pigment, which gives all important protection from UV radiations from the sun, the albino mammals are prone to skin cancer. Because of these two factors albino animals have a poor survival rate in the wild and this albino rhesus could not survive for her full life span in spite of the peri-commensal habit and adaptation to avoiding the bright sunlight of the desert.

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# MUDUMALAI WILDLIFE SANCTUARY AND NATIONAL PARK

by N.K. Bohra

Tamilnadu State is famous for its beautiful natural scenic places that attract many tourists from all over the world. Nature lovers can enjoy the cool, peaceful and lovely places. Among them, Mudumalai Wildlife Sanctuary and National Park can be called a nature paradise.

Mudumalai lies on the northeastern slopes of the Nilgiri range of Western Ghats, descending to the Mysore Plateau. The name Mudumalai means “the ancient hill range.” In fact, it was as old as 65 million years when the Western Ghats was formed. Mudumalai lies at the tri-junction of Kerala, Karnataka and Tamilnadu.

Mudumalai Wildlife Sanctuary and National Park has a varied habitat that ranges from semi-evergreen, moist deciduous, and thorny open scrub to swamps, dry grass lands and cultivated teak plantations. In recognition of its phenomenal biodiversity with floral and faunal richness, this area was declared a sanctuary as early as 1940 by the rulers of those times and one of the first to be declared during the then Madras presidency.

When the biosphere reserve was declared by UNESCO and adopted by the Indian government, the 321 km<sup>2</sup> Mudumalai Wildlife Sanctuary and National Park formed part of the Nilgiri Biosphere Reserve. At present, the sanctuary area is 218 km<sup>2</sup> and the national park area is 103 km<sup>2</sup>. It is situated at latitudes 11°32' to 11°42' N and longitudes 76°22' to 76°45' E, with an altitude of approximately 900 m. Theppakadu, Mudumalai Masingudi and Nelakottai ranges are part of the biosphere reserve. There are many tribes living in the sanctuary and national park, including the Kurumbars, Paniyas, Katu Naryakars and Irulars.

## Flora

There is a variety of forests and habitats in Mudumalai, including dry deciduous, moist

deciduous, riverine, semi evergreen, swamp and herb. Also found here are the tall grass commonly referred to as “elephant grass,” giant bamboo, valuable timber species such as teak, rosewood, mathi, vengai and ventek, and some very fine flowering trees and shrubs like Indian laburnum, Flame of the forest, coral trees, etc. Among the fruit bearers are Jamun, Nelli, Jujuba and varieties of wild figs.

## Fauna

Such a varied habitat is inhabited by a variety of animals, including elephant, gaur, tiger, panther, sambhar, spotted deer, barking deer, mouse deer, common langur, Malabar giant squirrel, four-horned antelope, wild dog, jackal, mongoose, jungle cat, rusty spotted cat, leopard cat, sloth bear, wild boar, porcupine, striped hyena, slender loris, etc.

## Avifauna

The avifauna includes minivet, hornbill, golden oriole, Chloropsis, paradise flycatcher, golden-backed and Malabar great black woodpeckers, blue-winged parakeet, fairy bluebird, jungle fowl, racket-tailed drongo, peacock, etc.

## Reptilians

The reptiles are represented by python, monitor lizard, flying lizard, cobra, krait, and vipers, among others.

## Scenic spots

Mudumalai Wildlife Sanctuary and National park is full of picturesque scenic spots, including the Moyar waterfall and the chief minister's watch tower, the view point at Kargudi, Ombetta Lake, tribal temples in Manradiar Avenue, the Theppakkadu elephant camp, etc.



## Climate

The climate is generally salubrious and equable. Average temperature is about 20°C. The cold season is from November to February, whereas the hot season runs from March to April. The rainfall ranges between 900 to 1,200 mm. The best time to visit the biosphere is April to June.

## Captive breeding and rearing of elephants

Mudumalai elephant camp is one of the oldest and best known elephant camps in South India, where elephants are reared and trained by the traditional methods for which Tamilnadu is known for. Tribes rear and train elephants. Their commitment and traditional lifestyle are the main factor for the success of the elephant camp over a century.

The elephant camps are mainly used for captive breeding and rearing orphaned and problematic elephants. The camp elephants also mate with wild elephants; thus, gene flows are ensured.

## Eco-commandments in the protected area

- Entry into sanctuary is by permission only during specified hours.
- Information of all sightings and habitats provides more knowledge to tourists.
- Wear dark clothes so as to be inconspicuous and merge with surroundings.
- Maintain absolute silence during van or elephant rides for better opportunities of sighting animals.
- Do not kindle fires in the forest and avoid smoking while in the sanctuary.
- Entry on foot, camp fires, music, cooking and littering in the sanctuary is prohibited.
- Do not get down from the vehicle.
- Use of spotlights, fast driving, blowing of horns, etc. is prohibited.

- Shouting, teasing, chasing or feeding animals is prohibited.
- Bathing, washing and fishing in the river is prohibited.
- Consumption of alcoholic drinks and carrying of arms in the sanctuary are strictly prohibited.
- Disposable plastic bags, cups, plates, pet bottles are banned.

## How to reach Mudumalai

Mudumalai Wildlife Sanctuary and National Park is approachable from Udhagamandalam by road by two routes: 1) via Kallatty, 36 kms from Ooty, which has 36 hairpin bends through the natural forest area; 2) via Gudalur, which is 67 kms from Ooty. It can also be approached by road from Mysore, which is at a distance of 91 kms.

The nearest airports are at Coimbatore (160 kms) and Bangalore (245 kms). Nearest fuel stations are Thorapalli (7 kms, towards Gudalur) Gudalur (18kms, towards Ooty), and Gundatpet (30kms, towards Mysore).

## Accommodations and visiting hours

Various types of suites and dormitories are available for lodging. Pre-booking is necessary.

Visiting hours for this sanctuary are 6.30 am to 10.00 am and 4.00 pm to 6.00 pm. Elephant rides are available in the morning at 6.30 am and in the evening at 4.00 pm. Vehicle rides are conducted along the tourist area routes in the morning and evening.

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# FOREST NEWS

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## *Forest development: a vital balance Report from the XIII World Forestry Congress*

The XIII World Forestry Congress (WFC) was held 18-23 October 2009 in Buenos Aires, Argentina. Over 7,000 participants from 160 countries attended.

The Congress was organized to:

- bring together knowledge and experience to guide the formulation and implementation of forest policy;
- express views which may help research organizations in identifying future areas of study and international organizations in planning future work; and
- promote the elaboration and world-wide acceptance of technical standards such as international forestry terminology, a uniform classification of forestry literature, and consistent research methods.

The WFC represented an excellent opportunity for the global forestry community to discuss advances on technical aspects related to questions such as how forests can contribute to mitigating climate change and how the impacts of climate change on forest and people can be addressed.

The 9 findings and 27 strategic actions that were developed by the Congress are summarized below.

1. Currently, the major pressures on forests are arising from outside the forest sector, such as changes in global climate, economic conditions and population. An integrated landscape approach is needed to confront these challenges.

*Strategic actions:*

- Initiate integrated cross-sectoral actions at global, regional, national and local scales on key issues, including climate change,

bio-energy, water, biodiversity, food security and poverty alleviation to reduce adverse impacts on forests.

- Implement mechanisms for cross-sectoral monitoring and reporting to influence policies and actions related to forestry.

2. A better understanding of the pressure on essential natural resources is needed to change behavior to reduce negative impacts on forests and communities.

*Strategic actions:*

- Create innovative mechanisms that incorporate local and indigenous knowledge as a source of valid information to enrich global knowledge and the understanding of sustainable forest management.
- Strengthen interfaces between forest knowledge and society, focusing in particular on opinion leaders in local populations, as a way to influence policy makers.

3. The economic and environmental values of forests need to be recognized.

*Strategic actions:*

- Foster the development of mechanisms at local, regional, national and global levels for realizing new economic values of forests that create financial incentives for landowners and communities to manage for these values.
- Focus immediately on climate change related mechanisms as the first priority with particular attention to REDD issues.
- Increase efforts to develop integrated policies and strategies for effective

management of forest and water resources.

4. Planted forests will become increasingly important due to the growing global population.

*Strategic actions:*

- Recognize the importance of planted forests in meeting economic, social and environmental needs.
- Focus activities on degraded landscapes, especially restoration of degraded forest lands.
- Develop and implement technologies to maintain and enhance the productivity of planted forests and their contributions at local and landscape levels.

5. Well-managed forests, both native and planted, will be vital as a sustainable supply of biomass for home use.

*Strategic actions:*

- Develop energy forests within the context of a sustainability framework to minimize the risk of unintended consequences across the forest, agriculture and energy sectors.
- Implement good governance policies for sustainable bioenergy development.
- Develop and improve technologies for more efficient production and diverse use of biomass for energy including second generation technologies.

6. Foresters can do more to improve the resilience of forests to the adverse impacts of climate changes while at the same time helping to sequester and store carbon being emitted into the atmosphere.

*Strategic actions:*

- Develop new approaches for enhancing carbon sequestration using forests and new options for managing forests in the face of climate change and implement them widely.
- Provide informed and scientifically proven inputs to climate change negotiations.
- Simplify AR CDM rules and implementation of REDD+.
- Advocate that local needs currently met from forests are respected and reflected in international climate change-oriented mechanisms and policies.
- Expand research on adaptation to climate change and its impacts on ecosystems, economies and societies.

7. Fragile ecosystems play a significant role in biodiversity conservation and are sensitive to global changes.

*Strategic actions:*

- Promote protection and restoration of fragile ecosystems to improve their resilience and adaptation to changing climate and human impacts and to maintain their vital environmental services, including food security and livelihoods for their inhabitants.
- Increase efforts to combat desertification through forestry-related actions.

8. Creating enabling policy environments that promote investment in clean technologies and the necessary infrastructure for efficient and environmentally responsible wood harvesting and processing are essential to achieve sustainable development goals.

*Strategic actions:*

- Create an enabling environment of policy and legal framework for the forest industry sector.
- Expand research to develop new clean technologies and forest products.

9. Good governance, secure tenure and new and innovative instruments for financing sustainable forest management are needed.

*Strategic actions:*

- Improve governance at all levels of the forest sector, including building capacity of forestry institutions to enforce laws and regulations, and facilitate sustainable forest management by state and non-state actors.
- Provide better mechanisms to recognize and value women's roles in both informal and formal domains.
- Improve worker skills and working conditions needed for safe and productive work in the expanding forest sector.
- Promote land tenure reform providing secure rights to communities and local stakeholders to use and manage forest resources.
- Develop financing strategies within the framework of national forest programmes using innovative instruments for investment and market development in forestry.

## MESSAGE FROM THE XIII WORLD FORESTRY CONGRESS TO THE COP 15 OF THE UNFCCC

The 13<sup>th</sup> World Forestry Congress, convened in Argentina in October 2009, notes with concern the impacts of climate change on forests and strongly emphasizes the important role forests play in climate change mitigation and adaptation as well as the need for forest-dependent people and forest ecosystems to adapt to this challenge.

Forests are more than carbon. They harbor two thirds of all land-based biodiversity, and generate critical ecosystem goods and services such as water, food, and income from over 5000 commercial forest products. Forests sustain the cultural and spiritual identity of billions of people, foremost among them the indigenous peoples and local communities.

The 13<sup>th</sup> WFC calls for urgent action and endorses the main messages of the Collaborative Partnership on Forests' Strategic Framework for Forests and Climate Change, of its Expert Panel on Adaptation of Forests to Climate Change, and of The Forests Dialogue's Statement on Forests and Climate Change, in particular the following:

- Forests contribute positively to the global carbon balance. Maintaining high carbon stocks by reducing deforestation and forest degradation and promoting the sustainable management of all types of forests, including the conservation of biodiversity, forest protection and restoration, should be amongst the world's highest priorities for the forestry sector;
- Sustainable forest management provides an effective framework for forest-based climate change mitigation and adaptation;
- For forests to fully achieve their potential in addressing the challenges of climate change, forest governance must be improved, financing and capacity building should be enhanced, and processes to empower disenfranchised people, including indigenous peoples and other forest dependent communities, be strengthened;
- Sustainably harvested forest products and wood fuels can reduce greenhouse gas emissions if they substitute neutral or low emission, renewable materials for high-emission materials;
- Even if adaptation measures are fully implemented, climate change would in the long run exceed the adaptive capacity of many forests and therefore forest-based climate change mitigation and adaptation measures should proceed concurrently;
- Inter-sectoral collaboration, strengthening forest governance, establishing positive economic incentives, and improving sustainable livelihoods of the poor are essential for reducing deforestation and forest degradation;
- Accurate forest monitoring and assessment help inform decision-making and should be strengthened in a coordinated and transparent manner; and
- Actions on climate change mitigation and adaptation in forestry would benefit from a more active engagement of forestry professionals.

The 13<sup>th</sup> WFC stresses the need to reduce poverty as a driver of deforestation and to safeguard the rights of indigenous peoples and forest-dependent communities, and recognizes the important roles that the private sector and civil society play in climate change adaptation and mitigation.

The 13<sup>th</sup> WFC supports the inclusion of REDD+ in the agreement on long-term cooperative action under UNFCCC, including enhanced incentives for conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries, and calls for further support for adaptation in the forest sector.

Buenos Aires, 23.10.2009





*Mountain temple in Bhutan (Photo: Patrick B. Durst)*

## ***Bhutan to welcome 23rd Session of the Asia-Pacific Forestry Commission***

Delegates and participants of the 23<sup>rd</sup> session of the Asia-Pacific Forestry Commission (APFC) will have the unique opportunity to visit Bhutan – a country increasingly recognized for its approach toward balancing environmental sustainability and social security with economic development. Preparations are underway for this exciting event, to be convened in Thimphu, 9-11 June 2010.

Bhutan seeks to balance environmental, social, and economic objectives by advancing the concept of “Gross National Happiness” (GNH), which focuses on four cornerstones: 1) sustainable development, 2) preservation and promotion of cultural values, 3) conservation of the natural environment and 4) establishment of good governance. With this concept in mind, the Bhutanese people are listed as among the happiest people in the Asia-Pacific region.

Nearly 70 percent of Bhutan is covered with forests (3,195,000 of the country’s total land area of 4,100,000 hectares) – the highest proportion of

any country in Asia. Roughly a third of the total country area is protected under the IUCN categories I-V. The country is recognized as one of ten main hotspots for biodiversity in the world.

The Asia-Pacific Forestry Commission is enthusiastic to be welcomed by Bhutan and be presented with the opportunity to observe Bhutan’s astonishing forest resources and dynamic forestry sector. The three-day session of APFC will feature a “Heads of Forestry Dialogue” on pressing forestry issues in the region, and agenda topics related to the state of forestry in the region (including consideration of the results and findings from the Forest Resources Assessment 2010 and the second Asia-Pacific Forestry Sector Outlook Study), forests and climate change, FLEG, and other issues of current concern in the region. The APFC session will be preceded by a pre-session workshop on 8 June 2010, organized in collaboration with the Asia Pacific Association of Forest Research Institutions (APAFRI) and other



partners. Mark your calendars now and plan to attend!

Further information on the program and agenda topics will be posted as they are developed. Formal invitations for the 23<sup>rd</sup> APFC session will soon be extended to the Commission's 33 member countries and international and regional organizations active in Asia and the Pacific.

Due to restructuring of FAO's calendar of statutory meetings, it is anticipated that the 24<sup>th</sup> session of APFC will be convened in late 2011 in Beijing, in conjunction with the 2<sup>nd</sup> Asia-Pacific Forestry

Week, in accordance with recommendations of the APFC Executive Committee.

For more information on the 23<sup>rd</sup> session of APFC, please contact Mr. Patrick Durst, Senior Forestry Officer (Asia and the Pacific), who also serves as FAO Technical Secretary for the APFC, at the address below:

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*Mountain view of Thimphu, Bhutan (Photo: Masakazu Kashio)*

## ***Codes of practice for forest harvesting -- monitoring and evaluation***

*Prepared by Michael Pescott (Forestry Consultant, FAO) and Graham Wilkinson (Chief Forest Practices Officer, Forest Practices Authority, Tasmania, Australia)*

*If forests are not managed for timber production, they are often not managed at all and frequently face the threat of being converted to alternative land uses, rather than being conserved.*

### ***Good forest management***

Codes of practice for forest harvesting (also termed reduced impact logging (RIL) guidelines) in several countries, provide the foundation for sound forest management. Codes of practice for forest harvesting, if effectively implemented through an appropriate forest practices system, can provide multiple benefits, including maintenance of habitat for biodiversity, management and monitoring of carbon stocks, watershed conservation, as well as access to timber markets and the sustainable management of non-timber forest uses.

### ***Implementing Codes of Practice for Forest Harvesting***

A forest practices system should be based on the principles of continuous improvement, and include the following steps: development (policy and legal frameworks); planning (codes, guidelines and harvesting plans); implementation (training and supervision); followed by monitoring and evaluation. Experience indicates that while many countries in the region have made good progress with the development of codes of practice, there are still challenges in achieving their widespread adoption and effective implementation.

### ***Monitoring and evaluation (M&E)***

Monitoring and evaluation of compliance and effectiveness in implementing codes of practice are key components of a forest practices system, as they provide forest managers with information about the standards that are being achieved and how those standards can be improved over time.

In June 2009, FAO carried out three training workshops on M&E, with the assistance of Graham Wilkinson and Mick Schofield from the Tasmanian Forest Practices Authority, the Secretariat for the Pacific Community (SPC), and with funding from Australian Government's Asia-Pacific Forestry Skills and Capacity Building Program. There were two country workshops, one in Papua New Guinea organized with the PNG Forest Authority, the other in Malaysia, followed by a regional workshop held in China with the Chinese State Forestry Administration.

The workshops, presentations, discussions and field trips raised the following key points:

- The importance of M&E in assessing both compliance and effectiveness of the codes of practice
- The need to clearly define roles and responsibilities for carrying out harvesting supervision and M&E
- M&E should be carried out both by forest managers and by independent bodies
- Results of formal M&E should be made transparently available to senior officers, Ministers, stakeholders and the general public
- M&E procedures should be reviewed and revised on a regular basis
- The essential role M&E can play in improving the credibility of forest practices
- M&E can reduce the costs of attaining and maintaining forest certification schemes
- M&E is fundamental to broader sustainable forest management and the continuous improvement of forest practices



Table 1 highlights the status and areas to improve M&E across the region, as identified in group discussions during the workshops.

**Table 1. Status of M&E in eight countries of the Asia-Pacific**

Component of M&E	PNG	Fiji	Laos	Cambodia	Viet nam	Malaysia	Indonesia	China	Regional score (%) <sup>*</sup>
1. Do forest companies have the skills and capacity to do routine supervision of their operations?	P	P	X	✓	P	P <sup>3</sup>	P	P	13%
2. Does the legislation require formal M&E?	✓	✓	✓	✓	✓	X	✓	X	75%
3. Is formal M&E conducted nationally or on a project or concession basis?	P	✓	P <sup>2</sup>	✓	X	P <sup>3</sup>	P <sup>1</sup>	✓	38%
4. Are the objectives of M&E clearly defined?	✓	✓	P <sup>2</sup>	✓	✓	P <sup>3</sup>	✓	✓	75%
5. Is the responsibility for M&E clearly defined?	✓	P	P <sup>2</sup>	✓	P	P <sup>3</sup>	P <sup>1</sup>	✓	38%
6. Is the organisation responsible for formal M&E independent of the forest managers?	X	X	P <sup>2</sup>	X	X	P <sup>3</sup>	P <sup>1</sup>	P	0%
7. Does the organisation responsible for formal M&E have sufficient knowledge of M&E and resources?	P	P	P <sup>2</sup>	P	X	P <sup>3</sup>	P <sup>1</sup>	P	0%
8. Is there a systematic checklist of monitoring questions?	✓	✓	P <sup>2</sup>	✓	✓	✓	✓	✓	88%
9. Does the checklist cover all provisions of the Code or RIL Guidelines?	P	✓	P <sup>2</sup>	P	P	P	P	P	13%
10. Does the checklist assess the <u>standard of compliance</u> with the Code/RIL Guidelines?	✓	✓	P <sup>2</sup>	✓	✓	✓	✓	✓	88%
11. Does the checklist assess the <u>effectiveness</u> of the Code/RIL Guidelines?	X	X	X	X	X	X	X	X	0%
12. Are reports on the results of M&E prepared and provided to the forest manager?	✓	✓	P <sup>2</sup>	✓	X	P <sup>3</sup>	P	✓	50%
13. Are reports on the results of M&E provided to Ministers?	X	X	X	✓	X	X	X	✓	25%
14. Are the reports on M&E made publicly available?	X	X	X	X	X	P <sup>3</sup>	P	P	0%
15. Is there a formal process for translating the results of M&E into corrective actions and improvements to the Code/RIL Guidelines?	P	X	P <sup>2</sup>	P	X	P <sup>3</sup>	P	P	0%

Notes-

✓ = yes, X = no, P+ partial

\*the mean is the % of countries with a "Yes"

P<sup>1</sup> – for areas covered by certification systems

P<sup>2</sup>- only within the SUFORD project

P<sup>3</sup> – within areas covered by the MTCC



Participants - Wang Qing Forest Management Bureau – Mixed temperate conifer/broadleaf forest recently thinned



## *Charting paths for regional collaboration*

The Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) was formally launched in September 2008, with leading support from the Government of China, Australia and the United States. Since its launching, APFNet has supported several capacity-building activities, including training workshops, symposiums, and study tours. FAO has coordinated closely with the APFNet Secretariat since its founding, to ensure synergy and complementarity of activities.

The International Symposium on APFNet Development was organized 28-29 August 2009, in Lushan, China, to assess the activities and progress of APFNet to date, and to discuss priorities and activities for future focus. Approximately 40 people participated, including representatives from Asia-Pacific Economic Cooperation (APEC) economies and selected international organizations. The symposium focused on the following:

- Activities and progress of APFNet to date;
- Functions of the APFNet Secretariat;
- APFNet's relationship with APEC;
- Modalities of APFNet;
- Financial arrangements; and
- Future priorities for APFNet.

During the first year of APFNet, several capacity building workshops were organized, as well as information exchange events convened in collaboration with FAO and other partners.

The Chinese Government has committed initial financial support, with additional contributions from Australia and the U.S., and support from The Nature Conservancy (TNC) for specific activities. Members of the network have been encouraged to contribute in a variety of ways, including in-kind contributions in terms of staff, hosting of workshops, etc.

The Lushan meeting recognized that it would be advantageous for APFNet to develop a broad base of funding support and promote the concept of cost-sharing of activities to the extent possible. Discussion also focused on options for applying to

APEC for funding support (normally up to US\$100,000 for each capacity-building activity, with application endorsed by three or more APEC members).

There was general agreement among participants on the value of APFNet to maintain a focus on capacity building. Particular emphasis was given to the need to strengthen capacity related to forest policy development and implementation, learning from the experiences of countries in the region, and supporting the scaling up of promising approaches.

Other aspects of capacity building that were emphasized:

- capacity building activities should evolve to match the emerging trends and needs of forest development in the region;
- strong emphasis should be placed on capacity building related to forest policy;
- there is a current need to address forestry and climate change, especially carbon stock issues;
- senior-level education programs for retraining forest experts and officials should be developed;
- capacity of training institutions should be strengthened;
- a longer training strategy and program should be developed;
- cooperation and exchange among major schools for educating the next generations of foresters should be promoted; and
- exchanges and secondments of personnel for capacity building should be facilitated.

Other focus areas considered important by participants, reflecting current regional needs, included the following:

- cross-sector coordination (including possible case studies and learning experiences based on China's efforts in this aspect);
- illegal logging, poverty and rural development nexus; and
- conflict management.

## *The youth are our future - FAO invests in them!*

*Prepared by S. Appanah, nfp Advisor (Asia-Pacific)*

“Investing into our future by building our youth” may sound like a cliché, but its potential value cannot be ignored by development organizations. Indonesia played host to the 37<sup>th</sup> International Forestry Students’ Symposium (IFSS), which was held in Bogor and Jogjakarta from 27-29 July 2009. The International Forestry Students’ Association (IFSA), which organizes these events worldwide, clearly recognizes that forest conservation is a long-term endeavour, and is a heavy responsibility that is passed from one generation to the next. And that they will inherit the consequences of action or inaction. With that in view, IFSA works at developing programs and activities to foster capacity building and knowledge growth among forestry students.

This year’s theme was “Forest Conservation: Youth’s Role in Abbreviating the Long Process.” Notwithstanding the fact that abbreviating the process can be anathematic to forestry, the National Organizing Committee prepared an impressive program. The objectives of the Symposium included:

- enriching of formal forestry education;
- providing a forum where all stakeholders can discuss the issues concerning Indonesia’ forest conservation;
- fostering leadership in a multicultural environment; and
- delivering a strong message to the world about the need to support forestry education for a better future.

To meet the objectives, the organizing committee put together three sets of activities. It started with a lecture forum designed to give a comprehensive overview of Indonesian forestry. This was followed by excursions to learn directly from civil society and practitioners in the field. The final activity was the general assembly of IFSA, where decisions on the future directions of the organization were deliberated.

The lecture forum included interesting topics covering a wide range of issues, such as the following:

- Introduction to Indonesian forestry – the challenges of high deforestation and forest degradation, and how the Ministry of Forestry has been responding to them, the achievements so far, and the opportunities they offer. The intent was for the students to see things from a different perspective from an Indonesian one.
- Sustainable forest management – this forum focused on tropical forests, touching on basic concepts of sustainability, value of forest services, ongoing destruction of tropical forests, global initiatives to address the problem, and the importance of monitoring forest management.
- Forests and climate change – the role of tropical forests in carbon emission and sequestration was explored, including the leadership role that Indonesia can play in developing the Reduced Emissions from Deforestation and Degradation (REDD) mechanism. The various activities within the REDD scheme were examined, providing international forestry students with additional knowledge on the approaches, while at the same time appreciating its complexity during implementation.
- Forest plantations – increasingly, many countries in the region, including Indonesia, are developing large tracts of forest plantations for timber and several other forest products. Although the forest plantation technology has advanced considerably, yet there is heightened concern among the public about the negative impacts of forest plantations on the environment. The forum addressed many of these issues.
- Multi-stakeholder processes – forest management has gone through considerable changes with the inclusion of local people in decision making. These changes from central

control to decentralization and devolution were captured in a trenchant way in Indonesia. The students were given examples of how these changes evolved, the complex nature of involving people in forestry and decision making, and the future shape of things to come.

- Forestry education – this issue, which is close to the hearts of all the students, received intense attention, particularly so because of the severe drop in attendance in forestry schools worldwide. The lectures provided an insight into how the forestry curriculum is changing, and what kind of work forestry graduates would be undertaking – it is certainly quite changed from the traditional perception of a forester so far.
- Community forestry – interest in community forestry is gaining ground worldwide. Indonesia happens to be an extremely interesting model, considering its large population and their heavy dependence on forests for their livelihood. The concepts of community forestry are evolving rapidly, much of the work is still in a state of flux, and the students were able to imbibe such innovations directly through lectures and later from field observations.

The Organizing Committee managed to get some well known speakers from a number of international institutions for the lecture forum, including FAO, CIFOR, ITTO and GTZ. Besides the lecture forum, the Organizing Committee arranged field excursions to several parts of Indonesia to highlight specific features, as following:

- Forest products workshop in Kribet – traditional wood-working products that

included masks and statues with local designs;

- Gunung Kidul Community Forest – community forest management and value of forest for local communities;
- Wanagama – site used for forestry education;
- PT Pindo Deli – paper manufacturing plant;
- Gunung Walad – collection of non-timber forest products such as resin and copal;
- Bedul Segoro Anak – mangrove forest management;
- Ngagelan – turtle breeding ground and hatchery; and
- Alas Purwo National Park – nature tour and camping.

The Organizing Committee did not confine the activities to only forestry work. They came up with interesting cultural activities, conservation campaigns and dinners in some exotic sounding places. This Symposium unfortunately took place at the time when the H1N1 flu scare was at its height, but this hardly made a dent in the students' enthusiasm – some 90 participants from over 20 countries came for seeking knowledge, and naturally to see the lovely country. The Organizing Committee must be congratulated for raising the funds, organizing the wonderful variety of activities, and lining up some high profile speakers. FAO supported them by providing lectures on two themes and some funds. Someone once said that the objective of education is to prepare the young to educate themselves. It may be a small contribution, but FAO has certainly invested into the future.

## *Commonwealth Forestry Association honors FAO forestry expert*



The Commonwealth Forestry Association recently awarded the Southeast Asia-Pacific Regional Medal of Excellence to Simmathiri Appanah, National Forest Programme Advisor (Asia-Pacific), FAO Regional Office for Asia and the Pacific, for outstanding service in the field of research, silviculture and forest policy development.

In the citation, it was noted that Dr. Appanah has played an exceptional role in the fields of forest research, silviculture, and the development of forest policy. As a forest ecologist his endeavors have encompassed practical research into the reproduction, regeneration and rehabilitation of the production rain forests of Southeast Asia. His research findings have led to innovative practical applications in the management and harvesting of the region's natural forests. He has displayed valued leadership in forest research in Malaysia and in the publication of research work as founding editor of the *International Journal of Tropical Forest Science*. His work has been extensively published in several books and many scientific papers. He has also been instrumental in organizing many seminars, workshops and conferences.

Apart from his work in Malaysia, he has played a pivotal role assisting other countries in the Region (including Cambodia, Laos, Vietnam, Bangladesh, Papua New Guinea, and Sri Lanka) to review their forest research programmes, and to develop research management strategies. He has fostered valuable regional networks and encouraged scientific exchange and collaboration. His work has extended to include the promotion of the national forest programme and assistance in forest policy and legislation formulation in many Asia-Pacific countries. This has focused on equitable sharing of forest wealth and supporting legal arrangements, and the award recognizes his contribution and leadership in these fields.

Dr. Appanah has worked at the FAO Regional Office for Asia and the Pacific for almost 10 years, first as Senior Programme Adviser of the Forestry Research Support Programme for Asia and the Pacific (2000-2003), and currently as the National Forest Programme Adviser (Asia-Pacific) since 2003. Before joining FAO, Dr. Appanah was Director of the Division of Natural Forests at the Forest Research Institute Malaysia, where he worked from 1981-2000.



## *UN-REDD picking up speed in South East Asia*

*Prepared by Petteri Vuorinen, Regional Natural Resources Officer (UN-REDD Secretariat, Bangkok)*

UN-REDD is the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries. It is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. The predicted significant flow of funds could reward a meaningful reduction of carbon emissions and could also support new, pro-poor development, help conserve biodiversity and secure vital ecosystem services. UN-REDD also engages and respects the rights of indigenous peoples and other forest-dependent communities.

Contrary to the plodding pace of many UN programs, UN-REDD has moved very fast, releasing and committing US\$18.8 million during the last 12 months – in fact, in some quarters there has (perhaps uniquely) been suggestions that the UN is moving too quickly! UN-REDD also represents another landmark event – three UN agencies, namely FAO, UNDP and UNEP, have been collaborating unusually closely. Initially, the UN-REDD program was funded solely by the Government of Norway, but recently Spain and Denmark have also become donors.

To emphasize the interest in the region towards the UN joint program, three new countries – Cambodia, Nepal and Sri Lanka – in addition to the first pilot countries (Indonesia, Vietnam and PNG) have joined the UN-REDD Programme, and Solomon Islands has also applied to join.

Below is a short update of the UN-REDD process in the Asia-Pacific countries.

### **Vietnam**

The Government of Vietnam requested assistance under the UN-REDD scheme to prepare itself for REDD under a post-Kyoto climate regime. Among

the UN-REDD pilot countries, Vietnam's progress in officially launching its UN-REDD national program in September 2009 and starting up some key activities puts the country in a leading position to share lessons with other countries preparing for REDD. UN-REDD's three main areas of action are: 1) capacity building and coordination work at the national level; 2) capacity building and piloting of activities at the provincial and local levels; and 3) cooperation and dialogue at the regional level – particularly with neighbouring countries in the Lower Mekong Sub-region. The Programme also provides a framework for national REDD preparation, taking into account the various other related initiatives taking place in the country.

So far, the UN-REDD program for Vietnam has assisted the Government in establishing a national network for REDD, where various governmental agencies, donors, and NGOs (both international and national) come together for discussing REDD-related issues. The program has also undertaken a preliminary study on benefit distribution, identifying necessary key national policy actions, as well as proposed options at the local level for an equitable benefit distribution system.

The next steps and challenges identified for Vietnam's REDD preparedness will be to align itself with the outcomes from the COP-15 deliberations; building national level capacity in various technical areas and in coordinating these capacities; mainstreaming REDD into national policy; establishing mechanisms for sub-national coordination and collaboration; piloting options proposed under the benefit distribution study; and promoting regional collaboration to address regional leakage.

### **Indonesia**

Indonesia is also one of the nine pilot countries for implementing the UN-REDD Quick Start Programme. The program aims to support the

Government of Indonesia to develop a REDD architecture that will allow a fair, equitable and transparent REDD implementation, and a sustainable contribution of forestry to a reduction of forestry-related green house gas emissions.

Compared to Vietnam, Indonesia is behind in the implementation of the national program as the UN-REDD National Joint Programme Document was just signed on 23 November 2009. The Ministry of Forestry is the lead implementing agency and has appointed the National Programme Director, but the Programme Management Unit has not yet been set up. Despite this, UN-REDD has managed to make some preliminary contributions to REDD-readiness in Indonesia; for example, in compiling and analyzing data on deforestation and forest degradation in Sulawesi.

Since the COP-15 meeting in Copenhagen was just ahead and the UN-REDD programme was late in implementation, technical advice to the Ministry of Forestry to speed up implementation of the program was urgently needed, so a UN-REDD Programme Mission visited the country at the end of November.

The primary objective was to discuss and reach final consensus with the Ministry of Forestry on program implementation arrangements between UNDP, FAO, UNEP and third parties. Other issues discussed included the establishment of Project Management Unit including staff recruitment, development of the work plan for 2010, selection of the pilot province, the inception workshop and proceedings to get the Free Prior and Informed Consent.

The inception workshop is planned to be organized in the beginning of February 2010 in Jakarta. Due to the many actors involved in REDD in Indonesia, UN-REDD will focus on the area of Sulawesi, while other actors are active in Kalimantan and Sumatra. By 2012, the results from the activities by the different actors will be used to design one national system for Indonesia.

FAO's role in the UN-REDD programme is to develop an appropriate Measurement, Reporting and Verification (MRV) system, as well as establish Reference Emission Levels.

## **Papua New Guinea**

The Papua New Guinea UN-REDD Programme also aims at initiating the quick start phase of readiness support for REDD. In contrast to Vietnam and Indonesia, Papua New Guinea has only secured initial funding at present. This funding will be used to assist Papua New Guinea to prepare a draft National REDD Plan for consideration by the Cabinet and to develop a full national program that will be resubmitted to the UN-REDD Policy Board.

A number of activities have been undertaken towards signature of the Papua New Guinea Programme document. For finalization of the initial Programme document, various drafts have been discussed with key government and non-governmental stakeholders. Also, a series of regional conferences were organized by the Office of Climate Change and Environmental Sustainability (OCCES) to discuss with provincial governments, landowners and relevant stakeholders their roles and functions on mitigation programs under REDD, such as forest inventory, monitoring & reporting and benefit sharing.

In addition, representatives of FAO, UNEP, and the Government of Australia met together with OCCES and the Forestry Administration, in order to develop a mutually agreed roadmap on the development of a comprehensive monitoring, reporting and verification system for Papua New Guinea, and the necessary capacity building work required to implement it.

## **Cambodia**

Upon the request of the Director General of the Forestry Administration of Cambodia to UN-REDD, FAO and UNDP are providing support to the government to undertake REDD readiness planning activities. Cambodia has been already accepted by the World Bank REDD financing mechanism (FCPF) and the UN-REDD, but significant program funding is not yet available. FAO and UNDP have therefore provided funding at the national level to support Cambodia's involvement in REDD.

In collaboration with UNDP, FAO is providing support on REDD Roadmap development with specific focus on the following aspects:

- Assessment of land use and drivers of land use change and forest governance.
- Planning development of a REDD Monitoring, Reporting and Verification System (MRV) and Reference Emissions Levels (RELS).

The next steps include the formation of a national REDD Technical Taskforce to oversee development of a REDD Roadmap and to coordinate REDD-related activities at the national level. Many important tasks lie ahead, including,

perhaps most importantly, awareness-raising in relation to REDD. At present, although REDD has been the talk of the town in forestry and environmental circles, a level of understanding sufficient for decision making and policy development is limited to a minority of individuals at the national level. The efforts of FAO and UNDP will, therefore, be accompanied by capacity building in the wide range of areas relevant to REDD development.

### **Sri Lanka and Nepal**

Activities are still to be initiated in these new UN-REDD countries.

## ***THIRD EXECUTIVE FOREST POLICY SHORT COURSE: ENHANCING FOREST POLICY IN THE GREATER MEKONG REGION***

*Prepared by Marija Spirovska-Kono, FAO Consultant*

Over recent decades, natural forests have come under increasing pressure to meet the ever-growing demands of nation-states. In order to balance vital, but often conflicting needs, the need for strong forest policy has never been greater.

However, forest policies are not always crafted as a result of thorough analysis and multi-stakeholder consultation. In reality, they are often developed and implemented as a knee-jerk response to political pressure, or unforeseen circumstances such as natural disasters. As a result, they can impact negatively on the very people and forests whose interest they were designed to protect.

The Third Executive Forest Policy Short Course has been designed to improve country-level policy development by addressing current shortcomings in policy formulation, implementation, and review.

Building on the success of two similar courses conducted by the FAO and the Secretariat of the Pacific Community (SPC), this third course focuses on the needs of the Greater Mekong Subregion. It emphasizes the significance of strong

rights, good governance and equitable benefits, as well as the need to for effective communication.

### **Building skills**

The course will build the skills of those involved in forest policy development to be able to:

- critically analyze problems and identify solutions;
- identify current cross-sectoral developments affecting people and forests;
- evaluate economic, environmental and social aspects of forest policy options; and
- practice effective communication of solutions, decisions and opportunities to a wide range of stakeholders.

A variety of training methods will be used, including course assignments, group work and practical development of communication skills.

### **Real issues**

Participants will be encouraged to bring “real issues” from their countries and use them as learning tools through facilitated team activities.

### Case studies

Throughout the course, a number of carefully selected case studies will be presented, analyzed and discussed.

### Field trip

A one-day field trip will be organized at the end of Week 1 for participants to observe and discuss a topical issue in the field.

### Guest speakers

Eminent guest speakers will complement the coursework, leading discussions on fundamental and topical issues related to forestry.

### Information materials

Participants be given an outline of reading materials for each session, a list of additional literature on the specific subject, as well as access to the RECOFTC documentation center.

### Topical issues

Discussion will emphasize the current challenges of:

- climate change mitigation;
- forest tenure reforms;
- forest law enforcement and governance;
- the role of forests and forestry in poverty reduction; and
- constraints in financing sustainable forest management.

### Who should participate?

The course is best suited for senior and middle-level forestry officials and civil society

representatives, ages 35 to 50, working on forest policy issues in the Greater Mekong Subregion. To enhance learning opportunities, the course will be limited to a maximum of 20 individuals.

### Asia-Pacific Forest Policy Think Tank

The course is organized and promoted under the umbrella of the Asia-Pacific Forest Policy Think Tank. The Think Tank espouses a variety of activities and approaches for invigorating forest policy processes in the Asia-Pacific region through sharing of knowledge, experience and expertise among countries and institutions.

### What else is important?

When: 8–19 March 2010

Where: RECOFTC Headquarters at the Kasetsart University Campus Bangkok, Thailand

Course fee: US\$2,500

Enrolment deadline: 15 February 2010

For further information please contact:

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### This course was designed through the collaborative efforts of the following organizations:

*RECOFTC – The Center for People and Forests, Asia-Pacific Forestry Network, FAO Regional Office for Asia and the Pacific, the National Forest Programme Facility and the USDA Forest Service*





## ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

### RARE MASS FRUITING IN BRUNEI PEATLANDS IN 2009

Brunei experienced a mass fruiting of its peat lands last year according to the Brunei Deputy Forestry Director, Mahumud Hj Yussof. This natural phenomenon occurs once every 25 years and occurs when trees of different species all bear fruit at the same time. Trees and plants also release their seeds and sprout seedlings at this time. Fruiting is essential to the regeneration of peat swamps, which cover about 60 percent of Brunei's land area. The Brunei Forestry Department intends to collect half of the seedlings from this event to carry out an "enrichment planting" project that will aim to enhance the regeneration of Brunei's peat swamps.

– *The Brunei Times* –

### GREENER STOVES COOK UP HEALTH BENEFITS

A recent study estimates that the introduction of 150 million stoves in India would not only reduce greenhouse gases but also prevent the deaths of 240,000 children under five from acute lower respiratory infection and 1.8 million deaths from lung and heart disease by 2020. The study is the first to quantify the potential health benefits of the widespread introduction of low emission cook-stoves in India. It was further estimated that the cost of introducing the stoves would amount to less than US\$50 every five years per household. The findings of the study were reported to COP15 in December to promote the idea that switching to low-carbon economies can also save lives and reduce medical costs.

– *scidev.net* –

## FAO ASIA-PACIFIC FORESTRY CALENDAR

3 February 2010. Bali, Indonesia. **Workshop on forests and climate change in Asia and the Pacific - Assessing COP 15 and the road ahead.** Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

8-9 March 2010. Bangkok, Thailand. **Third Executive Forest Policy Short Course.** Co-organized with RECOFTC. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

19-23 April 2010. Nadi, Fiji. **South Pacific regional workshop on strategic planning in forestry.** Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

8-11 June 2010. Thimphu, Bhutan. **23rd Session of Asia-Pacific Forestry Commission (APFC) and pre-APFC workshop.** Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

23-28 August 2010. Seoul, Korea. **XXIII IUFRO World Congress.** Contact: Secretariat, IUFRO Headquarters, Mariabrunn (BFW), Hauptstrasse 7, A-1140, Vienna, Austria; E-mail: office@iufro.org

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

- Report of the twenty-second session of the Asia-Pacific Forestry Commission (RAP Publication 2008/06)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04)
- Reaching consensus. Multi-stakeholder processes in forestry: experiences from the Asia-Pacific region (RAP Publication 2007/31)
- Trees and shrubs of the Maldives (RAP Publication 2007/12)
- Coastal protection in the aftermath of the Indian Ocean tsunami: What role for forests and trees? (RAP Publication 2007/07)
- Developing an Asia-Pacific strategy for forest invasive species: The coconut beetle problem – bridging agriculture and forestry (RAP Publication 2007/02)
- The role of coastal forests in the mitigation of tsunami impacts (RAP Publication 2007/01)
- Taking stock: Assessing progress in developing and implementing codes of practice for forest harvesting in ASEAN member countries (RAP Publication 2006/10)
- Mangrove guidebook for Southeast Asia (RAP 2006/07)
- Proceedings of the workshop on forests for poverty reduction: changing role for research, development and training institutions (RAP Publication - 2005/19)
- APFC - The unwelcome guests: Proceedings of the Asia-Pacific Forest Invasive Species Conference (RAP Publication 2005/18)
- Helping forests take cover (RAP Publication 2005/13)
- Elephant care manual for mahouts and camp managers (RAP Publication 2005/10)
- Forest certification in China: latest developments and future strategies (RAP Publication 2005/08)
- Waves of hope – report of the regional coordination workshop on rehabilitation of tsunami-affected forest ecosystems: strategies and new directions (RAP Publication 2005/07)
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- In search of excellence: exemplary forest management in Asia and the Pacific (RAP Publication 2005/02)
- What does it take? The role of incentives in forest plantation development in Asia and the Pacific (RAP Publication 2004/27)
- Forests for poverty reduction: opportunities for Clean Development Mechanism, environmental services and biodiversity (RAP Publication 2004/22)
- Forests for poverty reduction: can community forestry make money? (RAP Publication: 2004/04)
- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
- Bringing back the forests: policies and practices for degraded lands and forests (RAP Publication 2003/14) out of print
- Practical guidelines for the assessment, monitoring and reporting on national level criteria and indicators for sustainable forest management in dry forests in Asia (RAP Publication: 2003/05)
- Giants on our hands: proceedings of the international workshop on the domesticated Asian elephant (RAP Publication: 2002/30)
- Communities in flames: proceedings of an international conference on community involvement in fire management (RAP Publication: 2002/25)
- Applying reduced impact logging to advance sustainable forest management (RAP Publication: 2002/14)
- Trash or treasure? Logging and mill residues in Asia-Pacific (RAP Publication: 2001/16)
- Regional training strategy: supporting the implementation of the Code of Practice for forest harvesting in Asia-Pacific (RAP Publication: 2001/15)
- Forest out of bounds: impacts and effectiveness of logging bans in natural forests in Asia-Pacific: executive summary (RAP Publication: 2001/10)
- Forest out of bounds: impacts and effectiveness of logging bans in natural forests in Asia-Pacific (RAP Publication: 2001/08)
- Trees commonly cultivated in Southeast Asia: an illustrated field guide - 2nd edition (RAP Publication: 1999/13)

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