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Featuring

FOREST NEWS

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FOREST NEWS

TIGERPAPER is dependent upon your free and voluntary contributions in the form of articles, news items, and announcements in the field of wildlife and nature conservation in the region. In order to better serve the needs of our readers please write to us and send in the information you have or let us know if there is any information that you need. We appreciate receiving your letters and make all efforts to respond.

Front cover: Tamil Yeoman Butterfly (*Cirrochroa thais*) life stages (Photo: Nayana Wijetilaka)

Female Tamil yeoman ovipositing on Hydnocarpus venenata leaf (Photo: Nayana Wijetilaka)

LIFE HISTORY OF THE TAMIL YEOMAN BUTTERFLY

by Nayana Wijetilaka

The Tamil yeoman butterfly (*Cirrochroa thais*), first described by Fabricius in 1787, belongs to the family Nymphalidae which comprises 67 species in Sri Lanka, including seven endemics (Perera and Bambaradeniya, 2006.) This is the only member of the genus *Cirrochroa* recorded in Sri Lanka, and the species is restricted to Sri Lanka and India. It is not an uncommon butterfly, and occurs throughout the island up to 1,200 meters above sea level. The Tamil yeoman is a strong butterfly and can fly at considerably great speeds when threatened and disturbed; however, the species can be easily approached while feeding. This species usually flies up to tree canopy level and can also be seen on wet patches on the ground, depicting a large microhabitat selection. Tamil yeoman butterflies breed throughout the year and the known host plants of the caterpillars belong to the family Flacourtiaceae, especially *Hydnocarpus wightiana* (Davidson & Aitken, 1890).

In August 2007, a Tamil yeoman butterfly was observed ovipositing on the underside of a leaf of a Makulu (*Hydnocarpus venenata*) tree near a river bank at Doluwa in Kandy district. This is an endemic plant and grows along water courses in the wet zone of Sri Lanka. The oviposition site was the underside of a young leaf, 1.8 m above ground, and shady. The egg clutch of the species was unusual in form as the ten eggs were attached to each other in the shape of a short beaded string. The Tamil yeoman is the only known butterfly that shows this type of egg-laying pattern in the country (M. van der Poorten, *pers. comm.*). The eggs were originally yellowish green in color, 1.5x1.5 mm in size and cylindrical in shape and showed clear longitudinal ridges, continuing along the egg string.

The unusual egg string of Tamil yeoman (Photo: Nayana Wijetilaka)

The egg clutch was removed with the branch from its original location and kept in a glass container under optimum conditions. The eggs hatched four days after laying, but only three hatchlings emerged. The rest of the eggs may have been unfertilized. The caterpillars were fed on fresh shoots, young leaves and young stems of the plant. Feeding was initiated from the leaf tip and continued towards the leaf base in an irregular manner. Feeding was observed randomly during the day time.

The larvae had six rows of uniformly black, branched, shiny spines, two sets dorsally and two sets each on the lateral sides. Two black characteristic spots were present on the yellow forehead and one on each lateral side of the head. Along the two sides of the body was a brown stripe edged below by a white line.

Tamil yeoman caterpillar, 10 days after hatching (Photo: Nayana Wijetilaka)

By the 8th day after hatching the larvae were 26 mm in length. They stopped feeding by the 10th day and were observed actively moving on the plant, probably searching for a suitable place to pupate. By the 11th day all three caterpillars were observed hanging on small silken pads on the underside of leaves.

Tamil yeoman caterpillar, 11 days after hatching (Photo: Nayana Wijetilaka)

By 12.20 hrs of the same day, one caterpillar had metamorphosed into a bright yellow chrysalis, and the others did the same a few minutes later. Curved spine-like projections depicted the locations where the branched spines were present on the body of the caterpillar.

Tamil yeoman chrysalis after metamorphosis, 11 days after hatching (Photo: Nayana Wijetilaka)

Eventually the chrysalises changed colour to dark brown by the 18th day after hatching.

One week after pupation, three brilliantly colored imagoes emerged on the same day at 15.10 hrs, 15.24 hrs and 15.36 hrs respectively. They remained on the same leaves for nearly one and a half hour until they experienced their first flights.

Newly emerged Tamil yeoman imago, 18 days after hatching (Photo: Nayana Wijetilaka)

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Mrs Hume's Pheasant *Syrmaticus humiae* male (Illustration : Anwaruddin Choudhury)

MRS. HUME'S PHEASANT IN NORTHEASTERN INDIA

by Anwaruddin Choudhury

Introduction

Mrs. Hume's Pheasant (*Syrmaticus humiae*) is a poorly known, but globally threatened bird. It has been listed as "vulnerable" (Birdlife, 2001). A bird of the hills and mountains, it is threatened by habitat loss and hunting. It is thinly distributed in the hill tracts of northeastern India, northern and western Myanmar, southwestern China and northern Thailand (Ali & Ripley, 1983; Fuller & Garson, 2000). Very little current information is available on this species from its entire range (Fuller & Garson, 2000). Whatever information is available is mostly spread out in synoptic works or broader works on birds (Choudhury, 1992, 2000; King *et al.*, 1996; Zheng Guang-mei & Wang Qishan, 1998; Zheng Guang-mei & Zhang Zheng-wang, 1993). Recent surveys in its range in NE India resulted in only a couple of records or no recent reports (Choudhury, 1997, 1998, 2000, 2001; Katju, 1996; Kaul *et al.*, 1996).

A survey was carried out in the states of Nagaland, Manipur and Mizoram in NE India in January 1996. The methods included foot-transects (*c.* 235 km) along the existing trails, paths and roads. Motor vehicles were used to reach the sites and also when surveying the transects along the roads (approx. 2,455, 1,860 and 2,790 km in Nagaland, Manipur and Mizoram respectively). The villagers and forest department officials and staff were also interviewed with the help of colored visuals. To create awareness among villagers, informal meetings with locals were held (Choudhury, 2002).

Distribution and habitat

In Nagaland, Mrs. Hume's Pheasant is recorded mainly from Phek and Tuensang districts. There have also been reports from Mon district. The bird might still occur in Kohima district (extreme eastern

Fig. 1. Distribution of Mrs Hume's Pheasant in Nagaland, Manipur and Mizoram

and southern areas), and also possibly in Zunheboto district. All the localities were new for this species, as the map in Birdlife (2001) showed only a single site, vaguely referred to as Naga Hills and was not recent (1950-79). In fact, there are no recent records from the state. From the present survey, it appears that the species is still widely distributed in the hills of southern and eastern Nagaland. In Manipur it still occurs in Ukhrul, Senapati and Churachandpur districts, while there have been unconfirmed reports from Chandel district. Except for Kamjong in Ukhrul and Churachandpur, other sites were already known. From the present survey, it appears that the species is still widely distributed in the hills of north-eastern Manipur covering Ukhrul district and north-eastern areas of Senapati district. It is very rare in Barail Range and sparsely distributed in the higher hills of Churachandpur and Chandel districts. In Tamenglong district, the villagers along the Barak river have never seen it, which corroborates Higgins (1933-34) who maintained that it occurred only up to the Irang river valley, a tributary of the Barak, where a number were shot by one J. Needham in 1918-19. Their continued occurrence in areas such as Karong and Phailengkot in Senapati district of Manipur is doubtful in view of the complete destruction of the habitat and the presence of a fairly dense human population. A few might still occur in the higher areas of the range that separates Tamenglong and Senapati districts.

In Mizoram, it occurs mainly in Champhai and Saiha districts and possibly in Lunglei and Serchhip districts. Except for Murlen and Phawngpui, the others were new localities for this species as the map in Birdlife (2001) showed only three sites, of which one, i.e., Phaileng, was wrongly listed. It was actually Phailenkot, located in Manipur. From the present survey, it appears that the species is still widely distributed in the higher hills of eastern Mizoram. There are no reports or records from the western low hilly tracts. However, unlike Nagaland and north-eastern Manipur, the distribution here is discontinuous, with only the hilltop areas being used by the birds. Blue Mountains or Phawngpui National Park (93°01'E) is the known westernmost locality for the species.

In Arunachal Pradesh, its general distribution indicates that it should occur in Patkai Range and Mishmi Hills (eastern areas). However, there is only one report, which looked authentic, from Namdapha National Park (Robson, 1999).

The habitat in the study areas where the bird occurs is hilly and mountainous. The terrain is rugged but also has gentle slopes. The vegetation types where the birds are found include secondary and degraded jungle with scattered trees and grass, tropical evergreen forest, subtropical broadleaf forest, and coniferous pine (*Pinus kesiya*) forest with good grass cover on the ground. In Mizoram, the habitat is largely secondary evergreen forest with grass. The species occurs from tropical wet evergreen rain forest to subtropical broadleaf. Because of the lower latitude, the tropical forest occurs up to 1,500 m elevation in Mizoram, which is comparable to 1,200 m in Nagaland. In the tropical rain forests, it haunts the edges of abandoned *jhum* (slash-and-burn cultivation) sites (e.g., between Lamzawl and Lengteng). In Nagaland, the species has been recorded from *c.* 1,000 to 2,200 m elevation and in Manipur from *c.* 1,000 to 2,700 m (at Shiroi). In Saramati, it might also occur at higher elevations. In Mizoram, it occurs from 1,000 to > 2,100 m asl.

The total potential habitat of Mrs. Hume's Pheasant in Nagaland, Manipur and Mizoram is approximately 1,600 km², 1,700 km² and 1,300 km² respectively (calculated from the maps and broad field verification). Since they are not necessarily inhabitants of dense forest, the secondary and light forests with grass and without any human habitation nearby were also considered as part of the main habitat. In Nagaland, Phek and Tuensang districts have significant potential habitat of 700 km² and 800 km² respectively. In Manipur, Ukhrul and Senapati districts have the most habitat with 900 km² and 500 km² respectively, while in Mizoram, Champhai district alone accounts for about 61% (about 800 km²) of the total potential habitat.

Status and abundance

It is extremely difficult to make any population estimate of a bird such as *humiae*. Even a guesstimate is impossible with the existing

information. Moreover, due to shooting and snaring, the species is generally shy all over its range. However, after visiting the field sites and talking to villagers – including hunters, many of whom were involved in snaring – the following three categories of "abundance assessment" were identified: 1) *not uncommon* (where it is regularly snared, especially in winter and where the majority of the villagers interviewed could recognize it from colored visuals); 2) *rare* (where it is occasionally snared and where the majority of the villagers interviewed could not recognize it from colored visuals); and lastly 3) *very rare* (where it is very rarely snared, and where only a few villagers interviewed could recognize it from colored visuals).

Areas in the *not uncommon* category include south-eastern Nagaland, north-eastern Manipur and north-eastern Mizoram. In Nagaland, such areas were located near Chizami, Luzaphemi, Thewaty, Lephori and Reguri, all in Phek district. In Manipur, such areas were found in Ukhrul district, around Jessami, Shiroi, Kamjong and the range between Jessami and Shiroi, and in the north-eastern areas of Senapati district. In Mizoram, it occurs around Murlen and Lengteng, including Ngur in Champhai district.

Areas in the *rare* category include southern and eastern Nagaland, northern Manipur and pockets in eastern Mizoram. In Nagaland, such areas are located near Meluri and Letsam in Phek district and Pungro in Tuensang district. In Manipur it is found in Senapati district, while in Mizoram, it mainly occurs in the Phawngpui area of Saiha district.

Areas in the *very rare* category include elsewhere in Nagaland, Tamenglong, Churachandpur and Chandel districts in Manipur, and other parts of Mizoram.

The global population has been estimated at "a few thousand individuals," and the subspecies *humiae* may number as few as 1,000 (McGowan & Garson, 1995). Bildlife (2001) mentioned that the species' range is centered in some of the most remote and inaccessible highlands of Asia, and any estimate of its true population in Yunnan, Myanmar and the Naga hills is guesswork at best. Studies in China give some idea about possible density, at least in areas where they were *not uncommon*. Li Xiangtao (1996) had estimated densities that ranged from 10 to 33 individuals per km^2 in coniferous-broadleaf forest, with 22 per km^2 in coniferous plantations in its typical habitats in western Guangxi. The minimum was 8.9 birds per km^2, estimated during the surveys conducted at Jinzhongshan Forestry Station in April and May 1987–1988 (Lu Taichun, 1991). Even if we consider only 10% (or 460 km^2) of the potential habitat in NE India as their "best" areas, then there may be at least 4,000 birds (taking the lowest density of the Chinese studies, i.e., 8.9 per km^2), with some more in other areas.

Conservation issues

Habitat loss

Loss of habitat is a major threat faced by *S. humiae*. However, the destruction of dense forest may not have a significant impact on the status of this species, although it indicates the magnitude of the overall loss of habitat. Unlike Blyth's Tragopan (*Tragopan blythii*), which is sympatric with Mrs. Hume's Pheasant in some places, the latter suffers less from such destruction. In fact, at places such as Chizami and Ziphu in Nagaland where earlier surveys (Ripley 1952) could not get any information of the bird, this study was able to get specimen records.

Birdlife (2001) has rightly pointed out that "it may be that intact forest comprises an essential habitat for part of the annual cycle, or in part of the species' range; it would be injudicious to discount this possibility. In any case, the species' preference for a patchwork of habitats suggests that undue degradation of habitat will be deleterious."

The destruction of forest comes about mainly through felling of trees and *jhum* (slash-and-burn cultivation), and also unplanned clearance for human settlement, encroachment and developmental activities such as construction of roads. Closed forest (canopy cover 40% and above) in Nagaland comprised 42.8% of the total geographical area in 1972-1975. By 1980-1982, this had dropped to only 29.8% (NRSA, 1982), which was further reduced to 21% by 1995 (FSI,

1997). Closed forest in Manipur was 50.5% of the total geographical area in 1980-82 (NRSA, 1982). This was reduced rather alarmingly to only 22.1% in 1993-95 (FSI, 1997). Closed forest in Mizoram was 62.6% of the total geographical area in 1972-75. By 1980-82, it was reduced to 52.9% (NRSA, 1982). It further dropped down to only 20.6% in 1995 (FSI, 1997). Today, it is less than that.

During winter, besides the *jhum* fires, which often destroy the ground cover over large areas even outside the marked area of *jhum*, accidental and deliberate fires from other sources have also destroyed large areas, which severely affects species such as Mrs. Hume's Pheasant. Often such fires are lit to drive animals towards a clearing, where they are then shot from vantage positions.

The ultimate cause of habitat destruction is, however, the very rapid growth of the human population. Since bulk of the rural population practice *jhum* as their main occupation, large-scale destruction of the natural habitat seems inevitable. Moreover, new hamlets are coming up all over. Loss of habitat also results in fragmentation and is more conspicuous in Mizoram, where the remaining range of Hume's Pheasant is located in isolated pockets.

Poaching

Trapping with crude snares and hunting with guns are the major threats to Mrs. Hume's Pheasant in NE India. In fact, snaring is the most common practice as the trapper need not pursue the birds but only needs to set snares in known habitats. There were also instances when the trapped birds were eaten by unknown predators before being collected by the trapper. This would perhaps account for a large number of birds are being lost every year. The trappers, however, did not set up snares specifically looking for Mrs. Hume's Pheasant, but for galliformes in general. All the tribes inhabiting the hills of Nagaland, Manipur and Mizoram kill birds for the cooking pot. The informal meetings with local villagers regarding the protection of this rare bird were successful to some extent.

Other threats

Trade in Mrs. Hume's Pheasant is insignificant and is mostly for local consumption. Developmental activities, especially road construction, are making hitherto inaccessible sites much more accessible to trappers and loggers, and also encourage the growth of new settlements. Insurgency is a long-standing problem and the entire range of Mrs. Hume's Pheasant in Nagaland, Manipur and Mizoram is affected. Insurgency by underground guerrillas has been a problem in Nagaland and Mizoram since the 1960s, although after the signing of the Mizo Accord in the late 1980s, there is now no major insurgency in Mizoram. But in Manipur it is still a major presence. However, while the insurgency has not directly affected Mrs. Hume's Pheasant, it made carrying out the survey more difficult. While the extremists themselves do not harm wildlife in most cases, the unscrupulous elements take advantage of the situation by resorting to tree felling and poaching.

Discussion

This was the first ever survey aimed at Mrs. Hume's Pheasant in India, and has provided important baseline information for planning detailed surveys in the future. The survey revealed that the species is still well distributed in Nagaland, Manipur and Mizoram and discovered 20 new sites for this species with an additional 24 unconfirmed sites, totaling 44. There were only eight sites mapped in the Birdlife (2001) study. Mrs Hume's Pheasant has been accorded the highest protection under the Schedule I of India's Wild Life (Protection) Act 1972. Most villagers, however, are not aware of this legal status. Even in the protected areas, enforcement is inadequate. At present, there are only five protected areas in the entire range of Mrs. Hume's Pheasant in NE India. Habitat loss due to *jhum*, tree felling and fires, along with snaring, were the main threats. The Saramati area, an important biodiversity spot in the region, has been covered by an ornithological/ wildlife survey for the first time. At the top of Saramati is the highest peak in India, south of the Himalayas.

Recommendations

- New protected areas should be created in Saramati-Fakim (500 km²), Mt Ziphu (50 km²) in Nagaland; Shiroi (50 km²) and Anko Range (400 km²) in Manipur).
- Small sanctuaries (< 10 km²) with support from local communities, e.g., Khonoma Tragopan Sanctuary in Nagaland, should be established near Chizami-Luzaphemi and Reguri-Lephori in Nagaland, near Kamjong and Jessami in Manipur, and near Ngur, North Diltlang and Artlang in Mizoram.
- There should be an extension of existing protected areas, especially Murlen, Lengteng and Phawngpui in Mizoram.
- Further surveys, population estimates and monitoring should be carried out.
- Poaching needs to be controlled.
- Adequate protection measures in existing sanctuaries and parks should be set up.
- *Jhum* and fires should be controlled.
- Build up the awareness and motivation of fringe villagers. Since Mrs. Hume's Pheasant is the State Bird of both Manipur and Mizoram, motivation should not be difficult.
- Eco-tourism should be encouraged in a big way.
- The wildlife staff should be provided with better infrastructural facilities.
- Research on the ecology and behavior of Mrs. Hume's Pheasant should also be carried out to know its natural history and also for better conservation action.
- Take up massive population (human) control measures in the fringe areas.

Considering the increased literacy with emphasis on the English medium and strong traditional social values in these areas, any awareness campaign should be smoother in comparison to many other parts of India.

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Table 1: Number of total sites and new sites of *Syrmaticus humiae* recorded during the survey

State	Number of sites in Birdlife (2001)	Number of sites recorded in this study			Number of **new sites** recorded in this study		
		Confirmed	Unconfirmed	Total	Confirmed	Unconfirmed	Total
Nagaland	1	10	4	14	10	4	14
Manipur	4	7	8	15	3	8	11
Mizoram	3*	9	12	21	7	12	19
Total	8	26	24	50	20	24	44

**One site is actually in Manipur and wrongly shown in Mizoram in Birdlife (2001).*
For district by district details, see Choudhury (2002).

TRANSLOCATION OF URBAN RHESUS MONKEYS (*Macaca mulatta*) OF MUBARAK MANDI JAMMU TO FOREST AREAS OF NAGROT

by Poonam Sambyal, Sanjeev Kumar and D.N. Sahi

Introduction

Translocation involves the relocation of wild animals from one part of their natural distribution to another. It may be done for a variety of purposes, including conservation of rare species in threatened habitats, public education/tourism, research, alleviation of crop raiding and reduction of excessive populations (Caldecott and Kavanagh, 1983; Konstant and Mittermeier, 1982). So far, attempts to translocate nonhuman primate groups have had varied success (Yeager and Silver, 1999). Successful translocations of nonhuman primates have been reported by Strum and Southwick (1986), Malik and Johnson (1991), Southwick *et al*. (1998) and Struhsaker and Siex (1998).

Translocating individuals from a particular area to a suitable new site has been found to be the best non-destructive control measure for the rhesus monkey in India (Southwick *et al*., 1984; Forthman-Quick, 1986; Else, 1991).

There are over 0.3 million rhesus monkeys in Northern India (Malik, 1992). Approximately 48.5% of these are living in human habitation areas (Southwick and Siddiqi, 1994). The inordinate growth in populations of such monkeys in recent years has led to an unhealthy competition for space and food between man and monkey.

Rhesus monkeys in urban areas frequently damage or destroy property such as household goods, cars, etc. This increase in the nuisance activities of rhesus monkeys has had a detrimental effect on the traditional bond that exists between people and monkeys in India (Southwick and Siddiqi, 1998).

In Jammu, rhesus monkeys thrive in diverse ecological niches. They live in old forts, temples, villages and some urban areas of Jammu city. They also inhabit subtropical scrub forest and Chir-pine forest at Patnitop (Sahi and Sharma, 2004). In the present study it was found that the rhesus monkeys inhabiting urban areas of Mubarak Mandi of Jammu District were creating social problems such as stealing clothes and edible items. To overcome this problem a program for the translocation of urban rhesus monkeys was carried out by the Department of Wildlife of Jammu in collaboration with the Heritage Society of Jammu. In this paper an attempt has been made to describe and assess the translocation of 431 rhesus monkeys from Mubarak Mandi of Jammu District to the forest areas of Nagrota.

Study area

Jammu lies in the southern part of Jammu and Kashmir State, on alluvial plains and the foothills of the Shivalik mountain range. Geographically, Jammu district is situated between 74°19'E to 75°20'E longitudes and 32°27'N to 33°50' N latitudes at altitudes ranging from 275 m - 410 m above mean sea level.

Nandini is a small village located 26 km north of Jammu on the Jammu-Srinagar National Highway, at an approximate elevation of 410 m. On both sides of highway, there is a thick semi-evergreen forest of *Pinus roxburgii* and some broad-leaved trees such as *Mallotas phillipensis, Butea monosperma, Grewia optiva, Dalbergia sisso* and some shrubs.

Materials and methods

The program was carried out from 22 October - 10 November 2008. During the course of this project, monkeys were baited, trapped and

released. Trapping within the Mubarak Mandi area took place from early morning (6 a.m.) to sunset (5:30 p.m.). Attempts were made to capture as many monkeys as possible.

Monkeys were captured using a portable iron trapping cage (measuring 2x2x2m), with a heavy sliding door that could be operated from a distance using a rope. The operator would hide in a wooden box covered with a sac that had a viewing hole through which monkeys could be seen. Bananas and black grams (beans) were used as bait and spread inside the cage with the sliding door kept open. The bananas helped to attract the monkeys towards the cage. The trappers would imitate monkey calls, which the troop usually responded to positively. As the monkeys entered the cage they started picking up the grams. Because of the small size of the grams, the monkeys had to spend more time inside the cage, thus providing enough opportunity to shut the door by releasing the pulley.

The trapped monkeys were then transferred to a holding cage (1x1x1m) and were subsequently transported to suitable, pre-selected forest sites in Nagrota. To avoid any confrontations, release operations were carried out during the late evening. Immediately after completion of the translocation program, all of the release sites were visited to determine whether the monkeys had remained in the area. In total, six persons were involved in carrying out the trapping operations.

Photographs were taken using a Canon T-70 camera fitted with a 300mm zoom lens. A video was also made to record the process of monkey trapping.

Results and discussions

The large scale influx of rhesus monkeys to urban areas can possibly be attributed to the shrinkage and fragmentation of natural forest due to various human activities. Expansions in urbanization and industrialization have forced rhesus monkeys to shift from their natural wildlife habitats to cities, villages, and towns, resulting in increased man-monkey conflicts. In India, 86% of the total rhesus monkey populations are residing near human habitations (Southwick and Siddiqi, 1994). The large number of rhesus monkeys is a result of the people's religious and traditional attachment to monkeys, the absence of natural predators within inhabited areas, and a ban on the export of primates from India since 1978 (Southwick and Siddiqi, 1988). In Jammu, rhesus monkeys are observed to thrive in diverse ecological niches. They live in old forts, temples, villages and some urban areas of Jammu city and also inhabit subtropical scrub forest and Chir-pine forest at Patnitop (Sahi and Sharma, 2004).

During 20 days of trapping, 431 rhesus monkeys were trapped and translocated to the forest areas. A total of 180 males, 214 females and 34 young ones were trapped. These trapped monkeys were then released into the forest areas of Nagrota. Five sites were selected as potential translocation sites, viz. Akshar Kund, Kala Kopad, Reede Wala Nullah, Garane Wali Drabadi and Joodian Wala Nullah. Imam and Malik (1997) recorded 40 individuals being removed from the National Zoological Park in New Delhi and released in Tuglaqabad Fort (New Delhi). Imam *et al.* (2002) reported that 600 rhesus monkeys were captured from Vrindaban (Mathura District) and released in different forest patches. In August 1989, a troop of 21 rhesus monkeys was translocated from Tuglaqabad Air Force Station (New Delhi) to a rural area of Meethapur about 10 km away (Malik and Johnson, 1989). In 1988, a subgroup of 20 rhesus monkeys trapped from a mangrove in Chatari-do-raha was translocated to a canal bank forest patch in Sumera in Aligarh District (Southwick and Siddiqi, 1994).

The absence of a proper management plan for rhesus monkeys has led to an increase in man-monkey conflicts, which will continue to escalate in the future. Southwick and Siddiqi (1988) inferred that an increase in the nuisance activities of rhesus monkeys has had a detrimental effect on the traditional bond that exists between people and monkeys in India.

During the brief post-translocation study, it was verified that all troops had remained at their release sites. The monkeys were found to be behaving normally in their new locations.

It was also observed that translocating the monkeys brought welcome relief from monkey

problems to the people of Mubarak Mandi of Jammu District. Thus, the present study concluded that the translocation of rhesus monkeys to the forest areas was a successful technique for their rehabilitation and also substantially reduced or stopped the man-monkey conflicts.

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SPECIES DIVERSITY AND DISTRIBUTION OF BATS IN PANCHASE REGION OF NEPAL

by Achyut Aryal and Sanat Kumar Dhungel

Introduction

Bats are the second most diverse order of mammals worldwide, with close to 1,000 described species (Koopman, 1993). Although they are one of the largest groups of mammals in overall abundance, with the exception of man and possibly rodents (Duplaix & Simon, 1977), they remain poorly studied and misunderstood in most parts of the world. They are relatively inconspicuous only because they are active by night, hidden by day and wary of human contact (Rojan, 2000).

The Order Chiroptera is comprised of 17 families, approximately 200 genera (Shrestha, 1997), and close to 1,000 recognized species throughout the world (Koopman, 1993). Some 50 species are known to live and breed in Nepal (Walker and Molur, 2003). Bats are systematically classified into two suborders: Megachiropterans are the Old World fruit bats and Microchiropterans are predominately insectivorous bats (Koopman, 1993). Megachiroptera contains a single family (Pteropodidae), 42 genera, and 166 species, which are mainly comprised of frugivorous bats. Microchiroptera consists of 16 families, 135 genera, and 759 species. Although many microchiropterans feed on non-insect prey, all members of Microchiroptera probably originated from an insectivorous ancestor. It is worth mentioning that the taxonomy of Microchiroptera is constantly being revised, as new species are discovered and described.

Bats have been reported from almost all the geographical areas of the world, except for the Arctic, Antarctic, extreme desert areas, and a few isolated oceanic islands (Mickelburgh *et al*., 1992; Hustson *et al*., 2001). Bats are distributed mainly along the tropical belt of both the "Old" and "New" World, and it was probably within the tropics that they developed their present variety of species and forms. Hence, the greatest diversity of bat species is found near the equator in the warm, tropical climates. A few families have been successful in extending their ranges into the northern and southern temperate zones. However, the number of species living in these temperate zones decreases as the latitude increases.

Bats continue to be among the most misunderstood and feared animals in human society. Many people still view bats as sinister, eerie and demonic creatures. Unfortunately, this reputation has caused bats harm and ill-treatment throughout the world. This superfluous fear and superstition has contributed to the almost total destruction of several bat species, and has threatened the existence of many others (Phuyal, 2005).

Bats are natural insect predators and plant pollinators, and have been very beneficial to the human economy and the natural environment on which we depend. It has been estimated that a colony of just 150 Big Brown bats (*Eptesicus fuscus*) can eat enough cucumber beetles each summer to protect local farmers from 33 million root worms. These insect pests cost the United States government billions of dollars annually (Bat Conservation International). Bats also devour mosquitoes in our own backyards, and help keep vast numbers of night flying insects in balance. Additionally, bat droppings (guano) in caves support whole ecosystems of unique organisms, including bacteria that are useful in detoxifying wastes, improving detergents and producing gasohol and antibiotics. Consequently, bats are extremely important for the economies of developing countries like Nepal.

Why bat conservation in Panchase?

The Government of Nepal has established wildlife conservation areas to protect endangered flora and fauna. These flora and fauna are being depleted

day by day due to over exploitation, pollution, habitat destruction, poaching and human and livestock pressure in their habitats (MDO/UNDP, 2006). The Government of Nepal is not able to protect these animals outside the protected areas due to insufficient manpower and budget and the present country situation. Panchase is one of the most important biodiversity hotspots in Nepal and a proposed protected area. Panchase forest provides significant habitat for different flora and fauna, and especially bats. Recently, UNDP/GEF has been carrying out research on the flora and its conservation, but there is a lack of data regarding the wildlife of the area. There are no activities focusing on bat conservation; however, Panchase is a potentially important site for bats. Therefore, this study was conducted to determine the present status of bats and their distribution area and the local people's perception towards the conservation of bats in the Panchase area. Approximately 36,759 populations (Gurung, Brahmin/Chhetri, Bishwakarma, Nepali, Pariyar and some Newar and Magar) are dependent on Panchase forest and the surrounding area for firewood, timber and livestock grazing; some illegal poaching also occurs. These activities directly affect wildlife conservation. In the case of bats, the people do not consider them to be of value or benefit. The habitat of bats and their food plants are subject to deforestation by the local people for fuelwood and timber, and many of the caves in the Panchase area used by livestock herders are habitats for bats. They use fire to drive the bats from the caves and then make shelters for their livestock and themselves (MDO/UNDP, 2006).

The present study was able to indentify the present bat species diversity and distribution in the Panchase region of Nepal, which will help to support future management of those species in the region.

Study area

Panchase forest and region

Panchase forest is located at the nexus of Kaski, Parbat and Syangja districts, in the western region of Nepal. The forest is a biodiversity hotspot and is a national forest, and thus owned by the Government of Nepal. It is managed by the District Forest Office and the Ministry of Forestry and Soil Conservation (MFSC). Panchase forest is bordered by ten Village Development Committees (VDCs) spread across Kaski, Parbat and Syangja Districts.

The total area of Panchase forest is 45.93 km^2. It is comprised of sub-tropical and temperate mixed evergreen forest, with altitudes ranging from 1,450 m to 2,517 m. The region is very rich in plant diversity. Red rhododendron and orchids are the major blossoming plants, with 400 species of orchids occurring in Nepal, out of which 112 species are found in the Panchase area, including 3 species found nowhere else in the world. The forest near the settlement and the lower part of Panchase forest has become a community forest as per the conservation policy. At present, 68.69% of the forest is protected forest and the rest is community forest. There are two patches of Panchase protected forest – one around the peak and the other in Pumdibhumdi. The protected forest located in Pumdibhumdi will be converted to community forest.

Methodology

Distribution area of bats roosting in the Panchase region

The distribution area was identified on the basis of direct observation, surveys of caves, and interviews with local herders and other knowledgeable persons. These preliminary information will be vital for locating potential bat roosting areas, which will be visited later to confirm the presence of bats. In addition, the local people in the area were interviewed to confirm any particular bat roosts in their area and their attitude towards bats. Confirmed roosting localities were recorded using a Global Positioning System (GPS) unit. In the case of inaccessible roosts, a GPS location was taken at the closest accessible point to the bat roost.

GIS Distribution Map

Based on GPS points and a topographical map of the project area, bat distribution maps were prepared. From the data collected during field visit, a bat distribution map of Panchase region was

created using Arc GIS 9.3.

Results and discussion

Bat species and distribution

Trees roosting bats were distributed in all VDCs of the Panchase region; every village in the Panchase region has recorded bats around their houses in the late evening, especially in the summer time. Five caves were identified but only three were reported to be occupied by bats. Others caves didn't have bats because they had been driven away by fires lit by livestock herders or other parties seeking shelter. Panchase forest harbors more tree roosting bats than cave roosting bats. Bats commonly enter homes and livestock sheds, and there are frequent reports of bats chewing the horns of young buffaloes and cows, which is why the local people don't like bats.

Fig. 1: Bat Distribution in Panchase region: GIS Map

(continued on p.17)

(continued from p.16)

Table 1: Bat distribution - main potential areas

S.N.	Place	V.D.C.	Type of Places
1	Alapeshor Gufa	Thuli Pokhari- Parbat	Cave
2	Malangdi River	Pipal Gachi-Parbat	Canal of Malangdi River
3	Phalebans	Sanakha Pokhari-9, Parbat	Reservoir of Phalebans canal
4	Tuni Khola Kalidaha	Wangsing-9- Syangja	Den/cave
5	Dhundure Khola	Wangsing-2- Syangja	
6	Tareveer CF	Arther Dandakharkha-6- Syangja	Cave
7	Rapu Ward-4	Pamja Deurali- Parbat	Banana leaf
8	Dableswara-5	Arther Dandakharkha- Parbat	Bamboo clump, Prunus tree
9	Bharuwaswara-5	Arther Dandakharkha-Parbat	Bamboo clump
10	Tareja-4	Bange Phadke-syangja	Ceiling of livestock shed
11.	Harpan	Bhadaure Tamagi, Kaski	Cave
12.	Tamagi Village	Bhadaure Tamagi, Kaski	Cliff/cave
13.	Bhadaure Deurali	Bhadarue Tamagi, Kaski	Roosting in tree

Because of the different microclimates in the Panchase region, there is high diversity of bats. During the field surveys eight species of bats were found in the Panchase region, and it was assumed that this only accounted for 10% of the overall species to be found in the Panchase region, so further studies on species identification should be priority research for this region.

Table 2: Bats species diversity in Panchase Region

Species	Scientific name
Asiatic Greater Yellow House Bat	***Scotophilus heathii***
Fulvous Fruit Bat	***Rousettus leschenaulti***
Himalayan Whiskered Bat	***Myotis siligorensis***
Horseshoe Bat	***Rhinolophus pusillus***
Andersen's Leaf-nosed Bat	***Hipposideros pomona***
Nepalese Whiskered Bat	***Myotis muricola***
Short-Nosed Fruit Bat	***Cynopterus sphinx***
Hodgson's Bat	***Myotis formosus***

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Fig. 2: Rhinolophus pusillus in Panchase cave

ETHNO-MEDICINAL PLANT KNOWLEDGE OF A TRADITIONAL HEALER IN SHERSHONG, BHUTAN

by Phurba Lhendup

Introduction

From time immemorial, local people have built up an intimate knowledge of many aspects of their own environments, and adapted their daily lives accordingly. It is generally believed that indigenous people have an impressive knowledge of useful plant species and that this knowledge reflects the plant wealth of their living environment. Traditionally, many rural communities have relied upon the spiritual and practical skills of the traditional medical practitioners, whose knowledge of plant species and their ecology is invaluable. Some Bhutanese people have more confidence in local healers than in modern medicine. But cultural and economic transitions associated with globalization threaten such knowledge – which could be of enormous benefit to the global community, e.g., the use of medicinal plants. However, there has been reawakened scientific interest in the fundamental role that plants play in many cultures, including medicinal purposes. Therefore, documenting the indigenous knowledge through ethnobotanical studies to make people aware of the importance of biological resources is one of the important strategies for conservation and sustainable utilization.

It is not a new revelation that natural resources are presently being depleted in the natural forests due to annual and non-sustainable collection of various species on an *ad hoc* basis. New settlements and the expansion of land under cultivation also threaten the survival of natural forests. At the same time, it is feared that the traditional knowledge on the use of medicinal plants and the techniques of making many herbal formulations might have declined over the years due to lack of awareness and the spread of conventional medicines. Without the knowledge of medicinal plant species and their method of utilization, it will not be possible to implement sustainable use and unless they are studied, it is only a matter of time before some of these plants become extinct.

Realizing the growing importance of plant-based formulations, this study aims to document the medicinal plants, their uses, and the various formulations in Shershong village, which falls under Bumdeling Wildlife Sanctuary.

The objectives of the study were as follows:

- Identification of medicinal plants and derived products used for treatment of various diseases and their uses in the local traditional medicine.
- To study harvesting techniques and time of harvest
- Find out the sustainability of the present use and collection methods of potentially threatened species in the study area.
- Compare the use of identified plants with other studies
- Documentation of the drug formulation process from the plants.

Study area

The study was conducted in August 2008 in Shershong village, which falls under the jurisdiction of the Bumdeling Wildlife Sanctuary (BWS), Trashi Yangtshe, in eastern Bhutan. BWS is one of the 10 protected areas in Bhutan gazetted in the year 1994. BWS aims to protect high and medium altitude ecozones/habitats, increase knowledge of nature conservation, protect the cultural heritage and improve the living standards of the communities living in and around the Sanctuary area. It covers an area of 1,487 km^2. The altitude ranges from 1,500 to 6,450 m above sea level, with a warm temperate climate in the south and an alpine climate in the mountainous region in the north. Due to a wide range of altitudes and climatic conditions, there is a great ecological diversity, ranging from sub tropical forest, through extensive

temperate broad-leaved and coniferous forest and alpine scrub and meadows to barren rocks, scree slopes and permanent snow and ice. Unlike most protected areas around the world, Bhutan's protected areas have human settlements inside them. The local communities are considered part and parcel of the parks. According to the latest BWS socio-economic survey, there are 867 people living inside the park who rely on the park's biological resources for their daily subsistence.

Methods

The research was based on semi-structured informal interviews with the healer. The questions included aspects such as the source and extent of his knowledge on the use of plant species, harvesting techniques, source of plants used, various health conditions treated, etc. The healer was requested to accompany the researchers in the field to indicate specimens of the plants he uses, which were then collected. A standard method was followed with regard to the collection of plant materials, drying, mounting, preparation and preservation of plant specimens. Voucher specimens of medicinal plants were identified in the field referring to the **Flora of Bhutan** (Grierson and Long, 2001), **Flowers of the Himalayas** (Polunin and Stanton, 1984) and **Weeds of Bhutan** (Parker, 1992). Specimens were collected in duplicate and prepared. Photographic recordings of the plant species and derived products were also made.

Results

The information presented in this paper was gathered from the sole recognized professional healer in the region, Ap Minjur, a 73-year-old man from Sonekhar village, who started practicing the art when he was 11 years old. Like most of the community members, Ap Minjur is a subsistence farmer who lives with his wife, son, daughter-in-law and two grandchildren. The family is the only one in the area practicing traditional healing. The medicinal knowledge and practices are passed down entirely by oral instructions based on personal experience. According to Ap Minjure, he learned the art from his late father. It has been reported that his son is now practicing the art. On average, the healer treats between 20-40 patients annually without charge, but most patients offer him gifts in the form of edible commodities. The healer also uses magical and ritual procedures to treat his patients.

Plant species and parts used

Local herbs and other plant resources found in the area are the principal source of the medicines prescribed by the traditional healers. The present investigation comprises only nine species of plants belonging to eight families. It was assumed that the healer was reluctant to disclose all the plant species he uses, because other local people reported that healer uses at least 20-30 species of plants. This might be due to the general insecurity surrounding this fringe activity and the healer being afraid that his knowledge will be stolen from him. Most of the plant species are found in open grassland near cultivated fields. A few of them occur in the forest. One species, *Capscicum annuum*, is widely used in curries. The parts of the plant species used include leaves, roots, the whole plant, fruit and latex, but the most commonly used plant parts are leaves. Table 1 shows a list of plant

Table 1. Plants species and parts used in tradition medicine

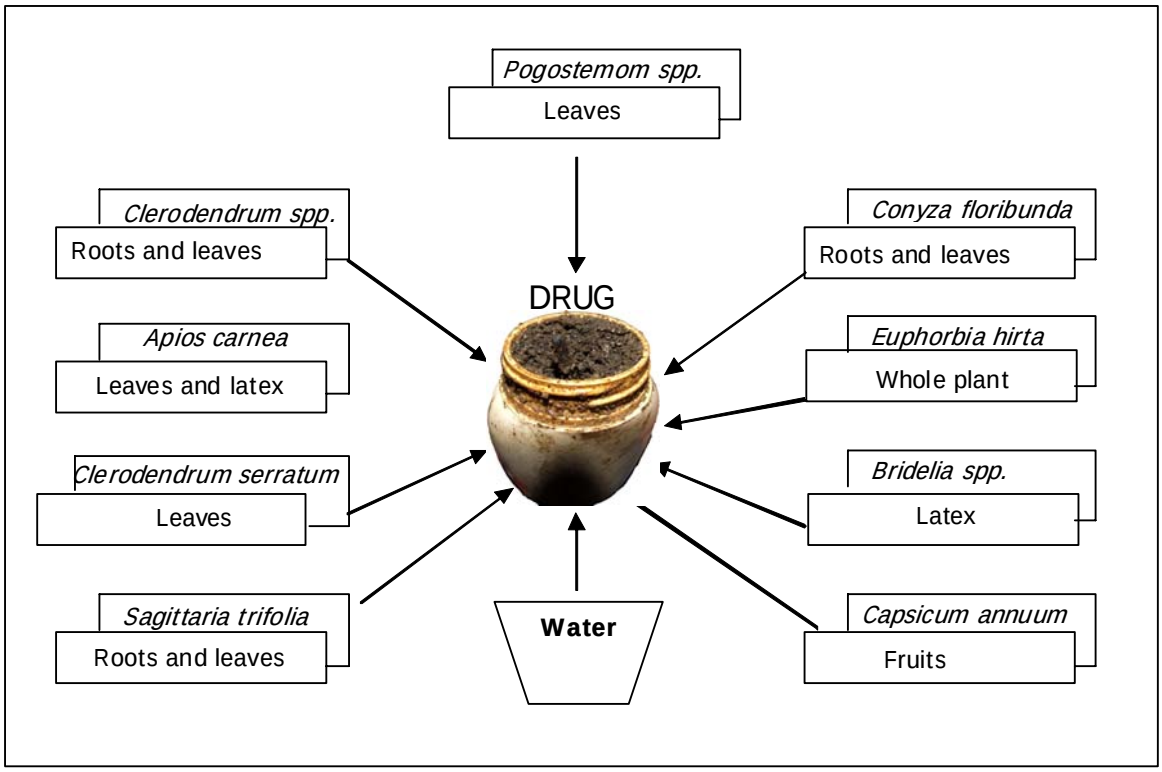
Botanical name	Family	Habit	Parts used
Pogostemom spp	*Labiatae*	Herb	Leaves
Clerodendrum spp.	*Verbenaceae*	Shrub	Leaves
Conyza floribunda	*Compositae*	Herb	Roots and leaves
Apios carnea	*Papilionoideae*	Climbing herb	Leaves and latex
Sagittaria trifolia	*Alismataceae*	Herb	Roots and leaves
Clerodendrum serratum	*Verbenaceae*	Shrub	Leaves
Euphorbia hirta	*Euphorbiaceae*	Herb	Whole plant
Bridelia spp.	*Myrsinaceae*	Giant climber	Latex
Capscicum annuum	*Solanaceae*	Cultivated herb	Fruits

species and their parts used. Some species, such as *Conyza floribunda* and *Euphorbia hirta*, are considered as weeds in Bhutan (Parker, 1992)

Method of preparation and medical use

Medicines are prescribed in two ways: as a single drug or in a mixture with other ingredients. Leaves of *Pogostemom spp, Sagittaria trifolia, Conyza floribunda, Apios carnea, Clerodendrum serratum* and *Euphorbia hirta*, either individually or mixed, are wrapped in banana leaves and heated in hot ash in an oven. Then it is wrapped in clean cloth and used as a hot patch to cure joint pains, wounds, body aches and swellings. The mixed ingredient form of drug consists of powdered leaves, roots and fruits mixed with latex and water. Equal amounts of powder from each species are used, depending on the amount of drug needed. The mixture is not changed depending on the person, but the dose is changed according to the age of the patient and severity of the disease. The drug is taken orally or applied to the affected body part based on the recommendation of the healer. According to the healer, the drugs are used to treat dermatological (skin) problems, gastrointestinal disorders, generalized body aches, uro-genital disorders and bone fractures. Plant parts from different species used to prepare single drugs are presented in Figure 1.

Figure 1: Ingredients for drug from different plant parts



Based on literature reviews, a few of the plants are also being used in other countries for medical purposes. For example, in Tongo Village in the western province of Cameroon, *Conyza floribunda* is used as one of the ingredients in drugs to treat epilepsy (Noumi and Fozi, 2003). *Euphorbia hirta* is considered as a potent source of natural antioxidants and a promising plant source in the health-food and cosmetic industry based on an aqueous extract made from the plant (Sharma, *et al*., 2007). The anthelmintic efficacy of the aqueous crude extract of *Euphorbia hirta* was tested on 20 dogs in Nigeria that were naturally infected with nematodes. It was found that it caused a reduction in the worm load as indicated by a significant reduction of the faecal egg count of the helminthes

(Adedapo *et al*., 2005). Whole parts of *Clerodendrum serratum* are used for the treatment of gastrointestinal disorders such as indigestion and constipation by the tribes in North Cachar Hills district of Assam, in northeast India (Sajem and Gosai, 2006). The essential oil of *Sagittaria trifolia* is a well-known medicinal foodstuff in China (Xiangwei *et al*., 2006).

Harvesting methods and collection time

As indicated above, the majority of the plant parts used are leaves, in which case the plant is not uprooted. Only plants of *Euphorbia hirta, Conyza floribunda and Sagittaria trifolia* are uprooted. The latex collection from *Apios carnea* involves the whole climber, whereas in case of *Bridelia spp.,* cuts are made on the stem and latex is allowed to flow into a container. The wound heals and other cuts are made later. It appears that there are no serious threats from the current harvesting practices.

The collections are made mostly in summer when the leaves and vegetative parts of the plants are fresh. Latex can be extracted throughout the year.

Threats and sustainability

Colonization of some species such as *Conyza floribunda, Euphorbia hirta,* and *Sagittaria trifolia* as weeds in the open fields are mentioned as threats, since the weeds compete for the soil nutrients. In addition, these species are uprooted while cultivating crops in the field since their value is unknown to the farmers and they consider them as weeds. Usually weeds are common species and weeding them does not much influence their chances for survival. Based on the interview, a sustainability table was constructed for each species (Table 2). Among all the species, *Sagittaria trifolia* was reported to be rare (Fig 2).

Fig 2: *Sagittaria trifolia* reported as rare

Table 2. Sustainability status of each species

Species	Sustainability status
Pogostemom spp	Abundant along the edges of the cultivated fields and open grassland
Clerodendrum spp.	Not very abundant, but in sufficient quantity
Conyza floribunda	Sustainable in the open field and near the cultivated fields
Apios carnea	Abundant near farm houses and fields
Sagittaria trifolia	Rare, found only in some areas in open and cultivated fields
Clerodendrum serratum	Sustainable in open fields and along the edges of forest
Euphorbia hirta	Abundant
Bridelia spp.	Not very abundant, but in sufficient quantity
Capscicum annuum	Cultivated crop

Discussions

The study shows that some of the plant species used by the healer are also in use in other countries, often using more advanced technologies. Most of the species are local weeds which grow in open grassland near cultivated fields, and are not in any danger of extinction. *Sagittaria trifolia* is reported to be rare by the healer and our experience during the collection of specimens in the field also indicated that there are only a few plants of this species. A thorough verification in the field and possible cultivation trials of this species may be needed. The current list of plants shows that the species used by the healer are different from those used by the Institute of Traditional Medicine Services in Bhutan (ITMS). This difference could be mainly due to the fact that the ITMS only use species which are approved by scientific authority, whereas the traditional healers use plant species which grow locally or herbs which were used by their ancestors.

Plants represent an important source for drug discovery. The picture today within the region is a general availability of the conventional medicine and a small and decreasing interest in traditional medicines and a consequent loss of an old professional tradition and ethnomedical knowledge. There is no systematic instruction for the next generation of healers, and the children of the present day healers appear to have low interest in the subject. It appears that when the present generation of practitioners dies, most of their knowledge will die with them.

The status of reportedly rare species such as *Sagittaria trifolia* needs to be verified in the field. Community-based cultivation or domestication of rare species would be one option to solve the problem if there is a market for the products derived from the species. Otherwise, the healers may need to establish their own herb gardens to procure and protect the species. Since the healer is ready to cooperate for the cultivation of the species, technical guidance and other support is necessary from BWS. As there could possibly be more rare species, another trip to visit the healer should provide more information on the species used and their status.

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EVALUATING PROSPECTS OF REINTRODUCING CHEETAHS (*Acinonyx jubatus*) IN KUNO WILDLIFE SANCTUARY

by Ganesh Ghosh

Introduction

At the time of Christ, the cheetah was found throughout Africa and southwestern Asia (including India). Currently, cheetahs are found in about 25 African countries and Iran (5). The last physical evidence of the Asiatic Cheetah in India were the three shot (with two bullets) by the Maharajah of Surguja in 1947 in eastern Madhya Pradesh, in central India (6). In the Indian sub-continent, cheetahs were present from Pakistan (including the Indus river basin) to the states of Bihar and Orissa in India and to the state of Tamil Nadu in south India (Divyabhanusinh, 1995). The cheetah was continuously removed from the wild for the sport of coursing antelope for at least a millennium if not more. Undoubtedly, this had a considerable effect on its survival in its natural habitat. Particularly, the capture of females would have made the survival of cubs in the wild impossible. Additionally, in its final phase the animal came to be hunted relentlessly by the British as well as by Indians, which snuffed out the last remnants of its population.

The cheetah's mode of hunting, which is running down its prey in a short monumental burst of speed, is highly specialized. For this performance it required open grasslands and scrublands. With a growing human population and the attendant growth in cattle and other livestock, such ecosystems were obviously the first to come under pressure in the subcontinent.

With the loss of their habitat and hence prey, cheetahs started preying on livestock. This caused conflicts with humans and more cheetahs were killed. Moreover, cheetahs could not rear their young with continuous human and livestock interference (Divyabhanusinh, 1995).

India's conservation outlook and efforts would be better served if the cheetah was reintroduced into India, mainly because of the amount of potential revenue that such an undertaking would generate, through ecotourism. This paper evaluates the deciduous thorn forest encompassing Kuno Wildlife Sanctuary as a possible reintroduction site. This area was selected because it has a large area, the density of human habitations is low, and it was a part of the historical range of the cheetah (Qureshi, 2006; Divyabhanusinh, 1995). The study area also does not have a high density population of large carnivores (Jhala *et al*., 2007, Jhala, pers. comm.). The study area was analyzed through a population habitat viability analysis of primary data collected on Kuno by line transect surveys and demographic parameters of the cheetah, obtained from a review of literature of various studies on the cheetah.

Study area

The study area was the grassland ecosystem which encompasses the Kuno Wildlife Sanctuary. Kuno Wildlife Sanctuary (or Palpur-Kuno Wildlife Sanctuary) is located between latitudes 25°30'-25°53'E & longitudes 77°07'-77°26'N. It lies in the Sheopur district of northwestern Madhya Pradesh, in central India (1). The total area of the ecosystem is 3,000 km^2 (Qureshi *et al*., 2006). The climatic conditions of Kuno Palpur Sanctuary are moderate, but slightly arid. The average elevation of the sanctuary from mean sea level ranges from 238 m to 498 m. The average annual rainfall is 760 mm. There are three distinct seasons with no real autumn. The forests found in Kuno Wildlife Sanctuary are classified into the following types: northern tropical dry mixed deciduous forest, *Angeissus pendula* forest and *Boswellia* forest (Champion & Seth, 1968; Choudhary, 2001). The

general physiography of the terrain is hilly. It comes under the Vindhya series. The sanctuary falls in the semi-arid zone and has a terrain typical of the Central Indian highlands, interspersed with woodlands and meadows. The soil is sandy and sandy-loam, showing a spatial variation in depth. The Kuno River, a tributary of Chambal River, vertically bisects the sanctuary from north to south. It occupies an area of 5.90 km^2 in the sanctuary (2). The species of prey available for cheetahs to catch are nilgai and cattle calves, chinkara, chital, langur, peafowl and wild boar.

Methods

The prey densities for the grassland ecosystem which encompasses the Kuno were estimated using line transect sampling (Burnham, 1980), and then analyzed by the software DISTANCE (Laake, 1992) in order to determine cheetah prey density. A population habitat viability analysis (Lacy, 1993/ 1994; Seal, 1993) using the software Vortex (Lacy, 2000) was done in order to determine the probability of a successful cheetah reintroduction. Various scenarios were simulated in Vortex by changing certain parameters, while keeping others constant.

Line transect sampling

The author sampled 41.9 km by vehicle transect to estimate cheetah prey abundance in Kuno. The data was recorded along with the group size and structure on the perpendicular distance on all species sighted with the help of a laser range finder. The data was recorded in prescribed formatted data sheets and analyzed using DISTANCE software (Laake, 1992).

Population habitat viability analysis

A population habitat viability analysis simulation was run for Kuno and the inputs used for it were obtained from primary data collected in Kuno by line transect surveys; demographic parameters of cheetahs were obtained from a review of literature of various studies by Caro (1994) and Eaton (1977).

One of the parameters in the PHVA model was carrying capacity, using the following parameters:

- The cropping rate of wild prey by cheetahs is conservatively considered as 5%, as other large carnivore densities at both sites were low (Karanth, 1987).
- A cheetah family will hunt once every 3 days, therefore making 121 kills a year.
- A cheetah family consists of a mother and three cubs on average.

The carrying capacity of the Kuno ecosystem was calculated as follows:

Kuno Wildlife Division
(5% of (D * Area)/121)*4
D = Density of cheetah prey
Density = 32 animals
Area = 1,280 km^2 (Choudhary, 2001)

Surrounding areas
The density is expected to be one-fourth that of Kuno WLS
(5% of (0.25*D * Area)/121)*4
Density = 8 animals
Area = 1720 km^2

Total carrying capacity of the Kuno ecosystem = 91 animals.

The simulations were modeled for 100 years with 1,000 iterations. In all the simulations, the number and severity of catastrophes were kept constant along with all demographic parameters and the initial population size of 6 animals (2 females age 2, 2 females age 3 and 2 males age 4). This population was determined by an analysis of cheetah reproduction and a trial and error modeling for the most successful and economical initial population composition given the current Indian scenario.

The catastrophe was labeled disease with the frequency of occurrence of 5 years. The severity on reproduction and survival was taken as 0.5, because this was the maximum severity of many diseases.

Simulation 1- Supplementation of two individuals (1 male and 1 female) every 10 years, with harvest kept constant at 2 animals, every 5 years for the entire length of the simulation.

Simulation 2- No supplementation, with harvest kept constant at 2 animals, every 5 years for the entire length of the simulation.

Simulation 3- Harvest of 4 animals (2 males and 2 females), with supplementation kept constant at 2 animals (1 male and 1 female) every 5 years for the entire length of the simulation.

Simulation 4- Harvest of 6 animals (3 males and 3 females), with supplementation kept constant at 2 animals (1 male and 1 female) every 5 years for the entire length of the simulation.

Simulation 5- Supplementation of 2 animals (1 male and 1 female) every 5 years for the entire length of the simulation and a harvest of 2 animals, every 5 years for the entire length of the simulation.

The harvest was finally chosen at 2 animals (1 male and 1 female) every 5 years after reviewing the management structure of the study area along with the number of human settlements and the attitudes and diet of the local people.

Results

Density

The maximum densities in Kuno were of feral cattle. Chital distribution was patchy and had a high coefficient of variation. Cheetah prey includes chital, chinkara, calves of feral cattle and calves of nilgai.

The cattle calves made up 5% of the total feral cattle population. This is an age class that would constitute cheetah prey.

PHVA results of the study area

The survival rates of the population for the next 100 years was within the acceptable probability of greater than 0.95 for scenario 5, where the probability of survival was 0.99. Scenarios 1-4 did not show an acceptable probability of survival (0.81, 0.30, 0.93 and 0.89 respectively).

Discussion of the results of line transect sampling

The percentage of young was the highest among nilgai and the lowest among cattle during the sampling season. Chital and nilgai had a larger percentage of females than males in the population, indicating that males have a higher mortality rate than females (Caughley, 1966).

The average group sizes of chital and cattle were 5 and 11.13, with standard deviations of 2.50 and 2.99 respectively, while the average group sizes of chinkara and nilgai were 2.27 and 2, with standard deviations of 0.4 and 0.45 respectively. This shows that chital and cattle gather in larger groups than chinkara and nilgai. A reason for this could be that since chital and cattle are grazers whose food source is plentiful and chinkara and nilgai are browsers, the competition for specific foods is directly proportional to group sizes (Jarman, 1974). However, to counter this, larger group sizes are effective barriers against predation as there is a smaller probability of predation per animal with more individuals scanning for predators. Thus, a balance must be maintained between feeding and anti-predatory behavior, accounting for the varying group sizes.

Recommendations

All the prey in the grassland ecosystem encompassing the Kuno WLS are either wild or feral cattle and 1,280 km^2 of the total 3,000 km^2 ecosystem is protected, with no villages inside the core and buffer area of the wildlife sanctuary (Choudhary, 2001), thus providing favorable conditions for cheetah reintroduction and its long term survival. This is shown by a high probability of survival of the cheetah.

The best chance of survival of the cheetahs is in the Kuno ecosystem and they should be introduced there. The initial population size of the cheetahs should be a minimum of 6 animals with the age structure as follows: 2 females aged 2; 2 females aged 3; and 2 males aged 4. Females must be of different ages because there must be a variation in breeding cycles so as to ensure maximum survivability.

Supplementation should be a minimum of 2 animals (one adult male and one adult female) every five years, as this is the minimum viable population that can sustain the population. If the supplementation is decreased to two individuals every 10 years, then the probability of extinction increases from 0.01 to 0.19. Also, when there is no supplementation the probability of extinction further increases to 0.70.

Harvesting, in the form of cheetahs poached, can reach a maximum of two animals every 5 years; thus, heavy protection against poaching is required. Beyond this point, the probability of extinction increases greatly. If the harvest is increased to 4 animals every 5 years, then the probability of extinction increases from 0.01 to 0.06. When the harvest increases to 6 animals every 5 years, the probability of extinction further increases to 0.13.

Though there are no villages in the protected area (Banerjee, 2005), there are villages in the rest of the ecosystem and a compensation system should be established for livestock because there is a possibility of livestock predation despite the reasonable density of wild prey.

The carrying capacity of the ecosystem is 91 animals, and at this point some cheetahs should be relocated from this population so as to lower the chances of this population suffering an epidemic disease, to prevent inbreeding, and to help establish other populations.

No other large predator should be introduced at the same time as the cheetah population as the rate of cheetah mortality is likely to increase. This is evident in the Serengeti ecosystem, where lions account for a large portion of cheetah cub mortality (78.6% of all predation deaths) (Caro, 1994).

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Table 1: Ecological densities of prey in the core area of Kuno Wildlife Sanctuary in winter 2006, as estimated by road transects.

	Density		Group Density		Encounter rate		ESW		CV% density
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
Chital	12.761	12.039	2.5523	2.0423	0.28640	0.21945	56.106	12.934	94.34
Chinkara	10.062	3.1527	4.8577	1.2503	0.33413	0.47326E-01	34.392	7.3908	31.33
Cattle	95.843	118.10	7.0129	8.4673	0.28640	0.33904	20.419	4.8503	2.6135
Cheetah Prey	32.743	20.336	10.488	5.9931			46.650	5.7101	62.11
All Prey	76.022	49.643	14.639	9.0869	1.3604	0.82885	46.463	5.5103	65.30

*The half-normal key model was used estimate density (Laake, 1992).

Bostami turtle (Aspideretes nigricans) (Photo: M. Farid Ahsan)

BOSTAMI TURTLE (Aspideretes nigricans) NO LONGER ENDEMIC ONLY TO BANGLADESH

by M. Farid Ahsan and M. Abu Saeed

Introduction

The Bostami turtle, or black soft-shelled turtle (*Aspideretes nigricans*) is no longer endemic only to Bangladesh. This turtle was said to be restricted to a pond attached to the shrine of the famous saint, Sultan al-Arefin hazrat Bayazid Bistami (locally known as Bayazid Bostami), located about 6.5 km northwest of Chittagong city. Anderson (1875) first described this turtle from a couple of specimens deposited at the Indian Museum, which were collected from a pond in Chittagong in what was then Bengal (now Bangladesh). Four decades later, Annandale (1912) reported that Bostami turtle inhabited a tract of country intermediate between the Brahmaputra river system and the Arakan streams. Annandale and Shastri (1914) first reported that the species was found only in a pond attached to the Mohammedan shrine Bayazid Bostami. Until the end of the last century, this species was not known to occur in the wild. Thus, it was considered to be endemic to Bangladesh, particularly in the Bayazid Bostami pond. It was not believed to occur anywhere except Bangladesh. It should be mentioned here that Bangladesh supports 27 species of turtles and tortoises, including 5 species of sea turtles.

Since 1983, the present authors have been involved in working on the morphological, biological, ecological, behavioral and historical aspects of the Bostami turtle. Several scientific articles of the research findings have already been published (Ahsan and Haque, 1987; Ahsan and Saeed, 1989; Ahsan *et al*., 1991, 1992, 1994; Ahsan, 1997) in scientific journals of India, Holland and the USA.

The Bostami pond is situated at Nasirabad in Chittagong, in front of a mosque at the foot of a hill about 50m in height, at the top of which is the "astana" (sitting place) of the shrine of Bayazid Bostami. It is most likely that Bostami pond was excavated in the 17th century in front of the mosque. The pond has been excavated and expanded many times. During February to April 2003, the Mazar authority cleared up all the bottom mud from the pond in order to increase the water depth during the summer, change the polluted water, catch cultured fishes and repair and reconstruct the surrounding pond walls and stairs. More than 95% of the water in the pond was pumped out to eliminate poisonous effects on the water and hence to the turtles.

Currently, the area of the pond is 0.58 ha (94.64 m x 61.27 m), with concrete banks and one stair in each side (the west one is mainly used by visitors, pilgrims and for other purposes). Visitors and pilgrims would watch, feed and worship the turtles at the west steps, where the turtles would ascend to obtain food offered on skewers by the visitors. The water depth of the pond fluctuates seasonally. In the monsoon, it may rise up to about 5 m or so, and drop down to about 2.5 m in the dry season.

Myth

In Bangladesh, the Bostami turtle is associated with the Mohammedan shrine Bayazid Bostami. There is a strong religious belief about Bostami turtles and their attachment to the shrine of Bayazid Bostami. There is a tale that these turtles were brought into the Bostami pond by the Saint himself. Locally, it is also believed that these turtles were once sinful men associated with the Saint, who changed them into turtles as a punishment for their wickedness. There is another belief that these turtles were "djinns" (evil spirits) and were turned into the present form because they incurred the wrath of the Saint.

The general belief is that the famous Iranian Sufi, Bayazid Bistami is buried at this shrine, but in fact this is not true. Khan-Bahadur (1871) commented that Sultan al-Arefin Hazrat Bistami never visited Chittagong. Ali (1964) reported that Sultan Bayazid Bostami is a historical figure who was born in the year 777 at Bistam in Iran and died in 874. Arberry (1963) mentioned that the tomb of Bayazid Bostami is situated in Bistam of Iran. So there is no tomb of the Saint in Chittagong.

Population

The total number of turtles in the Bostami pond was estimated to be 320 in 1986, of which 54% were adult males, 36% adult females and 10% were young (Ahsan and Saeed, 1989). In 1986, 100 adult Bostami turtles (56 males and 44 females) were randomly chosen and measured and their lengths ranged from 39-78 cm, width from 33-71 cm, and weight from 7-54 kg (Ahsan and Saeed, 1989). In 1998, the estimated population in the pond was 400 (Ahsan and Uddin, in prep.). The Indian population of this species has not yet been estimated.

Distribution

From 1914 to 2002, the only known population of Bostami turtles was at the Bayazid Bostami pond in Chittagong, Bangladesh. Surprisingly, the assertions that Bostami turtles were endemic to Bangladesh were dismissed. According to Praschag and Gemel (2002), it is a common species in temple ponds in Assam in India, and seems to be widely dispersed in the Brahmaputra river system of Assam, which was unknown to Indian scientists. Praschag and Gemel (2002) recorded Bostami turtles from 8 different locations in India, namely: 1) Kamakshya temple pond; 2) Nagsankar temple pond in the north strand of the Brahmaputra; 3) a pond in the east of Guhati on the southern bank of the Brahmaputra river; 4) in the vicinity of Dibragach of the Brahmaputra; 5) northeast of Assam at Tinsukia; 6) Bisnath Ghat; 7) Kaziranga National Park; and 8) Nameri National Park. Praschag and Gemel (2002) also commented that the species might have been present in Pakhui Sanctuary, adjacent to Arunachal Pradesh and also in the southeastern part of the same province. Its possible distribution in Nagaland, Meghalaya of India and in the wild in Bangladesh needs to be verified.

Food

Bostami turtles living at temple ponds are dependent on foods supplied by visitors. The major food items consist of bread, banana and offal (mainly cattle lung), but puffed rice, chapatti, meat, etc. are also offered. The amount of turtle food sold daily in the shops of the Bostami shrine area is estimated to bring in US$10,372 per year (Ahsan and Haque, 1987; Ahsen *et al.*, 1991; Ahsan and Uddin, in prep.)

Turtles in the temple ponds in India are fed on bananas, white bread, meat waste, rice-snakes, chips and biscuits. Visitors and pilgrims mostly throw the food onto the water surface and it is rarely offered on wooden sticks. Praschag and Gemel (2002) commented that in Assam, Bostami turtles eat dried foods when they become very hungry; otherwise they are more selective.

Breeding

Female Bostami turtles will lay around 12-38 eggs between February and May in the areas adjacent to the pond, including the western hills of the mosque. They dig a hole and fill it in after the eggs are laid. The eggs hatch after 93-108 days. After much effort, in 1985 some Bostami eggs were successfully incubated in the laboratory and gave hope to scientists that this species can be saved from extinction in adverse situations through artificial propagation from eggs. Laboratory-incubated eggs took between 96-104 days to hatch. Newly hatched turtles were 4.5-5.1 cm long and weighed 14.3-17.9 gm. During 2004, eggs were also incubated in an artificial breeding ground prepared at the northwest corner of the Bostami campus.

Life span

Annandale and Shastri (1914) estimated the oldest individuals to be 150 years old, by interviewing people living in the area of the Bostami shrine. According to the caretakers of the shrine and devotees, the oldest specimens may attain 150-200 years of age.

Conservation issues

In 1993, the attention of world turtle specialists at an IUCN Turtle Specialist Group conference at the State University of New York in the USA was drawn to conservation issues of the Bostami turtle and recommendations to save it from extinction (Ahsan, 1997). Consequently, the species gained recognition by the scientists and became listed as one of the two most endangered turtles species in the world.

Scientists have agreed that possible threats to the survival of the Bostami turtles in Bangladesh are: 1) their natural rarity and very small population size; 2) physical confinement of the single known population; 3) reduction of nesting grounds; 4) possible predation of eggs and hatchlings; 5) potential inbreeding depression; 6) food and water quality management; and 7) possible health risks from fungal infestation.

Conservation measures that have been taken for the species so far include the following:

- Listed in the 2002 **Bangladesh IUCN Red Data Book of Threatened Animal**s as "critically endangered" and "extinct in the wild."
- Listed in Appendix I of CITES, meaning international trade is prohibited.
- Listed under the Action Plan Rating 2 of the IUCN/SSC Tortoise and Turtle Specialist Group (i.e., little known and has confined distribution).
- Protected under Schedule III of the Bangladesh Wildlife (Preservation) (Amendment) Act of 1974, indicating that the species is not to be hunted, killed or captured.
- Actively protected by the local people due to religious views.
- Preliminary research on egg incubation and rearing young has provided some basic information about the species.

Scientists also agreed to the following proposed conservation measures for the Bostami turtles:

- A detailed survey of the species should be conducted on its population status and distribution in Bangladesh.
- Long term research and monitoring should be undertaken.

- In Bangladesh, a captive breeding program should be initiated with a few breeding pairs. Probable sites for the program would be Chittagong University Campus, Chittagong Zoo, Bangladesh Forest Research Institute, or government land within the cantonment near Bayazid Bostami area. A second captive colony should be established under controlled and monitored conditions in a suitable area in Bangladesh.
- Fungal samples from the turtles should be tested to determine what deleterious effects they have on the turtles and appropriate corrective measures taken.
- Physical, chemical and biological parameters of Bostami pond water should be analyzed to help understand the species' ecology in detail.
- The association between turtles and fish – two major components of the Bostami pond's fauna – should be studied.

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FOREST NEWS

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Asia-Pacific experts consider forest health in a changing world

Prepared by Sim Heok Chon, APAFRI (simhc@frim.gov.my) and K.V. Sankaran, Kerala Forest Research Institute (sankaran@kfri.org)

Background

Increased trade and international travel have resulted in significantly increased risks to forest health through the inadvertent entry of invasive pests and diseases. Similarly, growing trends in urban greening and landscape beautification often include imports of exotic plants. This has contributed to the rapid increase in the international movement of plant materials, including young seedlings. Many previously unreported or unknown pests and diseases are thus being transported inadvertently from country to country. These movements further aggravate the threat that has already multiplied by increased trade including, especially, of wood and non-wood forest products.

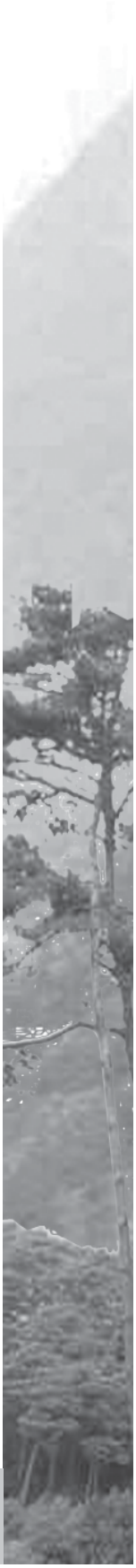
The Asian long-horned beetle, which attacks hardwood trees, for example, is indigenous to China and Korea, but was introduced to the United States most probably in the 1980s, on wooden packaging material. This pest is a serious threat to the multi-million dollar hardwood industry in North America. Similarly, eucalyptus rust, mahogany shoot borer and leaf blight in many of the Asian countries were probably introduced to Asia via exotic planting materials for forest plantations. Other species that have been introduced deliberately have later emerged as serious invasive pests. For example, fishes and frogs introduced for human consumption have out-populated local species, weeds for erosion control have invaded agricultural lands, and even species brought in for biological control have spread out of control.

Alongside these issues, there has emerged a growing awareness of the importance of healthy forests in providing various environmental services. Policies and strategies to strengthen the capability and sustain the capacity of the forests in providing these services are increasingly being debated as important parts of forest management in many countries, and also at many international and regional forums.

All of these concerns are captured in the scope of forest health which encompasses factors such as the forest's age, structure, composition, functions, vigour, and presence of unusual levels of insects or disease, as well as resilience to disturbances. The perception and interpretation of forest health are influenced by individual and cultural viewpoints, land management objectives, spatial and temporal scales, the relative health of the stands that comprise the forest, and the appearance of the forest at a particular point in time.

Workshop on forest health in a changing world

Fifty-four participants from 18 countries participated in the workshop on "Forest health in a changing world," held 1-3 December 2008, in Kuala Lumpur, Malaysia. The workshop was jointly organized by the International Union of Forest Research Organizations (IUFRO), the Asia-Pacific Forest Invasive Species Network (APFISN), the Asia-Pacific Association of



Forest Research Institutions (APAFRI), FAO, the Forest Research Institute Malaysia (FRIM) and the Korea Forest Research Institute, in Kuala Lumpur, Malaysia. The main objective of the workshop was to provide a forum for linking various international, regional and national agencies and institutions dealing with forest health issues, and to share strategies, experiences and knowledge related to forest health. The workshop also provided an opportunity for individuals and their associated agencies, organizations and networks to build collaborative linkages and better align programs to capture synergies. Special emphasis was given to plant pests and diseases.

The workshop had seven technical sessions:

- Forest health in a changing world – common but differential interests and objectives;
- Regional/sub-regional initiatives and inter-governmental collaborations;
- Current forest health practices in Asia and the Pacific;
- Forest health management strategies and activities;
- Linkages between forest health and SFM, biological diversity and pest management activities in non forest sectors;
- Linkages between forest health and soil and water, disturbances (biotic and abiotic) and climate change mitigation and adaptation; and
- Legal, institutional and economic frame works for protection of forest health.

A total of 39 papers were presented in the workshop, giving overviews of forest health issues and activities and action plans to prevent spread of invasive species adopted by each agency. Papers in Technical Session 2 highlighted regional and sub-regional initiatives such as stocktaking in the Asia-Pacific region carried out by the APFISN, experiences of forest health management in China through international collaboration, and the plant health service of the Secretariat of the Pacific Community.

The third session dealt with forest health practices and invasive species issues in Bangladesh, China, Fiji, India, Korea, Myanmar, New Zealand, Timor Leste, and Vietnam, and information was also presented on a network information system on forest health developed in Taiwan Province of China. In Session 4, presentations mainly dealt with indicators for assessing forest health, improvement of forest health through utilization of invasive species and environmental conditions conducive for invasion. Sessions 5 and 6 discussed linkages between forest health and a multitude of issues including sustainable forest management (SFM), biodiversity, soil, water, biotic and abiotic disturbances in forests, and climate change mitigation and adaptation.

The last session discussed the ecological impact of invasives on the structure and composition of native communities, economic considerations towards forest health, and the relationship between forest health and forest disturbance.

It was pointed out during the panel session that there exists considerable confusion and/or conflicts with regard to the expression of the terminologies used, for example: invasive species, alien, non-native, exotic, etc. The workshop was informed of the APFISN definition of invasive species: "an invasive species is a non-native species whose introduction can cause economic and /or ecological harm or harm to human health." The CBD's definition of "invasive alien species" was "plants, animals, microorganisms, species, sub-species or lower taxon introduced from outside its natural distribution and that survived/reproduced."

There are already a few programs on capacity building such as the Australian-Asian Capacity Building (AACBP) to impart training on taxonomic identification and diagnosis of invasive species. CABI expressed its support to the network along these lines. Creating awareness about invasive species among people is of high priority. Incorporating the topic in school curriculums, the involvement of NGOs in the awareness programs, and the role of print and visual media will be crucial to the success of these efforts.

Information on key pathways of invasive species is already available and the possibility of employing modern diagnostic tools and software for the identification of invasive species needs to be looked into. Information generation, stock taking, networking and dissemination or sharing the information needs to be strengthened. For pest/ pathogen-related issues it would be best to contact

the various national and global networks. Several programs and agencies such as CABI and IUFRO's Special Programme for Developing Countries (SPDC) have existing activities for training and capacity building which could support such efforts.

There is also a need for multinational cooperation for pest and pathogen control, since there are over 1,000 potential invasive species. It was suggested that APFISN could explore the possibility of developing a multinational megaproject on this topic under the Global Environment Facility (GEF).

FAO assists Timor-Leste in formulating its forest policy

Contributed by S. Appanah, National Forest Programme Advisor

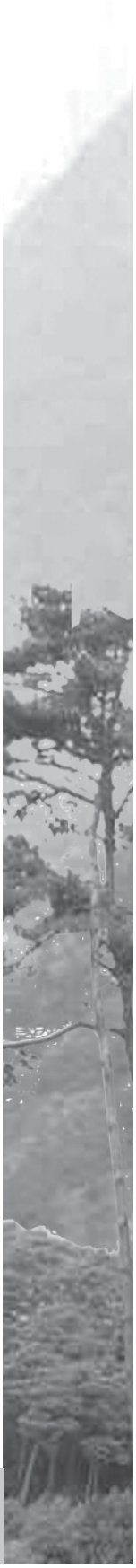
As a recently independent state (2002), Timor-Leste has been undergoing an accelerated process of nation-building. The creation of the basic institutional infrastructure to govern the country has included natural resources and the management of the country's extensive forests. In the years following independence, unemployment and underemployment have hovered at around 70 percent, with the bulk of the population relying on subsistence rural livelihoods – primarily shifting agriculture. This has led to a cycle of deforestation and unsustainable resource use in order to meet the growing population's basic needs. The degradation of the country's national resource base has similarly further entrenched poverty and reduced livelihood opportunities.

In response to the above issues, a project "Promoting sustainable forest management, national economic development and poverty reduction in Timor-Leste," was initiated by Timor-Leste, supported by the FAO-Netherlands Partnership Programme. A wrap-up workshop was held in June 2008 in Dili, Timor-Leste, to review the work undertaken under the project, capture lessons learned and disseminate findings to a wider audience. In addition, the workshop explored approaches for implementing the findings and identified supporting sources of funding. The workshop was attended by approximately 80 people, including representation from government, police, non-governmental organizations and international agencies.

Under the project, the following outputs were achieved and presented at the wrap-up workshop:

- *Forest Policy* – A comprehensive and widely accepted national forest policy, developed in a participatory and decentralized manner, and harmonized with other relevant renewable natural resources policies, consistent with the Government's overall national economic development policy.
- *Forest Legislation* – An effective forest legislation draft developed to support the new policy statement that can lead to enhanced implementation of the forest policy and compliance.
- *Community Forestry* – A policy and programme for a community-based forest management approaches that is more sustainable, equitable and participatory.
- *Forest Rehabilitation* – A community-based forest rehabilitation programme with an employment guarantee proposal.
- *Institutional arrangements* – A review of the institutional arrangements and organizational structures of the forestry sector.

The Timor-Leste exercise provided some valuable lessons for further consideration. One is the need for strong government support and commitment. In this case, the Minister of Agriculture and Forestry was personally interested in initiating the work, and followed its progress through to its completion. This was indeed critical to the overall success of the effort, where inclusive policy processes are involved. The need for high quality translation also emerged as a critical element of success, especially in a country where Tetun, Bahasa Indonesia and English are used at various levels, further complicated by the need for all



official documents to be produced in Portuguese. This required more investment than originally envisaged. Finally, broad-based stakeholder involvement at every stage was absolutely essential to develop policies and legislation that are widely supported and promoted.

Other issues that stood out include the following:

- Project duration (3 years) was key to the overall success and the establishment of a strong basis to ensure continuity. A shorter effort simply would not have been as effective.
- The iterative nature of the exercise and its various outputs underpinned this initiative. There were multiple stages of drafting, consultation and re-drafting.
- Involving the "right" people was indispensible – involving consultants and experts who had in-depth understanding and appreciation of the local context, the issues involved and the approach desired.
- For countries at an early stage of national development, such as Timor-Leste, emphasis on training and capacity-building is critical and local involvement needs to be mainstreamed within all activities.
- Collaboration and inclusion of diverse sectors need to be foreseen and incorporated throughout the process, starting at inception. Attempting to do so once the project is underway can prove much more difficult.

In retrospect, greater investment in training, from field staff levels up to officers would have been a valuable contribution. While the project worked at maintaining regular coordination and engagement with other donors to strengthen complementarities and minimize duplication, nevertheless, at the wrap-up workshop, the overall view was that more could have been done in this area. Under this category the need for wider dissemination of project outputs, experiences and lessons learned was emphasized. More weight should have been given to this component as well. But one single feature that made a huge difference to the project's success was the way the grant was managed – the donor allowed complete budgetary flexibility and fungibility which ensured the agility and responsiveness of project activities *vis-à-vis* changing needs and context. The donor also put less emphasis on reporting, and more on results – thus, this project, cost-wise, achieved much more as a result. This approach would be ideal for other projects that are leanly funded.

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National forest programme process in Cambodia

by H.E. Ty Sokhun, Director General, Forestry Administration, Cambodia

The Forestry Administration (FA), Ministry of Agriculture, Forestry and Fisheries and stakeholders in forest sector in Cambodia are embarking on a process to develop a national forest programme (nfp) as a significant step towards sustainable forest management. The national forest programme aims to meet local, national and global needs by providing a strategic, coherent, transparent and effective framework to plan, manage, use, protect and regenerate forest resources in a sustainable manner for the benefit of present and future generations. The nfp is a 20-year programme.

A Task Force with representatives from the FA, relevant government agencies, development partners, non-governmental organisations and the private sector was established in late 2007 to promote sustainable forest management through the development of the nfp. According to the

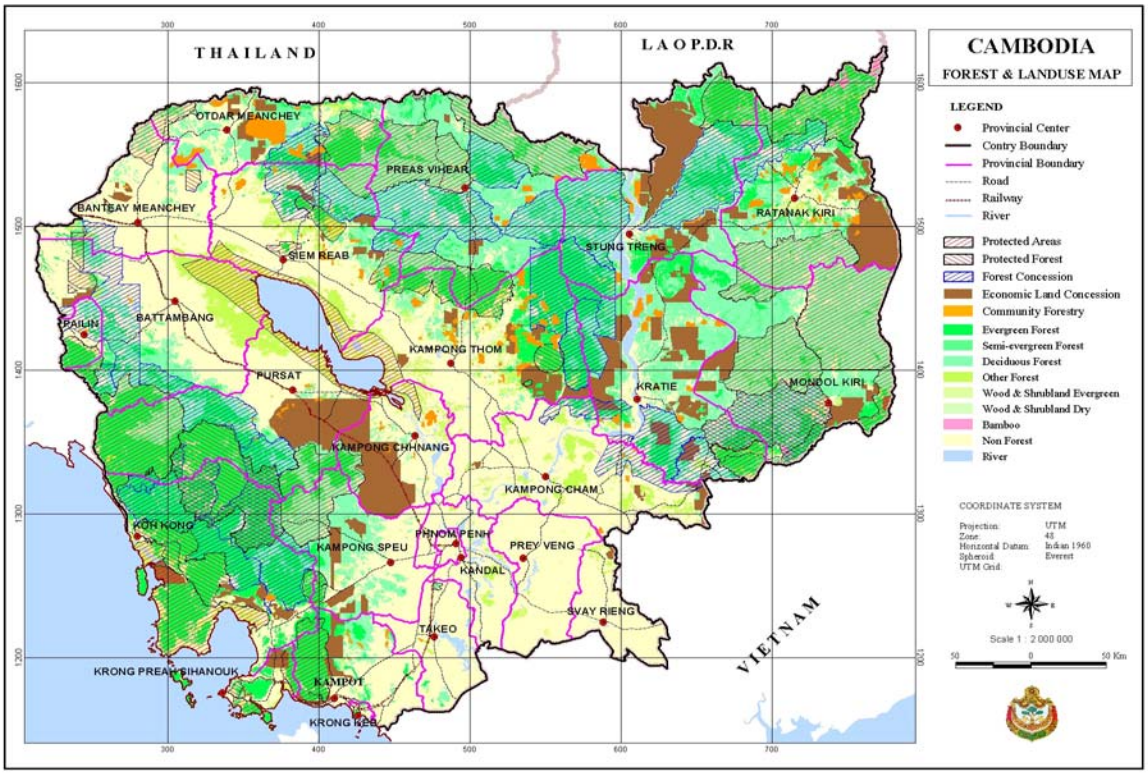
principle of the nfp, the government, represented by the FA, is taking a leading role in the process. The nfp in Cambodia is structured as a framework document with six specific programmes: i) Forest Demarcation; ii) National Forest Management and Conservation; iii) Forest Law Enforcement and Governance; iv) Community Forestry; v) Capacity Building and Research; and vi) Sustainable Forest Financing.

These programmes were identified and selected for formulation by the nfp Task Force at the beginning stage and six subgroups have been established to formulate one programme each. The development of the nfp is financially supported by the government and development partners including Danida/Dfid/NZaid, FAO and the National Forest Programme Facility.

Local consultations with the wider public across the country on the draft nfp document were conducted in four locations in March 2009. These four local consultation workshops were organized by the FA with the National Forest Programme Facility providing the main financial support. The workshops were aiming to raise public awareness and collect feedback and comments from local stakeholders on the draft nfp document. More than 150 participants attended each workshop, representing relevant local government agencies, local communities, local authorities, local NGOs and the private sector.

Feedback and comments from the local consultation workshops are being compiled and will be incorporated into the draft nfp document before conducting the next round of consultations, which is to be held at national level in July 2009. It is expected that the nfp document will be finalized in September 2009 and submitted to the Royal Government of Cambodia for adoption. The continued implementation of the nfp in Cambodia can be then move forward in early 2010.

Forest in Cambodia
(www.cambodiaatlas.com)



Assisted natural regeneration (ANR) - Harvesting lessons

Contributed by Marija SpirovskaKono (FAO Forestry Consultant) and Patrick B. Durst (FAO Senior Forestry Officer)

As a concluding activity of a 3-year ANR project implemented by the Philippine Department of Environment and Natural Resources (DENR) and Bagong Pagasa Foundation Inc. (BPFI), with support from FAO, the Philippines hosted the regional workshop "Advancing the Application of ANR for Effective Low-Cost Forest Restoration," 19-22 May 2009, in Bohol. The event brought together a range of stakeholders to share their views on the further implementation, up-scaling and improvement of ANR practices. The presentations and discussions highlighted some of the most important aspects of ANR, which show it to be an efficient and affordable alternative to conventional reforestation.

Low-cost forest restoration

Forest departments throughout the Asia-Pacific region are struggling to meet reforestation targets, while facing high costs and lack of available resources. It is therefore very important to allow latitude for diversity when designing forestry policy, and to adopt different approaches for implementing reforestation projects. ANR is one of the available low-cost approaches, best applied for restoring large grasslands of *Imperata cylindrica* and other low-productivity grasses. The following table compares the costs of ANR with conventional reforestation (based on compiled field data from the ANR project sites in the Philippines).

Simple methods for effective results

ANR is based on the principles of supporting and accelerating natural processes. It is, therefore, a relatively simple technique that pays special attention to: 1) fire management through establishing fire breaks and collaborating with local communities in organizing fire patrols for monitoring and preventing fires; 2) suppressing the growth of fast-spreading grasses such as *Imperata cylindrica*, by pressing with a wooden "lodging" board; and 3) supporting the growth of young seedlings by ring weeding, mulching and brushing.

The experience from the three pilot demonstration and training sites in the Philippines demonstrates

TABLE 1: Comparisons of average forest restoration cost per hectare (US$)

Item	Unit	Unit Cost (US$)	No of units		Amount (US$)	
			REF	ANR	REF	ANR
Fireline establishment & maintenance	p.d.	3	32	32	96	96
Locating & marking regenerants	p.d.	3	-	3.2	-	10
Pressing (lodging) *Imperata*	p.d.	3	-	90	-	270
Staking 2,500 planting spots	p.d.	3	6.25	-	19	-
Digging 2,500 planting holes	p.d.	3	25	-	75	-
Cost of seedlings	Sdlng.	0.1	3,000	-	300	-
Hauling 3,000 seedlings to field	p.d.	3	12	-	36	-
Planting/re-planting 3,000 seedlings	p.d.	3	30	-	90	-
Ringweeding 800 regenerants	p.d.	3	-	36	-	108
Ringweeding 2,500 planted seedlings	p.d.	3	113	-	338	-
Herbicide to spray firelines	Liter	10	8	8	80	80
Labor to spray herbicide	p.d.	3	5	5	15	15
			Total		1,048	579

Legend: p.d. person day; Sdlng. – seedling; REF – conventional reforestation methods
(Source: Patrick Dugan, BPFI, 2009)

that if applied properly, ANR can produce visible results within a relatively short time frame (2-3 years).

Probably the most visible result from ANR application at the pilot project sites is the absence of fires. *Imperata* grass is highly susceptible to fires, thus posing serious threats and damages to the surrounding vegetation and settlements. Fire control was carried out by members of the local communities and the lack of destructive fires is therefore a source of pride for local people involved in the ANR activities. This contributes to the ANR sustainability and possibilities for long-term application as demonstrated in the case of Danao Municipality in Bohol, where the Local Government Unit (LGU) is trying to secure new funding sources for ensuring community fire control and expanding the area of ANR-based forest restoration.

Another important contribution of ANR relates to the provision of vital environmental services, such as enhanced biodiversity and clean water. The pioneer trees and shrubs sprouting on the ANR sites are well suited to the local conditions and are indigenous species which would often not be considered for rehabilitation purposes. The ANR approach is flexible and allows for further improvement through enrichment planting or introduction of framework species, but its core is based on regenerating natural vegetation native to the site by accelerating natural processes.

Roles of the community

Communities play important roles in applying ANR and the success of its application largely depends on the support of local people. This necessitates the provision of and equitable sharing of tangible benefits from ANR.

Each community has different sets of values, plans and needs, and it is therefore important to adopt a site-specific approach and plan the restoration activities in a participatory manner. The long process of ANR application in the Philippines has already demonstrated a variety of ways for including and empowering communities involved in ANR, involving both financial benefits (e.g., salaries for ANR activities, income from non-wood forest products produced in the ANR areas, cash crops grown within the fire breaks), as well as a sense of accomplishment and pride for the positive changes that can be seen in the landscape.

Tending the ANR sprouts of hope

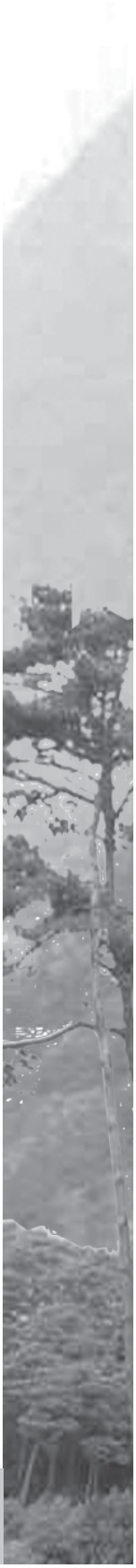
The Bohol workshop dedicated significant attention to the future potential of ANR and focused on identifying new partners and innovative mechanisms for financing and up-scaling.

The LGU and private sector representatives demonstrated strong commitment for supporting future ANR activities, either through their local plans of action or as part of their corporate social responsibility efforts. These commitments, alongside the DENR plans to use ANR for restoring around 9,000 hectares as part of the Upland Development Programme, are showing promising prospects for ANR expansion in the Philippines.

During the workshop, forest practitioners and researchers from different countries in the Asia-Pacific region also shared a wealth of knowledge and information on different forest restoration approaches applied throughout the region, demonstrating a diversity of methods, depending on available funding, level of degradation, local socio-economic conditions and specific management objectives.

The need for documenting and disseminating the results and processes from ANR application was identified as essential for further promotion of ANR and for enhancing the understanding of ANR principles. In particular, the effects on biodiversity and carbon storage potentials of ANR sites need to be better documented and promoted in order to capitalize on the promising prospects of payment for environmental services and voluntary carbon markets.

The workshop demonstrated that there is promising potential for developing successful ANR partnerships, as well as interest and willingness for adopting different methods. The challenge ahead is to collaborate on adapting the ANR approach to meet the specific needs of various sites and communities throughout the Asia-Pacific region.



Crystal ball gazing - What will forestry look like in 2020?

Compiled by Chris Brown, FAO Forestry Consultant

Chris Brown (Photo: Akiko Inoguchi)

The third meeting of the Scientific Committee of the Asia-Pacific Forestry Sector Outlook Study (APFSOS) convened in Chiang Mai, Thailand, 3–5 June 2009. While much of the meeting involved reviewing early drafts of the main report and sub-regional reports of the APFSOS, some time was also spent in a brainstorming exercise to tap the future visions of the "wise old (and not-so-old) heads" of the Scientific Committee.

Participants were asked to imagine they were sitting together in 2020, and to identify what will have been the five biggest changes in the forestry landscape in Asia-Pacific (in the region, sub-region or individual countries) in the preceding eleven years (i.e., what will be the most significant changes in the period 2009–2020).

The list of anticipated changes makes for interesting reading, including some diametrically opposed views – some optimistic and some extremely pessimistic.

Forecasted changes

Natural forests

- Tropical deforestation continued unabated.
- Serious decrease of tropical rainforest area in Indonesia (and in the Southeast Asia subregion).
- Forest area and growing stock will stabilize (i.e., no more net reductions) at the regional level.
- More forest cover, but with less natural growth trees.
- Major focus on forest rehabilitation and restoration.

- Sustainable management of natural forests for multiple goods and services will still only be seen in isolated "showcase" sites in Southeast Asia.

Plantations

- Plantation wood grown for fiber in tropics – a focus on pulp, bioenergy, carbon, reconstituted products.
- Planted forests will supply all wood. However, the line between natural and planted forests will be blurred, with indigenous species grown according to country/subregion conditions; SFM practiced in all forests.
- Much more timber plantation establishment in the region, especially in Southeast Asia.
- Dependence on plantations as the source of industrial wood strongly increased (>75% of total) spurring more planting and more protection of natural forests.
- Majority of wood from plantations.
- Tree-growing may emerge as a leading economic land-use option and agro-diversification (especially in India/South Asia).
- Planted forests (in tropical Asia-Pacific) will make a significant contribution of raw material (c.f. natural forests).

Wood supplies

- Wood will almost all be supplied by countries with large available land area, better governance, away from the aseasonal tropics.
- Subsistence use of forests will decline due to decline of the resource base and better economic options available (especially in India).
- New substitutes to wood products will emerge.
- China and India wood product demand shapes regional trade – also with increasing influence in Africa and Latin America.
- Prices of wood products will rise rapidly.
- Widespread use of wood and wood products.
- Use of timber – a move away from solids into panels and engineered material (e.g., laminated veneer lumber) for more efficient use of raw material.
- Increasing use of substitutes for wood products in the region.
- The demand for timber will grow faster than now.

Bioenergy

- Biofuels will become more important and widespread.
- Investments in alternative sources of energy will accelerate.

Economies

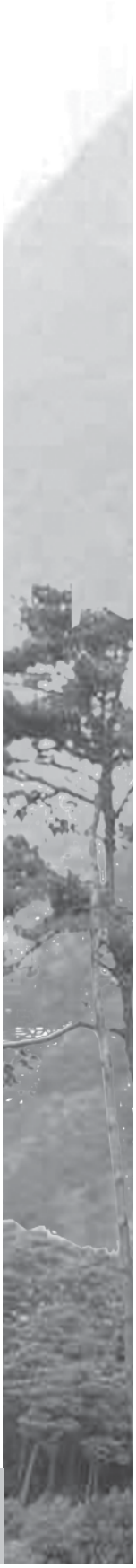
- Full economic recovery, fueling major new demands for energy, land, and commodities – bringing the world to the brink of a more serious economic collapse than in 2008.
- Biomass-based economies – not determined/ manipulated by Wall St.
- "Green economy" will become a more popular paradigm of development.
- Political and economic stability in tropical producer countries will lead to increased investment (domestic and foreign).

Environment

- Pollution of forest land with fertilizers and pesticides – harmful to animals and mankind.
- China and Japan have adopted progressive forestry and environment programs (including procurement practices) driving a major regional and global push towards SFM.
- Forests in good condition (healthy) and productive. People better understand the importance of forests and develop healthy relationship with forests.
- Increased green areas outside forests (especially for countries such as Thailand, Vietnam and Republic of Korea).
- Spread of rubber plantations threatens upland forests.

Ownership, management and tenure

- Landowners actively participate in management of their forests.
- In the Philippines, indigenous people will be receiving royalties for joint business ventures in their ancestral domains.
- Increased across-the-border financing of forests (e.g., from timber investment management organizations).
- Less forest dependence for livelihoods (in emerging economies).
- Indigenous people's roles and contributions to forest management better recognized.
- Community/local forest institutions will be greatly increased in terms of organizational



capacity and will hold the primary responsibility for forest management. Their status/authority will be on a par with public sector – but with greater share of responsibility.
- Conflicts over control of resources will still exist. However, poverty will be greatly reduced and this will not be a main driver of conflict.
- Production by community/public partnerships – with communities managing forests and private sector mainly as processors and suppliers to expanding green building programs.
- People take full responsibility to manage resources in an integrated manner.
- More integrated approach to land-use.
- Diminished government involvement in forest management (with communities, civil society, private sector assuming increasing roles).
- Increased role of trans-national corporations from regional emerging economies.
- Forest Services will have to be more responsive to growing social, economic and environmental (services) requirements from forests.
- Local governments strengthen stake in forest management due to increasing climate adaptation interest.

Environmental services
- Green finance mechanisms result in significant revenue for forest conservation and restoration.
- Increased forest financing from forest services (i.e., recreation), especially in Japan and Korea.
- Payments for environmental services (including carbon) "take off" – maybe in a limited sense initially.
- Payments for ecosystem services from tropical forests where investment environment supports.
- Remaining natural forests in Pacific countries conserved for ecosystem services.
- Society will be more willing to pay for environmental services from forestlands.
- Ecotourism will be big business in natural growth forests and protected areas.

Climate change
- Shifts in forest ecosystem types due to global climate change begin to become apparent.
- Forests will receive greater national importance in view of their roles in environment/climate change.
- Active forest carbon trading scheme in operation.
- Carbon credit market established.
- REDD has been a huge disappointment for forestry (after 15 years of discussion and negotiation, REDD mechanisms not emerging as practical).
- REDD will be dead.
- World attention has shifted from climate change mitigation to adaptation (reflecting acceptance of climate change as inevitable and largely unstoppable).

Water
- Water becomes the main force driving forest management.
- Water will be very expensive.
- Water supply will be very critical. People will think of the forest as a source of water rather than wood.

Biodiversity conservation
- Protected areas will be protected.
- Little improvement in biodiversity conservation.
- Forest restoration starts to significantly increase forest cover inside protected areas.

Others
- Food security – an issue in countries with large population pressures.
- Data on land cover and land-use available for planning and management (scale refined).
- Kids know forests only from screensavers and elevator sounds.
- Migration of rural people to cities reduces their immediate impact on remaining natural forests.
- Significance of forestry will fall significantly in all but a handful of countries.
- We will still be "at the crossroads."

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

INDONESIA'S FURNITURE EXPORTS EXPECTED TO FALL DUE TO FINANCIAL CRISIS

The Indonesian Association of Furniture and Handicraft Industries (Asmindo) has indicated that Indonesian furniture exports in the first quarter of 2009 were 35 percent lower than those recorded a year earlier. Asmindo has cited the global financial crisis as the key reason behind the drop and believes that reduced demand in global markets may lead to a sustained 30 per cent decline in furniture exports in 2009 from 2008 levels.

- Antara News -

VOLUNTARY CARBON MARKETS DOUBLE IN SIZE AND VALUE IN 2008

According to a report released in May by Ecosystem Marketplace, voluntary carbon markets doubled in both transaction volume and value in 2008. The value of the Chicago Climate Exchange (CCX) quadrupled from US$72 million in 2007 to $307 million in 2008. Similarly, the volume of carbon credits available on the CCX tripled to 69.2 million tonnes. According to the report, the United States is both the largest growing source of and demand for voluntary carbon credits, while corporate social responsibility and public relations benefits were identified as the key motivations for purchasing carbon offsets.

- Science Daily -

REDD FINANCIALLY COMPETITIVE WITH PALM OIL: STUDY

A new study by researchers at the University of Queensland has found that forest conservation via reduced deforestation and forest degradation (REDD) could be economically competitive with oil palm production. The study, published in the online journal *Conservation Letters*, estimates that REDD is financially competitive with oil palm production at carbon prices of between US$10 and US$33 per ton of carbon dioxide equivalent. The study indicates that paying to preserve the carbon stored in forests will have additional flow on benefits for the protection of endangered wildlife.

- mongabay.com -

COOPERATION FOR PROTECTED FOREST

Thailand and Cambodia have produced joint forest management plans to preserve the Preah Vihear Protected Forest Area (PVPFA), which stretches across the Thai, Cambodian and Laos borders. The project to coordinate efforts to preserve the Preah Vihear forest was established by the International Tropical Timber Organization (ITTO) in 2001 in partnership with the Thai Government. Cambodia became an official partner to the initiative in 2008 and it is anticipated that Laos will also join in 2010. The PVPFA is *deciduous dipterocarp* forest that is home to approximately 50 threatened species including gaur, banteng, sun bear and sarus crane.

- Phnom Penh Post -

MASTER PLAN FORTHCOMING TO INCREASE FOREST COVER IN BANGLADESH BY 20 PERCENT

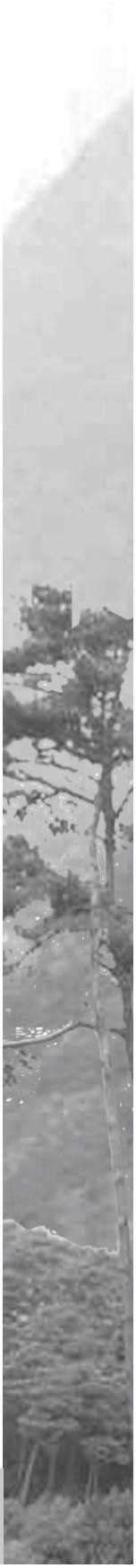
While attending the inauguration of the three-month "National Afforestation Movement," Bangladesh Prime Minister, Sheikh Hasina, indicated the Bangladesh Government will prepare a master plan to increase the country's forest coverage to 20 percent by 2015. At present, forest cover in Bangladesh is only 10 to 12 percent. Prime Minister Hasina said that the majority of the desired increase in forest cover would be achieved through community-based, social afforestation projects.

- The Daily Star –

REDD WILL ATTRACT ORGANISED CRIME: INTERPOL

An environmental crime specialist at Interpol has indicated that REDD is being assessed by organized crime syndicates as a potentially lucrative new opportunity for fraud. While participating in a forestry conference in Bali in June, Mr Peter Younger of Interpol encouraged governments, multi-lateral bodies and NGOs to involve law enforcement agencies in the development of REDD policies to prevent the fraudulent trading of carbon credits.

- Reuters -



VIETNAMESE TIMBER EXEMPTED FROM EXPORT TAX

The Vietnamese Ministry of Finance has removed a 10 per cent export tax previously applied to wood planks. The move has been motivated by a desire to help increase the export of Vietnamese planks and wood products. Exports of Vietnamese planks and wood products in the first quarter of 2009 were 22.9 percent lower than those recorded a year earlier. Vietnamese authorities have attributed the downward trend to reduced demand for wood products from import partners due to the global financial crisis.

- *Viet Nam News Agency* -

NEW INDONESIAN ORANGUTAN POPULATION DISCOVERED

A team of conservationists surveying mountainous forests in eastern Borneo have discovered a new population of orang-utans. It is estimated that 219 nests were found, indicating that the population of these remotely located orang utans was substantial. The conservationists intend to work with local authorities to ensure that the area and its special inhabitants are properly protected.

- *The Guardian* -

VITAL FOREST CORRIDOR SOON TO CLOSE FOR ELEPHANTS

Plans to develop a 2.5 kilometer wide corridor of forest located in the Western Ghats of India pose a serious threat to the world's largest population of wild Asian elephants. The corridor is the last unbroken forest leading the elephants from the wet season to dry season feeding grounds. Planned development of a highway checkpoint in the corridor will prevent the elephants from accessing a nearby river and fodder on the river margin. It will also provide persistent disruption to the elephant's behavioural patterns due to the constant, anticipated presence of highway traffic.

- *maongabay.com* -

AFGHANISTAN: DEFORESTATION MARCHES ON

According to provincial officials and forestry experts, the eastern Afghan province of Nangarhar has lost 90 per cent of its forest cover since 1989. Neighbouring provinces have also experienced similar dramatic declines in forest cover. In 2006, the Afghan government implemented a ban on tree-felling to address the problem. However, deforestation has continued unabated to meet demand for illegal timber exports and local communities' need for firewood. Afghan forestry officials say they lack the resources to combat deforestation and ensure better forest management.

– *IRIN & Reuters* –

VIETNAM: FORESTS DISAPPEAR AT RAPID RATE

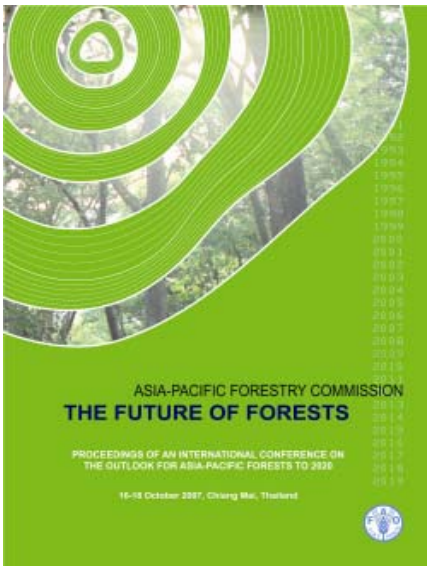
Forestry officials in Vietnam's Dak Nok province indicate that deforestation has intensified over the past year. Over the 12 months since April 2008, 440 hectares of forest have been lost – this represents a 55 per cent increase in the rate of deforestation from the previous year. The Department of Forestry has attributed the increase in deforestation to the rapid spread of illegal logging in the province and the limited resources of forestry officials. Officials indicated that the most vulnerable areas are located on borders with other provinces where the responsibilities of various provincial forestry departments are not clearly defined.

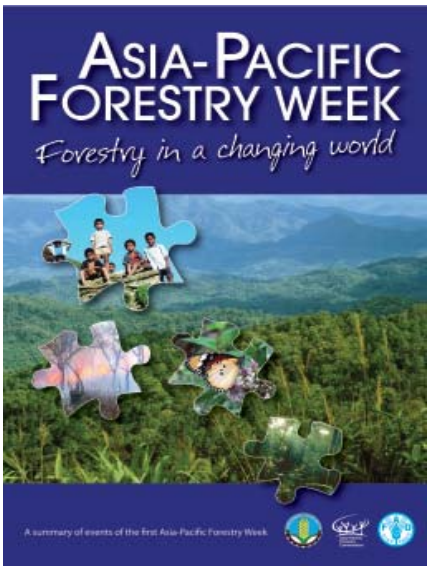
– *VietNamNet* -

ENGINEERS DESIGN FAKE 'TREES' TO TRAP CARBON DIOXIDE

Engineers at Global Research Technologies (GRT) are working to develop artificial trees that will absorb carbon dioxide from the atmosphere; much like actual trees. GRT's artificial trees are comprised of towers filled with an alkaline resin that traps carbon dioxide. Water is added to the resin to release the carbon dioxide so that it can be captured and stored. This process is able to be repeated indefinitely. GRT estimates that over 24 hours, one artificial tree containing 32,800 feet of resin will be able to harvest one ton of carbon dioxide per day. While promising, the technology is still in its infancy and may be some years away from commercial development.

– *MSNBC* –





NEW RAP FORESTRY PUBLICATIONS

THE FUTURE OF FORESTS
RAP Publication 2009/03

The "Future of Forests" conference was an important effort to understand the views of a wide spectrum of stakeholders on how forestry in Asia and the Pacific will unfold in the future in view of larger societal changes. A comprehensive set of forestry and related topics was addressed, including sessions describing land-use dynamics and underlying forestry trends, key drivers of change in forestry, shifts in forest policies and institutions, efforts to balance social, environmental and economic functions of forestry, globalization and national outlooks, and civil society and private sector perspectives on forestry. All of these are drawn together to help describe potential futures for forests in the region and to chart prospective ways forward.

ASIA-PACIFIC FORESTRY WEEK – FORESTRY IN A CHANGING WORLD
RAP Publication 2009/04

The first-ever Asia-Pacific Forestry Week, held around the 22nd Session of the Asia-Pacific Forestry Commission (APFC) in Hanoi, 21-25 April 2008, brought together individuals from governments, non-government organizations, research institutions, regional and international networks, UN agencies, and the private sector to share perspectives and seek solutions to the most challenging issues facing forests and forestry today. Each day was devoted to a different element of the three pillars of sustainable development: social, environmental and economic. This book captures some of the richness of the various debates.

Regional Training Workshop on Strengthening Monitoring, Assessment, and Reporting (MAR) on Sustainable Forest Management in ASEAN, 5-7 May 2009, Kuala Lumpur

Prepared by Masahiro Otsuka, Forestry Officer, FAO-RAP

The Regional Training Workshop on Strengthening Monitoring, Assessment, and Reporting on Sustainable Forest Management in ASEAN was held 5-7 May 2009, in Kuala Lumpur, Malaysia. The workshop was organized by the Forest Research Institute of Malaysia (FRIM) in collaboration with the Association of Southeast Asian Nations (ASEAN) and the "Strengthening Monitoring, Assessment and Reporting (MAR) on Sustainable Forest Management (SFM) in Asia" Project (GCP/INT/988/JPN). Forty-two persons from 9 countries and 3 organizations attended the training workshop. The workshop aimed to review the status of countries' application of MAR formats, introduce the ASEAN Criteria and Indicators (C&I) framework and its online format to participants, and receive their feedback for further improvement.

Questionnaire surveys conducted in member states illustrated the urgent need for institutional strengthening and capacity building to provide information on non-wood forest products (NWFPs), forest carbon stock, and endangered forest-dependent species, as well as to adjust classification of protected forest areas. There were nine country presentations on the progress and challenges in forest MAR. Important points from the presentations included the limited capacities of Forest Management Units (FMU) for data collection using C&I, lack of stakeholders' interest in MAR activities; difficulties in data collection for specific indicators (e.g., carbon stock, etc.); discrepancies in data formats among different data sources; and a need for translation of online formats into local languages. It is crucial to develop human resources in member states by disseminating online MAR systems to national and local stakeholders.

Participants suggested improvements of the MAR online system with the ASEAN C&I, such as further clarification of footnotes with adequate texts. They also discussed recommendations for further development of MAR with C&I in the ASEAN region, including:

- assessment of an adequate indicator set which is relevant to the national and FMU levels in each country;
- organization of follow-up training for trainers and technical officers at regional, national and FMU levels;
- research in assessment of forest-dependent flora and fauna as well as endangered/rare species, quantification of NWFPs, and valuation of forest ecosystem services with sufficient funds;
- effective coordination for inter- and intra-agency collaboration, especially to provide information for indicators at a national level;
- development of appropriate and cost-effective tools to obtain temporal and spatial data for indicators, including remote sensing and GIS technologies;
- inclusion of some critical variables for a future C&I framework, such as planted forest, resource ownership and use rights, and the role of forest in climate change mitigation and adaptation;
- preparation of the C&I format in local languages to enhance its implementation in countries;
- facilitation by the ASEAN Secretariat in sharing of experiences among member states to implement a clearing house mechanism (CHM) using the C&I format; and
- networking with other international organizations, covering their reporting tools, to encourage harmonization of forest-related reporting with C&I through ASEAN.

The workshop provided participants with a valuable tool to assess forest management capacities in member states, while also showing that it would still be necessary to improve the C&I format and increase country capacities for more effective application.

RAP forestry staff movement

After 26 years with FAO's forestry group at the Regional Office for Asia and the Pacific, **Masakazu Kashio** retired in April 2009 at age 62.

Mr. Kashio began his career with FAO under Japan's Associate Expert program in 1983. He subsequently took up the post of Forest Resources Officer for the Asia-Pacific region, where he coordinated the forest resources assessment and monitoring work, including FAO's Forest Resources Assessment (FRA), forestry statistics, forest inventory, and protected area management. He also provided technical support to member countries in the Asia-Pacific region in the field of silviculture, forest management and conservation, national park and wildlife management, community forestry, and non-wood forest products. He was one of the advisors to the *Tigerpaper* newsletter since its inception.

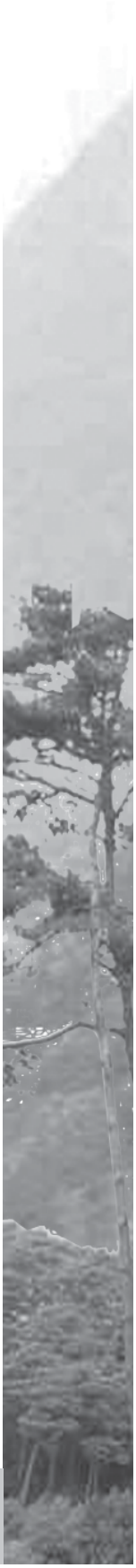
Mr. Kashio's expertise covered a wide range of subjects, including forest resources assessment, forest inventory, forest ecology, botany, reforestation, environmental assessment, wildlife conservation, remote sensing and GIS, and non-wood forest products.

He was well liked and respected in the forestry sector and known for his dedication and commitment to whatever he engaged in. His experience and knowledge of forestry will be greatly missed in the field.

For the immediate future Mr. Kashio will divide his time between Kyoto and Bangkok. His contact address is:
40 Minami-nishinoo-cho, Nishinanajo, Shimogyo-ku, Kyoto, Japan 600-8877; Tel: 075-315-1936, Mobile: 090-6608-8256; E-mail: kasiom@gmail.com

Akiko Inoguchi has completed her assignment with FAO-RAP and has relocated to Vietnam, where she will continue to work in the forestry sector.

Ratchadaporn Sommaneewan has been recruited to assist with the administrative work of the MAR project and the FAO-RAP forestry group until December 2009.



FAO ASIA-PACIFIC FORESTRY CALENDAR

12-14 August 2009. Manila, Philippines. ***National forum to strengthen policies and opportunities for forest investment in the Philippines***. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Tel.(662) 697-4139; Fax: (662) 697-4445; E-mail. Patrick.Durst@fao.org

18-20 August 2009. ***Forum on people and forests.*** Vietnam. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Tel.(662) 697-4139; Fax: (662) 697-4445; E-mail. Patrick.Durst@fao.org

7-11 September 2009. Tam Dao, Vietnam. ***FAO Training Workshop on stakeholder participation.*** Contact: Xiaojie Fan, National Forest Programme Facilitator, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Tel.(662) 697-4254; Fax: (662) 697-4445; E-mail. Xiaojie.Fan@fao.org

16-18 September 2009. Bangkok, Thailand. ***VIII World Bamboo Congress Thailand 2009: Bamboo, the Environment and Climate Change***. Contact: Mr. Harsh Adhyapak – Event coordinator, Equinox Marketing Co., Ltd.; E-Mail: wbc2009@hottdesk.com; Fax: (662) 231-8121.

21-24 September 2009. Nadi, Fiji. ***Pacific Heads of Forestry Meeting***. Contact: Sairusi Bulai, SPC, E-mail: SairusiB@spc.int

4 October 2009. Kuala Lumpur, Malaysia. ***5th APAFRI General Assembly***. Contact: Sim Heok Chon, APAFRI, E-mail: simhc@frim.gov.my

5-8 October 2009. Kuala Lumpur, Malaysia. ***International Forest genetic Resources Symposium.*** Contact: Oudara Souvannavong, FOMC, FAO Forestry Department, Via della Terme di Caracalla, 00100, Rome, Italy; E-mail: Oudara.Souvannavong@fao.org

18-25 October 2009. Buenos Aires, Argentina. ***XIII World Forestry Congress***. Contact: Olman Serrano, Associate Secretary General; E-mail: WFC-XIII@fao.org

23-28 August 2010. Seoul, Korea. ***XXIII IUFRO World Congress***. Contact: Secretariat, IUFRO Headquarters, Mariabrunn (BFW), Haupstrasse 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)
- Forests and floods – drowning in fiction or thriving on facts? (RAP Publication 2005/03)
- 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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