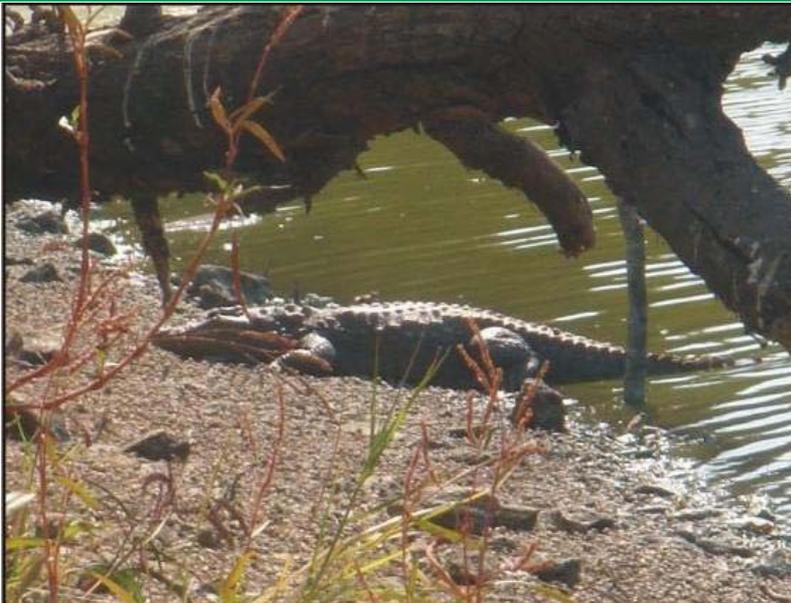




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Featuring

FOREST NEWS

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Front cover: Top left: basking crocodile at shore line; Top right: crocodile basking with mouth open; Bottom left: basking crocodile on shore; Bottom right: basking crocodile in grassy area (All photos courtesy: Meenakshi Mahur)

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Crocodile basking with mouth open (Photo courtesy: Meenakshi Mahur)

SOME OBSERVATIONS ON BASKING BEHAVIOR OF A WILD POPULATION OF MARSH CROCODILES IN BAGHDARRAH LAKE, UDAIPUR, RAJASTHAN, INDIA

by *Meenakshi Mahur, Chhaya Bhatnagar and Vijay Kumar Koli*

Introduction

Crocodiles, alligators, caimans, gharials and false gharials make up the crocodylian group which has survived for about 200 million years. In India, three genera of crocodiles occur naturally. These are: *Gavialis gangeticus* (Gmelin) or Gharial or long-snouted crocodile; *Crocodylus porosus* (Schneider) or estuarine or salt water crocodile; and *Crocodylus palustris* (Lesson) or mugger or marsh crocodile. Gharial can be easily differentiated from other crocodiles by the long and narrow snout which ends in a bulbous tip. The mugger and estuarine crocodiles are difficult to distinguish from each other in the field, but they normally do not occur together. The mugger has a broader snout, but estuarine crocodile's snout is longer. *Crocodylus palustris*,

the most "broad-snouted" true marsh crocodile species, is known to inhabit freshwater streams, rivers, lakes and ponds. The adult mugger measures about 4 m in length and weighs around 300 kg. It is a rough skinned reptile and prefers slow-moving and shallower areas. It has been included in the list of endangered animals according to **IUCN's Red list of 1999** and from then onwards, conservation measures have been taken for its protection. The species was threatened in the past by unregulated hunting for its skin, but now the threat is more due to its habitat destruction (Britton, 2003). Crocodiles are regarded as "keystone species" that maintain the ecosystem structure and function through selective predation on fish species, recycling of nutrients and maintenance of wetlands in droughts.

Study area

Lake Baghdarrah, located in Baghdarrah Nature Park (Udaipur Wildlife Division, Udaipur, Rajasthan), forms an ideal habitat for marsh crocodile. Although the lake is a small one, it has a highest water spread area of 1.8 km² that is greatly reduced during the summer period, yet it is a natural habitat for marsh crocodile. This nature park is a virgin area as regards to any documentation of fauna since the zone was only notified as a nature park in 2002. Thus, there is no scientific data available on various behavioral patterns of crocodile in this area so far. The present study is first of its kind which was aimed at studying the basking behavior of marsh crocodile.

In Rajasthan, 33 areas have been declared as “closed areas” for conservation and better management of various flora and fauna. Baghdarrah Nature Park is one of them and is situated 20 km southeast of Udaipur. It is under the jurisdiction of Udaipur Wildlife Division, along with four other Wildlife Sanctuaries. Earlier, this was a famous picnic spot, but now it is included in the protected area. A small population of *Crocodylus palustris* naturally inhabits the small lake within the nature park.

Methodology

The basking behavior was studied for a period of one year from June, 2007 to June, 2008. To study the basking behavior of crocodiles at Baghdarrah Lake, a weekly observation schedule was followed. On each visit the observations were recorded from 8.30 a.m. to 5.00 p.m. from the observation post demarcated earlier. The behavioral activities were watched carefully and recorded.

Results and discussion

The morphometric features of the lake are recorded in Table 1. Basking behavior was monitored every week and recorded in tabular form (Tables 2 – 5). The basking animals were carefully observed to document the following:

1. The substratum, area and season the crocodiles preferred to bask (Tables 2 & 3).
2. Orientation of the mouths of crocodiles, i.e., towards, away from the water or parallel to the water (Table 4).
3. Number of crocodiles with mouths closed or opened (Table 5). The basking behavior has been recorded in Plate 1 (Fig. 1 – 6).

Table – 1: Morphometric details of the Bagdarrah Lake, Udaipur (Rajasthan), India

S.No.	Details	Location
i.	Location – Longitude	73°48'E
	Latitude	24°31'N
	Altitude	577m above MSL
ii.	Water spread area	1.8 km ²
iii.	Catchment area	500 ha
iv.	Maximum depth	8.5m
v.	Dam	Masonry

TABLE – 2: Substratum preferred by crocodiles for basking

Month	Water temperature (°C)	Crocodiles					
		Adult			Young ones		
		Rock	Soil	Grass	Rock	Soil	Grass
June 07	27.0	-	-	-	-	1	-
July 07	31.0	-	-	-	-	-	-
August 07	32.1	-	-	-	5	-	-
September 07	29.3	-	1	-	11	2	-
October 07	27.4	-	-	-	8	-	-
November 07	22.8	3	1	2	5	1	1
December 07	18.5	3	2	1	5	2	1
January 08	18.3	11	-	-	2	-	-
February 08	19.9	14	2	-	8	3	1
March 08	28.3	-	3	-	2	1	-
April 08	28.9	1	-	-	1	-	-
May 08	32.0	-	-	-	-	-	-
June 08	33.4	-	-	-	-	-	-
Total		32	9	3	47	10	3

Basking is a seasonal phenomenon taking place during the colder months of the year. It is the crocodile's main activity while on land. There were sporadic sightings of basking crocodiles during the hot months from May to October. As indicated in Table 2, during the study period the adult crocodiles were observed to bask on rocks 32 times, while only on 12 occasions were they were found to bask on soil or grass. Similarly, the young ones were observed about 47 times to bask on rocks and only 13 times on soil or grass. As the majority of times the crocodiles were encountered to bask on the rocks, we can infer that this is the preferred site for basking by both young and adult crocodiles.

In the present study, it was also observed that a longer time period was spent on land in the cooler months than during the hot summer. In the winter season, *Crocodylus palustris* were observed basking from 9.00 a.m. to 4.00 p.m. It was further

recorded that both young and old crocodiles were encountered more frequently away from the water line while basking (Table 3). When not basking they preferred to stay in the water. This also indicated that the most preferred area for basking is on rocks away from the water body.

While observing the basking pattern it was noticed that about 22 times adult crocodiles had their mouths turned towards the water line and only 11 times with the orientation away from or parallel to the water line (Table 4). On 40 occasions, the young ones were found with their mouths oriented towards the water line, but were observed only 16 times oriented away from water line. This behavior indicates that while out of water the crocodiles are very alert and ready to escape into the water whenever they sense any danger.

Surveillance was also carried out with regards to whether the basking crocodiles had their mouths

TABLE – 3: Areas preferred by crocodiles for basking

Month	Crocodile				Young ones			
	OWL	IWL	WL	IL	OWL	IWL	WL	IL
June 07	-	-	-	-	-	-	1	-
July 07	-	1	-	2	-	-	-	-
August 07	-	3	-	4	5	-	-	-
September 07	-	-	1	4	14	-	-	-
October 07	-	-	-	4	8	-	-	-
November 07	5	1	1	3	8	-	-	-
December 07	5	3	1	2	6	-	2	-
January 08	10	-	1	1	2	-	-	-
February 08	16	-	-	3	14	-	-	-
March 08	3	1	-	2	3	-	-	-
April 08	1	-	-	1	1	-	-	-
May 08	-	-	-	-	-	-	-	-
June 08	-	-	-	-	-	-	-	-
Total	40	9	4	26	61	-	3	-

Acronyms:

OWL – Outside Water Line

WL – Water Line

IWL – Inside Water Line

IL – Inside Lake

TABLE – 4: Orientation of mouth of crocodiles while basking

Month	Crocodiles			Young ones		
	TWL	AWL	PWL	TWL	AWL	PWL
June 07	-	-	-	-	1	-
July 07	-	-	-	-	-	-
August 07	-	-	-	4	1	-
September 07		-	1	10	2	1
October 07	-	-	-	5	2	1
November 07	3	1	2	5	2	-
December 07	4	1	1	4	3	1
January 08	5	4	2	2	-	-
February 08	8	4	4	7	4	1
March 08	2	-	1	3	-	-
April 08	-	1	-	-	1	-
May 08	-	-	-	-	-	-
June 08	-	-	-	-	-	-
Total	22	11	11	40	16	4

Acronyms:

TWL - towards water line

AWL - away from water line

TABLE – 5: Crocodiles with mouth closed or opened

Month	Crocodiles		Young Ones	
	Mouth opened	Mouth closed	Mouth opened	Mouth closed
June 07	-	-		1
July 07	-	-	-	-
August 07	-	-	-	5
September 07	-	1	2	11
October 07	-	-	2	6
November 07	5	1	2	5
December 07	4	2	4	4
January 08	9	2	-	2
February 08	13	3	4	7
March 08	1	2	-	3
April 08	-	1	-	1
May 08	-	-	-	-
June 08	-		-	-
Total	32	12	14	46

closed or open. As is evident from Table 5, 32 adult crocodiles were observed with their mouths opened and only 12 with mouths closed, while among the young ones 14 were observed with their mouths open and 46 with their mouths closed (Table 5). The literature suggests that the crocodiles keep their mouths open while basking so as to maintain control over their body temperature. They basked outside the water line in the winter season when the water temperature was between 27.4°C and 19.9°C. They have a “preferred” body temperature of around 30°C - 33°C (Webb and Manolis, 1989) and to achieve such temperature they move back and forth between the warm and cool parts of their environment. They bask by orienting themselves in such a way that the maximum amount of body is exposed to the sun. Once the body is heated, they face the sun and open their mouth to allow the brain to cool through evaporative heat loss. This is known as the ‘mouth-gaping’ posture (Webb and Manolis, 2000). Hence, during the study period, in the winter season many

of the crocodiles were observed with their mouths open.

By observing the crocodiles’ basking pattern it is inferred that crocodiles are very careful when basking on the shore and quickly retreat to the water at the slightest disturbance. Hence, the majority of crocodiles basked while orienting their mouths towards the water.

The crocodile’s sense of sight, hearing and smell are well developed and the animal remains very alert while basking on land (Daniel, 2002). The basking behavior of a wild population of marsh crocodile was studied between Dec. 2000 and April 2001 in Ranganatittu Bird Sanctuary, Karnataka (Venugopal *et al.*, 2003). In that study, the number of crocodiles basking on land declined as the study progressed and contact with water increased towards the end of the study. This is true in our study also, i.e., in the winter season more

crocodiles were observed basking; the numbers decreased towards the end of the winter season.

Conclusion

During the study period more *Crocodylus palustris* were observed basking in the winter season as they bask to remain within their preferred temperature range, while in the summer season they spent most of their time underwater. While basking in the sun, the crocodiles preferred to remain on the rocks in comparison to land or grass. More crocodiles basked with their mouths open than closed. Many of the crocodiles were found to orient their mouths towards the water line as they stayed very alert while basking.

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INTOLERANT ATTITUDE OF PEOPLE TOWARDS BLACK BEAR (*Ursus thibetanus*) AND MITIGATION STRATEGIES IN KASHMIR VALLEY, INDIA

by Naim Akhtar and N.P.S. Chauhan

Introduction

There are wildlife species in conflict situations with local people in and around protected areas and managed forests in India (Singh, 2006; Bargali *et al.*, 2005; Akhtar and Chauhan, 2006; Chauhan, 2005a and 2005b; Mishra, 1997; Rajpurohit, 1996; Saberwal *et al.*, 1994; Vijayan and Pati, 2001; Schultz, 1986). Many of them are endangered and threatened (e.g., elephant, tiger, sloth bear, leopard, etc.), while some of them have lesser conservation value (e.g., nilgai, wild boar, jackal, etc.).

Throughout in their distribution range, bears are also known to attack people and livestock and to raid garbage dumps and orchards. Human-bear

conflicts have been reported from many parts of India. Conflicts with sloth bear (Bargali *et al.*, 2005; Akhtar and Chauhan, 2006) in central India, and black bear and brown bear (Chauhan, 2003 & 2004) in Himachal Pradesh and Uttarakhand have been reported.

Due to good forest cover and food availability, a sizable population of black bear thrives in the Kashmir valley. During the last few years, human-black bear conflicts have evolved into a big problem in all three wildlife divisions of Kashmir region. Attacks by black bear on local people and raids on livestock and horticulture crops are a very common problem and the retaliatory killing of bears is also taking place. The present study was planned to

assess the nature and extent of the human-bear conflict and to suggest mitigation strategies in the Kashmir region.

Study area

The Kashmir region of Jammu & Kashmir (J&K) state comprises six districts, three Wildlife Divisions and 30 Protected Areas (Figure 1). The J&K region consists of five great mountain ranges, namely the Himalayas, Karakoram, Ladakh, Zaskar and Pir Panjal. The state is divided into five physiographic regions viz, the Trans Himalayas, Great Himalayas, the lesser Himalayas, Shivaliks and Plains (Rodgers and Panwar, 1988). The Kashmir region has 8,128 km² of forest cover, which is more than 50% of the total geographical land area of 15,948 km². The region has four distinct seasons: Spring (March–May), Summer (June–August), Autumn (September–November) and Winter (December–February). The average maximum and minimum temperatures are 31°C and 18°C in July and 4°C and 2°C in January, except in Ladakh where the maximum temperature is 30°C and minimum temperature is –5°C.

The region is home to leopard (*Panthera pardus*), snow leopard (*Panthera uncia*), Tibetan wolf (*Canis lupus laniger*) and brown bear (*Ursus arctos*) as the major carnivores and hangul (*Cervus elaphus hanglu*), markhor (*Capra falconeri cashmiriensis*) and musk deer (*Moschus moschiferus*) are the major ungulate species.

The Kashmir region is well known for humans having conflicts with black bear and leopard. Occasionally Tibetan wolves will also kill or injure people.

Nature and extent of human-black bear conflict

Black bears killed 14 people and injured 108 (94 men and 25 women) between 2000 to 2006 in the South Wildlife Division (SWD) of Kashmir region (Table 1). Seven bears were captured, 17 were killed, 6 died natural deaths and 1 black bear was electrocuted in SWD (Table 3). These bears were comprised of 14 males, 8 females and 9 cubs (Table 4). A greater number of bear attacks on people occurred mainly between the months of July to November (Figure 2). Most of the bears were

captured or killed between September to December.

To date, 15 people (9 men and 6 women) were killed and 102 people (60 men and 42 women) were mauled by black bears and 100 incidences of livestock depredation have occurred since January 2002 onwards in Central Wildlife Division (CWD) of Kashmir (Tables 1, 2 & 5). Altogether 140 livestock (90 sheep and 50 goats) were killed in bear attacks in CWD (Table 5). All the killed bears were shot by police/military forces in CWD. Apart from this, there were 190 incidences of bear raids on apiaries (honey farms) in CWD. During the same period, 20 bears were rescued from human areas in CWD; 15 of them were released in the wild immediately after the capture and 5 are being kept in captivity at a rescue facility at Dachigam and Pehalgam Rescue Centre.

Sixteen incidences of black bear attacks on humans occurred in North Wildlife Divisions (NWD) during the last three years (2004 onwards). Twenty-two people were attacked by bears during these incidences. Of these, 3 were women and 19 were men.

There have been 32 incidences of black bear depredations on livestock during last three years in NWD and 40 livestock in number were killed (22 sheep and 18 goats).

Methodology

Data on human casualties and livestock depredations were taken from the records of the Divisional Forest offices of Baramula, Anantnag and Srinagar of Kashmir region. Forests and orchard areas of all three divisions were visited to assess the circumstances under which the bears arrived in the village and attacked local people. People's attitude towards black bear conservation was also observed.

Discussion

Farming is the main occupation in the region and people don't tolerate any loss to their crop or livestock from black bears. Maize and rice are the principal crops in the Kashmir region occupying 53% of the gross cropped area, followed by wheat

(24%), oil seeds (6.7%) and pulses (3.9%). The remaining area is under barley, bajra and other cereal crops. Maize is one of the attractive foods for black bear. As human populations expand and natural habitats are converted into agriculture land, people and animals are increasingly coming into conflict for food and space (Saberwal *et al.*, 1994). The impacts are often severe; people lose their crops, livestock, and many times their lives (Karanth and Madhusudan, 2002).

The bear menace was found to be very prominent in SWD and the actual number of human casualties (including mauling) was actually perhaps 4 times higher than the reported figures. The Forest Department has recently started paying compensations/ex-gratia to the victims/dependents, only for killing incidences but not in mauling cases. Hence, many incidences of human mauling by black bear go unreported. Moreover, the amount of compensation is very small, which also discourages people from reporting such incidents to the Forest Department. A similar trend was observed in Central and North divisions. Interestingly, 81% of bear capture and killing incidences occurred from September to December, which coincides with the post-fruiting season in SWD when bears get large amounts of leftover fruits (e.g., apple, walnuts, almond, plum, and apricot) in orchards. People were found to be highly intolerant towards bears. People chased bears if they strayed into human habitations from forests; consequently, many incidents of human or bear casualties have occurred. Recently, a single black bear that was chased by a group of people in a village of SWD mauled 12 people in row. All the human casualties caused by black bear occurred in human areas. Many times bears have been shot, burnt alive or killed by mobs. Due to insurgency in the region, paramilitary forces are posted everywhere and the local people have easy access to them to get protection from the wild animals. Hence, most of the black bears were killed by the police or army. Due to heavy security deployment, the extent of poaching apparently has been reduced significantly, which perhaps contributed to an increase in the population of black bears and the exposure of black bears to humans too; hence, encounters with people had been frequent in the region.

Moreover, black bears don't have any hunting value for their meat, bile or fur for the Muslim community in the area and people generally don't like this species, so bears by and large are safe in these forests.

Black bears are often killed in retaliation or to prevent future conflicts. Recently, one bear was burnt alive by local people in Pulwama district of SWD. And so, if solutions to conflicts are not adequate, local support for conservation also declines. People are naturally scared of these large predators and the first reaction is to attack or shoot them. However, attacks on humans do not appear to be a result of predatory behavior, but rather a result of the bear defending itself or its cubs from humans or trying to secure food. Many people have gotten hurt or killed by a mother bear with cubs when she is disturbed/chased by local people.

Mitigation strategies

There is urgent need to collect reliable information on the population status of black bear to deal with the human-wildlife conflict on a long term basis. Black bears straying into human settlement areas in the Kashmir region is a very common occurrence; hence, it was recommended to the Forest Department to set up more rescue centers for keeping nuisance or injured bears if rescued from human areas. It was also advised to immediately release all captured animals into the wild, far from human settlements, if the animals are healthy. People must change their intolerant attitude towards bears and play an active role in resolving conflicts. To achieve this, there is need to educate people through organizing seminars and symposiums about wildlife conservation, coexisting with bears, and making them aware of ways to avoid black bear confrontations. To reduce the frequency of bears coming to orchards, proper disposal of left over fruits is required. People need to be paid reasonable compensation/ex-gratia by the Forest Department in cases of attack and loss of crops.

Figure 1. Forest cover map of Jammu & Kashmir



Table 1: Status of human casualties caused by black bear in Kashmir region

Division Name	Killed	Injured	Period
South Wildlife Division	14	108	2000-2006
Central Wildlife Division	15	102	2002 onwards
North Wildlife Division	20	2	2004 onwards

Table 2: Status of people killed in Kashmir region

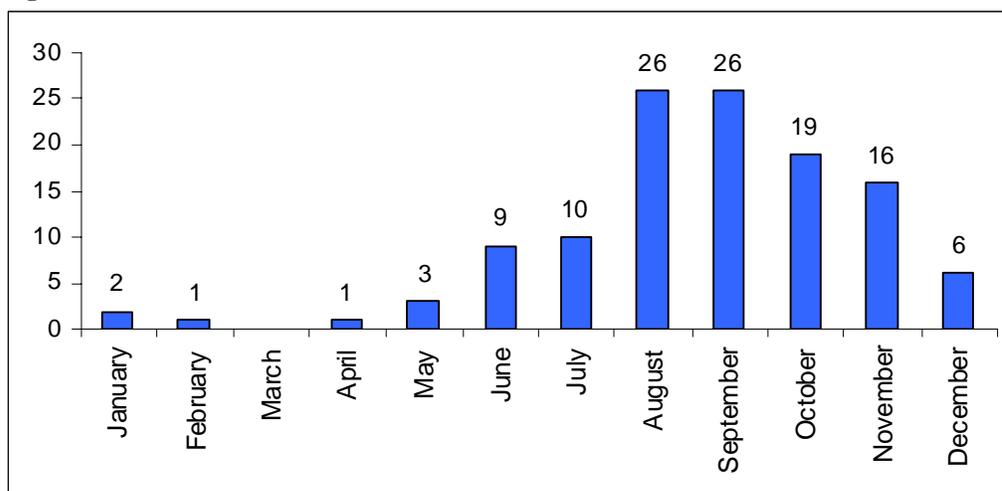
Division Name	Men	Women	Period
South Wildlife Division	96	26	2000-2006
Central Wildlife Division	69	48	2002 onwards
North Wildlife Division	19	3	2004 onwards

Table 3: Status of strayed bears in human areas of Kashmir region

Division Name	Captured	Killed	Natural death	Electrocuted	Period
South Wildlife Division	7	17	6	1	2000-2006
Central Wildlife Division	20	5		-	2002 onwards
North Wildlife Division	2	2		-	2004 onwards

Table 4: Status of black bears captured or killed in Kashmir.

Division Name	Male	Female	Cubs	Period
South Wildlife Division	14	8	9	2000-2006
Central Wildlife Division	12	8	5	2002 onwards
North Wildlife Division	2	2	-	2004 onwards

Figure 2. Occurrence of bear attacks on humans in SWD in Kashmir.**Table 5: Livestock depreations by black bear in Kashmir region**

Division Name	No. of incidences	Sheep	Goat	Cow	Buffalo	Period
South Wildlife Division	130	120	35	7	2	2000-2006
Central Wildlife Division	100	90	50		1	2002 onwards
North Wildlife Division	32	22	18			2004 onwards

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WITHERING WET TREASURES OF THE INDUS ECOREGION - HALEJI LAKE

by Muhammad Rais and Darakhshan Abbass

The Global 200 Analysis identified five ecoregions in Pakistan. The Indus Ecoregion is the only ecoregion that lies fully within Pakistan's boundaries. The Indus ecoregion is ranked among the world's 40 most biologically richest ecoregions. It is located in Sindh Province, Pakistan, covering around 65% of the province. The River Indus, its riparian zone, numerous permanent freshwater lakes such as Keenjhir and Haleji Lake, mudflats, mangroves and coastal wetlands are important features of the ecoregion.

Sindh Province is home to many wetlands — mostly natural lakes such as Manchar, Keenjhi, Hadero, and Drigh. Most of these lakes are fed by the River Indus and its tributaries. Haleji Lake is situated some 15 km northwest of Thatta and 75

km east of Karachi. It covers an area of almost 1,700 ha. Originally a saline lagoon formed by the collection of rainwater it was later modified into a water storage reservoir after completely draining out the salt water. Due to its significance as a habitat for diverse forms of wildlife species, the lake was declared a Game Sanctuary in 1971. Later, in 1977, its status was raised to a Wildlife Sanctuary in order to provide more effective protection by putting bans on some activities such as hunting, shooting, trapping of animals, clearing the natural vegetation and construction, etc. Under the Ramsar Convention in 1976, it was included in the list of wetlands of international importance. Haleji Lake is known for its bird fauna, for which it is sometimes referred to as a bird watchers' paradise.

Figure 1: Map showing Indus Ecoregion (Photo courtesy WWF)

Currently, Haleji Lake presents a very grim picture of the status of a wetland and its associated wildlife species. A multitude of factors such as hunting, angling and contamination, etc. have contributed to degrading the wetland once considered to be a haven for a spectrum of wild species of fauna and flora. However, the suspension of water from Jam Canal carrying water from Keenjhir Lake in to Haleji Lake by the Karachi Water and Sewage Board has badly deteriorated not only the water quality of the lake, but seepage around the lake has also shrunk within a short span of time. The former resulted in an increase in the frequency of water-borne diseases such as gastro, diarrhea and dysentery, etc. among the local community for

whom the lake is the only source of potable water. Grave repercussions on the richness, abundance and distribution of several wildlife species have also been recorded due to worsening water quality and reduction in the surrounding seepage area of the lake. Seepage from the lake forms shallow ponds with an abundant fish supply and extensive *Typah* and *Saccharum* that provides ideal breeding and nesting grounds for a number of resident and migratory birds. In addition, such seepage areas are suitable habitats for the smooth-coated otter and fishing cat. The current population of fishing cat comprises not more than few individuals and no more otters are found at the lake.

Figure 2: Sign board installed by the Sindh Wildlife Management at the entrance of Haleji lake*Black-winged stilt*



Haleji Lake

Migratory birds are considered to be an excellent indicator of the health of any particular wetland. A gradual decline in the number of migratory birds renders one able to infer the deplorable state of this lake. It is distressing to know that some of the migratory species, for example Ruddy Shelduck and Marbled Teal, have not been observed at Haleji for at least the past two years.

The latest development of RBOD (Right Bank Outfall Drainage), just few feet away from the lake, is the last nail in the coffin, as water from the lake will seep into the canal, resulting in even more worse consequences.

The Sindh Wildlife Management Board has successfully bred in captivity a few significant wildlife species of the lake. These include marsh crocodile, mallard and greater flamingo. Furthermore, captive breeding of hog deer is also in progress.

Therefore, if this treasure is to be preserved for the generations to come then, obviously, the first

and foremost important mitigating measure would be the resumption of the life line of the lake, i.e., the supply of water via Jam Canal into the lake. It is also suggested that locals should be encouraged to settle down at some distance from the main water body so that contamination through sewage and their livestock and poultry waste could be avoided and also human-crocodile conflicts. The increase in the number of cases of crocodile attacks on locals is also correlated to human activities within the home range of this giant reptile. When the conditions in terms of suitability of habitat and water quality are reversed, then this wet treasure of the Indus Ecoregion may again rightly be once again called not only a bird watcher's paradise, but a paradise for wildlife and nature lovers.

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VERMICOMPOSTING OF ELEPHANT DUNG WITH THE HELP OF INDIGENOUS IN-SITU BACTERIA AND FUNGAL CULTURE

by Shubhasree Ganguly, Saswati Guha and Pranabes Sanyal

Introduction

The elephant dung decomposition rate is so slow that it assumed to be in a “steady state” where production rates are equal to disappearance rates (Nchanji & Plumtre, 2001). So, dung counts are the most practical means of estimating the numbers and distribution of forest-dwelling elephants (Barnes *et al.*, 1997). The difference in decomposition rates depends on microclimatic conditions. Carbon mineralisation from the dung is extremely rapid during the first 48 hours after deposition, but micro-organism activity becomes progressively more limited by moisture after this initial period, and drops to a comparatively low rate after two weeks when the dung becomes dry (Masunga *et al.*, 2006; Anderson & Coe, 1973). The composition of elephant dung depends on the diet composition and foraging ecology (Chen *et al.*, 2006). But this dung is very fibrous as it contains a great deal of twigs, fibers and seeds that remain virtually untouched so that it helps in the seed dispersal process (Kitamura *et al.*, 2007). Elephant dung is a source of phenolics (Mandal & Brahmachary, 2002). It is also used as raw material for paper called “elephant dung paper” (Anon, 2001). But in the case of problems related to the pilkhanas of North Bengal, the implementation of vermicomposting is a better option than the above two uses, which did not become popular. Moreover, dung heaps attract a lot of mosquitoes and cannot be easily tackled due to the acrid nature of the dung. The present practice is to burn out the dry dung, contributing to greenhouse gases in the atmosphere. Since vermicoposts are in great demand in tea gardens in North Bengal, this is the best option.

Materials and method

The study was carried out in Garambasti in Buxa Tiger Reserve in Alipurduar. Raw elephant dung

was collected from Kalkut Pilkhana. To aid the earthworm’s consumption, pre-composting was done to partially decompose the materials. 9.8 kg of cow dung was mixed with 196 kg of elephant dung on 26 March 2009. Then this mixture of cow dung and elephant dung was equally divided into seven portions and put into six plastic containers; the seventh portion was kept on the soil bed. These were covered by banana leaves to facilitate moisture conservation. For better conditioning, 500 ml of extended Effective Microorganisms (EM) (Higa, 1995) was added to each container and in the soil bed on 4 April 2009.

E.M. is a brown colored liquid containing a consortium of beneficial microbes and acts as a soil conditioner as well as microbial inoculant. It is produced from the culture of over 80 strains of beneficial microorganisms, which are collected from the natural environment of India. Over 90 countries are using this technology successfully today. E.M. mainly consists of *Lactobacillus*, photosynthetic bacteria, yeast, filamentous fungi, and ray fungi species of microorganisms. The microorganisms are not imported or genetically engineered. E.M. includes both aerobic and anaerobic species of microorganisms which co-exist in an environment of less than 3.5 pH. E.M. is used to improve the quality of the product along with overcoming the pollution problem.

Preparation of Extended EM

Extended Effective Microorganism (EM) is prepared by mixing water, molasses and E.M. in the ratio of 16:3:1. The mixture is poured into a clean plastic container (previously sterilized under sunlight for one day) and made airtight, so that no air is left in the container. The container is then kept in the shade at ambient temperature for a week. After one week, when the pH of the

(continued on p.17)

(continued from p.16)

extended E.M. has attained a value of 3 with a good smell, it is ready to apply to the mixture of elephant dung and cow dung.

Sprinkling water on the heaps was done to maintain the moisture content. 500 ml of extended Effective Microorganisms (EM) (Higa, 1995) was again added to each container and to the soil bed on 30 April 2009 to make the moisture content 70-80%.

Indigenous natural microbe (growing at the dung and soil junction) culture

On 20 May, 550 ml each of indigenous bacterial and fungal culture was inoculated into the respective heaps by making five holes into the heaps. For fungal and bacterial culture, Potato Dextrose broth and Nutrient broth solution were used respectively. Then, 1 gm of elephant dung was collected from the dung and soil interface was added to each of the two above-mentioned broth solutions. Then this solution was kept for 48 hours of incubation, and was then ready to apply.

On 22 May, earthworms were collected from the banks and added into the respective containers and

the soil bed. Earthworms could be added because the pH was then 6.5, which was earlier 3.5 in the pre-compost. On the soil bed and in one plastic container, 252 *Eudrilus* (*E. eugeniae*) were added to each. In another two containers, 126 *Eudrilus* and 126 *Perionix* (*P. excavatus*) were added to each. In another two containers, 126 *Eudrilus* and 126 *Eisinia* (*E. fetida*) were added to each. In the last container, 84 *Eudrilus*, 84 *Perionix* and 84 *Eisinia* were added. Some water was sprinkled on the respective containers and on the soil bed to maintain the moisture content and the materials were churned to maintain aerobic conditions for the proper activities of worms. On 25 May, again 550ml of Extended E.M. was added to each of the containers and also to the soil bed.

On 16 July, cocoons were observed. On 31 July, "vermicompost" formation was noticed in all the containers as well as in the soil bed. After completion of vermicomposting, the worms were counted. The input of 252 earthworms had multiplied to 2,380; i.e., there was an increase of 2,128 worms. Samples of vermicompost were collected for the analysis of carbon (C), nitrogen (N), phosphorus (P) and potassium (K).

Results

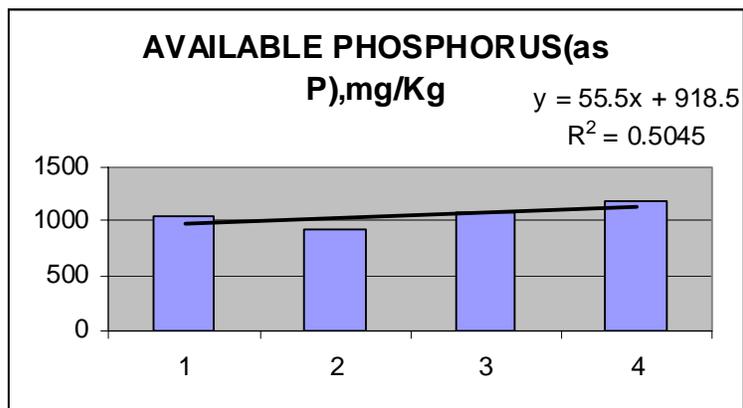
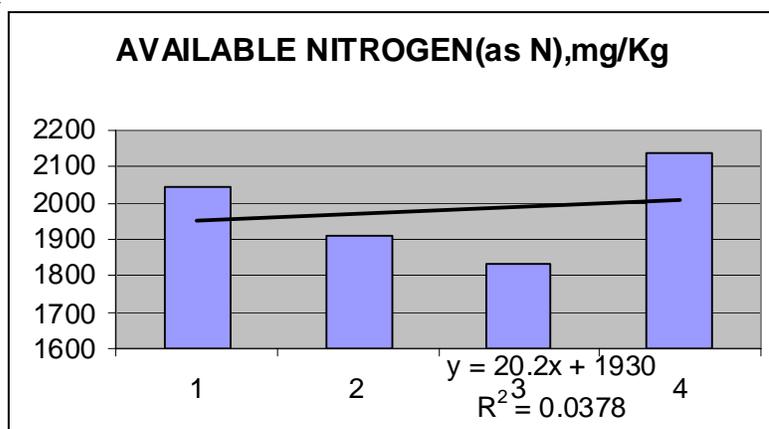
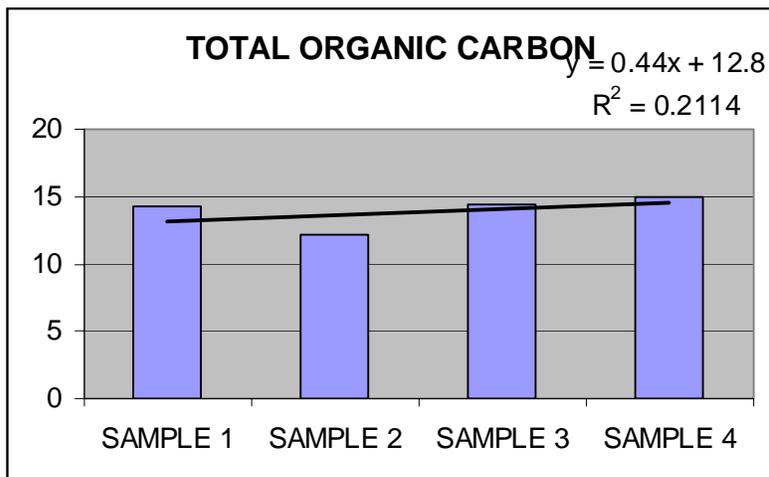
SERIAL NO.	PARAMETERS	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
1	TOTAL ORGANIC CARBON (%)	14.2	12.1	14.4	14.9
2	AVAILABLE NITROGEN(as N),mg/Kg	2042	1911	1834	2135
3	AVAILABLE PHOSPHORUS(as P),mg/Kg	1041	935	1073	1180
4	AVAILABLE POTASSIUM(as K),mg/Kg	8400	7500	8000	8400

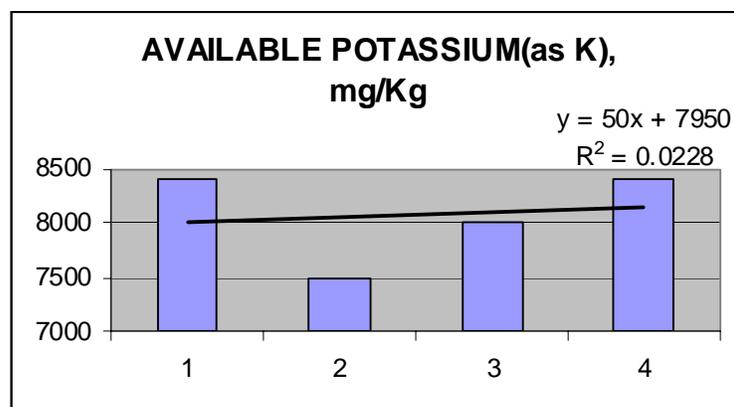
SAMPLE 1 - *Eudrilus*

SAMPLE 2 - *Eudrilus* + *Perionix* + *Eisinia*

SAMPLE 3 - *Eudrilus* + *Perionix*

SAMPLE 4 - *Eudrilus* + *Eisinia*





Discussion

All four parameters, i.e., total organic C, available N, available P and available K are highest in concentration in sample 4 (*Eudrilus + Eisinia*) and then in sample 1 (*Eudrilus*).

However, only Phosphorus is 'significantly' highest in the case of sample 4 (R^2 value = 0.5).

The C/N ratio stands as follows in descending order:

Sample No	C/N Ratio
3(<i>Eudrilus + Perionix</i>)	78.5
4(<i>Eudrilus + Eisinia</i>)	69.7
1(<i>Eudrilus</i>)	69.5
2(<i>Eudrilus + Perionix + Eisinia</i>)	63.31

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CONSERVATION PRIORITIES OF LESSER CATS (FAMILY: FELIDES) OF CHIRANG RESERVE FOREST, BTAD, ASSAM, INDIA

—by *Rakesh Soud, N.K. Dey, K.J. Mazumdar, Simi Ttalukdar and Lohit Gogoi*

Introduction

The lesser cats (Family: Felides) have proved to be far more elusive than other legendary predators such as tigers and leopards as the top carnivores distributed throughout the Indian subcontinent. The Chirang Reserve Forest (RF) (59,254.12 ha) is under the Haltugaon Forest Division (26° 06' 56.05" N to 26° 54' 1.95" N latitude and 90°12'03.76"E to 90°29'07.02"E longitude) of the Western Assam Circle Conservancy. Haltugaon territorial division is spread over parts of present Kokrajhar, Dhubri and Bongaigaon districts, on the northern bank of the River Brahmaputra. The total geographical area of the division is 1,071 km². The Chirang Reserve forest is located within the Assam-Duars in the western Assam region. It can be considered a plateau, rising gently towards the north where it meets the Bhutan Hills. The elevation reaches as high as 500 m in the north. The plateau merges

with the cultivated lands in the south and drains towards the River Brahmaputra. From the north, and for a few kilometers to the south, the tract is composed of rocks and pebbles, and remains waterless for most of the year, representing a typical *Bhabar* characteristic. Further down the streams are perennial, ground water is high, and the soil is more productive, thus representing a *Terai* characteristic. The major forest type of the region is characterized by natural regeneration of *Bhabar* and *Terai* sal forests. Located adjacent to lower central Bhutan, the RF falls within the Assam Plain Endemic Bird Area and a marginal part of the Eastern Himalaya Endemic Bird area with a significant avian diversity. The Chirang Reserve Forest is a part of the Ripu-Chirang elephant corridor and shares its eastern boundary with Manas Tiger Reserve as a potential mammalian habitat (Soud, 2007). Although literature about lesser cats has been published in many journals, few references refer to the northeast

(Chandiramani *et al.*, 2002) and none specifically deal with Chirang Reserve Forest. The present study aims to minimize the gaps of information on the diversity and conservation status of lesser cats in these potential habitats.

Methodology

In this study maximum efforts were directed at species inventory and threat records. Two techniques were used, derived from the existing wildlife survey techniques, but modified to suit the objectives of the study, i.e., i) Visual encounter surveys; and ii) strip transects. All techniques were primarily oriented towards effective sampling in such studies. Data were collected in various ways. Besides transects and random survey in the potential sites, an open-ended questionnaire was also used to collect data from selected respondents. Intensive observation and discussions with groups of community people were also part of the data collection technique. Both primary and secondary data were collected. Official data and other relevant documents were collected from relevant sources.

Results and discussion

The present study recorded a fascinating assemblage of mammals including five species of lesser cats belonging to the Family: Felidae (Table 1) in the Chirang Reserve Forest of Western Assam. Besides the lesser cats, the large cat species viz. tiger (*Panthera tigris*) and leopard (*Panthera pardus*) were also recorded during the study period. The status of most of the species of lesser cats according to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the Wildlife (Protection) Act, 1972 (Govt. of India), also shows the importance of the area from a conservation prospective. Analyzing the threat records reported through interviews, direct sightings and evidences, it can be stated that the habitat alteration due to logging and active hunting pressures are a major problem for the survival of the lesser cat species along with other mammals. The majority of people in the 25 forest villages under the Chirang Reserve Forest were dominated by *Bodo* tribes, followed by *Nepalies*, who never eat any lesser cats. Though the skins of some species were reported to be traded locally, the instigation of villagers towards

the killing of cat species in relation to livestock depredation cannot be ignored. In addition to hunting, the large scale habitat destruction due to logging and the extraction of other forest products is also a serious threat. Considering the limited legal mechanisms and vast areas that adjoin other well forested regions and the international Indo-Bhutan border and surrounding villages, the Chirang Reserve Forest acts as a safe refuge from the anti-wildlife activities. Compared to the high concentration of carnivores, including the lesser cats, the herbivore diversity is declining due to the pressure of hunting and habitat destruction. The probability of the predator species opting for non-target species can, therefore, not be ignored. An in-depth prey/predator study is needed as the prey/predator unit plays a key role in maintaining the energy balance in the ecosystem (Chetry *et al.*, 2001).

Significant resources and well trained manpower is needed to be available with a clear mandate of wildlife conservation and implementation of wildlife laws by the legal mechanism in collaboration with the local communities. Presently, the Chirang Reserve Forest is under the jurisdiction of the recently formed BTAD council, which is working with the local communities and other non governmental organizations to promote the conservation initiative in the area, which may lead the Chirang Reserve Forest as a viable habitat for the existing lesser cat species.

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Table 1: Lesser cat species recorded in Chirang R.F. with sighting evidences.

English Name	Scientific Name	*Status	Presence	Evidence
Clouded Leopard	<i>Neofelis nebulosa</i>	Vulnerable WPA-I Appendix - I	Confirmed	Pug Mark and Secondary information
Golden Cat	<i>Catopuma temmincki</i>	Vulnerable WPA -I	Reported	Secondary information
Jungle Cat	<i>Felis chaus</i>	Lower Risk WPA -II Appendix- II	Confirmed	Sighting
Leopard Cat	<i>Prionailurus bengalensis</i>	Lower Risk WPA-I Appendix - I	Confirmed	Sighting
Fishing Cat	<i>Prionailurus viverrinus</i>	Vulnerable WPA-I Appendix- II	Confirmed	Secondary information

**Status of Wildlife (Protection) Act, 1972 and Convention on International Trades in Endangered Species of Wild Fauna and Flora (CITES).*

ANTHROPOGENIC THREATS IN THE NATIONAL CHAMBAL SANCTUARY, MADHYA PRADESH, INDIA

by S.R. Taigor and R.J. Rao



Sand mining at Piparai in the National Chambal Sanctuary, India

Introduction

Anthropogenic processes have physically, chemically and biologically modified India's great river ecosystems. The impact of anthropogenic forces on the river ecosystem is either equivalent or greater than natural forces. The importance of human–environment interaction studies are widely recognized to understand the impact of anthropogenic activities on river ecosystems (Singh and Singh, 2006).

Many countries have pledged to reduce the accelerated rate of the loss of biodiversity by 2010 (Convention on Biological Diversity, <http://www.biodiv.org>). Asian countries went further by committing themselves to halt the loss of biodiversity in Asia by 2010. In order to judge whether these ambitious goals are met, detailed information on different components of biodiversity are necessary. Such information needs to be collected by properly designed monitoring systems

(Pereira and Cooper, 2006). Recently, much work has been focused on describing the desirable properties of monitoring systems or the indicators proposed to measure large-scale trends in biodiversity (Gregory *et al.*, 2003; Weber *et al.*, 2004; Balmford *et al.*, 2005; Gregory *et al.*, 2005; Mace *et al.*, 2005; Heer *et al.*, 2005).

Major ecological studies on crocodiles and freshwater turtles have been conducted in the Chambal River from 1983 onwards (Singh, 1985; Rao, 1988, 1990; Rao and Sharma, 1997; Rao *et al.*, 1995; Sharma, 1991; Hussain, 1991). A part of the Chambal River is protected under the National Chambal Sanctuary. In the Sanctuary, human activities are increasing and are affecting the aquatic animal diversity and their habitats. The impact of anthropogenic threats in the National Chambal Sanctuary on aquatic animal diversity, particularly crocodiles and freshwater turtles, are discussed in this paper.

Material and methods

The National Chambal Sanctuary was created to emphasize the conservation and propagation of gharial in the Chambal River. Geographically, the Sanctuary lies between latitudes 25°35'N and 26°52'N and longitudes 76°28'E and 79°01'E.

The present study was undertaken in the National Chambal Sanctuary, Madhya Pradesh, from 2006-2007. The study area in National Chambal Sanctuary was divided into nine zones from Pali to Chakarnager (0-395). These survey zones were Pali-Rameshwar (0-22), Rameshwar-Chenpur (22-60), Chenpur-Sarsaini (60-165), Sarsaini-Rajghat (165-200), Raghat-Babu Singh ka Gher (200-230), Babu Singh ka Gher-Usedght (230-272), Usedghat-Ater (272-310), Ater-Barai (310-350), and Barai-Chakarnagar (350-395).

Field map sheets developed from 1:50,000 topo maps were used to record animal sightings. Surveys were carried out using motorized boats (with a speed limit of 4- 6 km/hr). Observations were recorded using binoculars, cameras and GPS (GARMIN-12). Habitat characteristics of different animals along the Chambal River in the study area were recorded in the data sheets. Information on water depth, water current, nature of river banks and their suitability for different purposes like basking, nesting and resting at different stretches of the Chambal River was recorded.

Various human activities like sand mining, fishing, ferry, wood collection, agricultural practices and poaching on the river banks were observed during the study period.

Observations

Aquatic animal diversity

The important aquatic animals present in the Chambal River are Gharial (*Gavialis gangeticus*), Muggar (*Crocodylus palustris*), seven species of freshwater turtles i.e., *Batagur kachuga*, *Batagur dhongoka*, *Pangshura tentoria*, *Hardella thurgii*, *Nilssonina gangeticus*, *Lissemys punctata* and *Chitra indica*, Gangetic dolphin (*Platanista gangetica*), Otter (*Lutrogle perspicillata*), 176 species of birds and around 47 species of fishes.

Estimated populations of different species in the National Chambal Sanctuary, Madhya Pradesh are shown in Table 1.

Habitats

The characteristic feature of the River Chambal is that it has perennial, rapidly flowing water during the monsoon and slowly flowing water in other seasons, which makes this river fit to accommodate flora and fauna of two different kinds of river flow systems. The Chambal River in the study area has different habitat types, particularly regarding the river depth, flow and nature of the banks. Animals occupy various suitable habitats according to their requirements. Major habitat requirements of different species in the National Chambal Sanctuary are shown in the Table 2.

Anthropogenic activities

The Chambal River is subjected to extreme biotic pressure due to the exploitation of natural resources. In the Sanctuary, human activities like fishing, sand mining, deforestation, agriculture on the river banks, and poaching of wild animals are increasing (Table 3).

Sand mining

Sand banks are very much useful for the aquatic animals for resting, nesting and basking. The reptiles in the river such as gharial, muggar and freshwater turtles come out on the sand bank for basking and laying eggs in nests specially constructed by the individual females. The extraction of sand for construction work is a major usage from Chambal River. Sand mining is one of the major human activities in the National Chambal Sanctuary. In the present study, 14 sand mining sites were observed where illegal sand mining is being carried out.

Fishing

Although large scale commercial fishing is totally banned in the Chambal River to avoid incidental mortalities of aquatic animals in the fishing gill nets, illegal fishing was noticed in the Sanctuary. During the study, fishing on a commercial scale was observed at different places in the Sanctuary. Fishermen were seen using nylon gill nets and other

Table 1: Variation of animal population in different zones in the National Chambal Sanctuary from 2006-2007

Species	Year	Number of animals in the Zones									
		1	2	3	4	5	6	7	8	9	Total
Dolphin	2007	0	0	3	5	9	8	12	26	28	91
	2006	0	0	2	5	4	4	5	26	23	69
Otter	2007	0	0	1	3	2	0	0	0	0	6
	2006	0	0	0	1	1	0	0	0	0	2
Gharial	2007	4	64	26	73	120	63	56	198	261	865
	2006	8	3	51	32	48	87	211	92	103	635
Mugger	2007	19	44	54	10	14	12	10	14	17	194
	2006	9	31	27	20	33	18	20	10	24	192
Soft shell Turtle	2007	10	20	12	29	32	17	21	46	21	208
	2006	7	23	7	12	31	14	11	24	21	150
Hard shell Turtle	2007	12	33	45	32	87	75	97	66	45	492
	2006	11	25	43	25	55	66	89	23	33	370

Zones: 1- Pali – Rameshwar, 2- Rameshwar- Chenpur, 3- Chenpur –Sarsaini, 4- Sarsaini- Rajghat, 5- Rajghat--Babu S.Gher, 6- Babu S. Gher- Usedght, 7- Used ghat-Ater, 8- Ater – Barai and 9-Barai- Chakarnagar

Table 2: Habitats of animals in the National Chambal Sanctuary

S. No.	Species	Habitat requirement
1.	Gharial	Deep running water and sand banks for nesting and basking
2.	Mugger	Deep running water, Sand banks and Mid River Inlands
3.	Turtles	Sand banks, Mid River Inlands
4.	Dolphin	Deep water for breeding and movement
5.	Otter	Deep water with rocky stretch and sand banks for movement
6.	Birds	Nesting and resting in mid river Inlands

advanced fishing gear at 20 sites along the Chambal River and the maximum number of sites were from Pali to Rajghat. The fishing activities were mostly recorded in zones 1, 2, 4, 5, 8 and 9.

Water development activity

Unsustainable water extraction for agriculture and large scale human consumption will also render the aquatic habitat of the sanctuary uninhabitable for large aquatic wildlife. Water extraction activities were also observed in the study area. Due to this activity the water level is going down, which further adversely affects gharials and dolphins in these areas.

Poaching

Many dead softshell turtles were found during the study period. It was also found that turtles are being caught for export to outside fish markets. *Nilssonina gangeticus* was found to be killed and certain body parts are being taken out for the traditional health remedies, whereas *Lissemys punctata* was captured live for selling the meat. Usually fishermen communities are involved in all illegal poaching activities.

Discussion

Various attempts have been made to obtain population estimates of gharial. Among the 34 protected areas in India where crocodylian species are protected (Singh *et al.*, 1984), gharial receives protection in 9 (3%) areas. In a total of 13 crocodile sanctuaries in India, 7 sanctuaries (54%) with an area of 2,986 km² were specially created for the protection of gharial. The first estimate of the gharial population in Chambal River (400 km) during 1978 was estimated to be around 107 with a density of 0.29/km. (Singh, 1985) The results of surveys during 1983-84 and 1984-85 indicated that the population of gharial in the Chambal River was 451 and 605 with a density of 1.08/km and 1.42/km respectively (Singh, 1985). In the present study, a total of 635 and 865 gharial were found during 2006 and 2007 respectively. The major fluctuations in gharial populations have raised concern for protection of the highly endangered gharial in the Chambal River

In the National Chambal Sanctuary wildlife habitats have been considerably altered due to various human activities and there are disturbances in the core areas of the sanctuary by the sand miners, poachers fishermen and farmers. Considering the poor survival of aquatic animals it is recommended to provide greater protection to the animals and their habitats by better management practices. Effective cooperation between the forest departments of M.P., U.P. and Rajasthan is needed as sand mining and poaching is becoming an interstate problem.

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Table 3: Location of various human activities in the National Chambal Sanctuary

S. No	Human activities	Name of sites
1.	Sand mining	Bagadia Sand, Bharra, Barwasin, Bindwa, Jaitpur/Bhanpur,Piparai, Tighri Rithora, Mahuwa Kheda, Kuthiana, Bilpur, Daljit ka pura, Barsala, Garhi jafar, Sahas pura.
2.	Fishing	Bohna ghat, Siyapur, Rameshwar, Bilani, Sukhwas, Baroli, Barohta, Rahu ka Gaon, Chugpura, Batesura, Bharra, Sarsaini/Gargoli, Kuthiana Babu S. gher, Barsala, Sukhadyan ka pura, Kachiara, Useth, Ater, Bijora
3.	Water development activity	Rameshwar, Bagadia Sand, Batesura, Bharra, Sarsaini/Gargoli, Tighari Rithora, Mahuwa kheda, Kuthiana, Babu S. gher, Barsala, Sukhadyan pura, Kachiara, Useth, Bijila/Bindwa, Sahas pura, Ater, Maghera ka pura Bijora, Barai
4.	Poaching	Chugpura, Kachiara

WILDLIFE BUSINESS: PERSPECTIVE FROM DHAKA UNIVERSITY MARKET, KATABAN, DHAKA

by Noor Jahan sarker and a.N.M. Maruf Abdullah

Introduction

Wildlife business refers to the sale and exchange of wild animals and plants, and products made from them. The business in wildlife and wildlife-related products is booming, estimated to be worth billions of dollars and involving millions of plants and animals every year.

Wildlife business in most of the cases is illegal. The World Wild Fund for Nature (WWF) plays an important role against fighting the illegal wildlife business, most significantly through the world's largest wildlife business monitoring network called TRAFFIC (Wikipedia, 2008).

The illegal wildlife trade totals billions of dollars a year globally, but conservationists say the problem is most acute in Southeast Asia. Despite international and local laws designed to crack down on the trade, live animals and animal parts, often those of endangered or threatened species, are sold in open-air markets throughout the region (Sullivan, 2003).

Bangladesh is home to 932 species of wildlife, of which 23 species are amphibian, 154 species are reptilian, 632 species are avian and 123 species are mammalian (Sarker and Sarker, 1988). Eighteen species have already become extinct from Bangladesh, of which one reptile, five birds and 12 mammals are notable (Sarker, 2006).

Over-exploitation and illegal trade of wildlife causes an imbalance of the ecosystem, environmental degradation and economic loss. At the present time, rare, endangered and critically endangered animals are going to become extinct due to the unwise and non-scientific use of these species.

The objective of the present study was to undertake an inventory of the market and to detect the threatened species among the species sold.

Information was collected on the trade of wild animals at Dhaka University Market, Kataban. In this business spot, the species displayed were like the tip of the iceberg. In addition, the sellers supplied other wild species when customers ordered them.

Materials and methods

Dhaka University Market, Kataban is located near Nilkhet in Dhaka city. The study was carried out by direct observation on a regular basis. The identification of species was made according to Ali (1977), Bologna (1987), IUCN (2000) and Whitfield (1998).

Results and discussion

Fifteen shops were engaged in the sale of wildlife at Dhaka University Market. From August 2006 to July 2007, the total number of specimens dealt with by the shopkeepers was 137,164. Among them, 94,325 were indigenous and 42,839 were exotic. According to the study results, 6,630 reptiles, 123,564 birds and 22,970 mammals were recorded sold, which comes to 4.33%, 80.67% and 15% respectively. Both wild and pet animals were sold there. In total, 35 species were recorded, including three species of reptiles, 23 species of birds and 9 species of mammals. No amphibians were on sale.

Of the reptiles sold there were two species of turtle and one species of snake. Turtles were sold for 100-140 taka each. One live python (*Python molurus*) was on sale, but not noted to have been sold. The animal was caught in the Muktizoddha Ziaur Rahman Hall campus. The python was supposedly kept in one of the shops to be sold secretly and escaped to the Muktizoddha Ziaur Rahman Hall campus just behind the market (Sarker, 2005). It was reported that this species of

snake was sold in the Dhaka University Market regularly, exhausting the supply in nature. The habitat of python is only found in the forested areas of Bangladesh such as the Sunderbans and the evergreen forest area in Sylhet and Chittagong Hill Tract (IUCN Bangladesh, 2000). There was no reason for the appearance of the python unless it had been trapped from the forest. The status of python in Bangladesh is “critically endangered” and it is included in Appendix I of CITES (IUCN Bangladesh, 2000).

Bird species were noted to be sold from 100 taka to 13,000 taka each. Among the birds, the most costly species was Common Turkey (*Meleagris gallopavo*), which was sold for 13,000 taka each. The least costly birds on sale were the Black-headed Munia (*Lonchura malacca*) and Spotted Munia (*Lonchura punctulata*), which were priced at 100 taka each. Among the indigenous birds, the most costly one was Hill Myna (*Gracula religiosa*), priced at about 5,000 taka each. Prices of indigenous birds varied from 100 taka to 5,000 taka each. Among the exotic birds, the most costly one was Common Turkey and the least costly bird was the Zebra Finch (*Taeniopygia guttata*), which was priced at 200 taka only. Among the birds on sale, Budgerigars (*Melopsittacus undulates*) had the highest frequency and two varieties of Pigeons (*Columba livia*) had the lowest. Most of the indigenous species that were sold in the animal market were wild species, while most of the exotic species were pet animals. Among the mammals, the wild ones were Rhesus Monkey (*Macaca mulatta*), Capped Langur (*Trachypithecus pileatus*) and Hispid Hare (*Caprolagus hispidus*). The price was taka 6,000, 7,500 and 100 taka each respectively.

Among the indigenous species dealt in, Alexandrian Parakeet (*Psittacula euptaria*) is critically endangered, Capped Langur and Hill Myna are endangered, Rhesus Monkeys are vulnerable and Emerald Dove (*Chalcophaps indica*) is threatened (IUCN Bangladesh, 2000).

Each shop in Kataban market took in from 5,500 to 5,600 taka per day on an average from the sale of animals. The maximum amount of sales took place in summer, mostly in March, and the minimum in winter, mostly in December.

The wildlife trade is a very profitable business as people buy the animals to keep as pets. Businessmen try to collect rare species for their customers. They get the animals from breeding centers, trappers, poachers and by many other methods. Three to four workers were employed in every shop.

From the above observations on Kataban market, it was noted that the sale of pets and wild species has been going on for many years. The rate of selling of wild animals was much higher than that of pets. This is an assessment based on the specimens displayed in the shops. The rate of sale of the wildlife not on display was assumed to be much higher than what was sold openly.

Python molurus is now an endangered species in Bangladesh and *Morenia petersi* is vulnerable (IUCN Bangladesh, 2000).

Among the indigenous birds, most of them are threatened, especially Parakeet, Spotted Dove, Hill Myna and Kite, which are now facing great ecological trouble (IUCN Bangladesh, 2000).

The status of Capped Langur is endangered and Rhesus Monkey is vulnerable (IUCN Bangladesh, 2000).

Several news reports on the illegal wildlife trade have been published in newspapers. In spite of these reports, the authorities give no attention to controlling the illegal business. There is a law on wildlife conservation, the “Wildlife preservation act of Bangladesh-1974,” but implementation of the law was not seen to be carried out.

The wildlife trade is a global issue. Despite it being illegal, it occurs in most countries. At Margui Tavoy district in Myanmar, the wildlife trade involved four species of reptiles, four species of birds and 18 species of mammals. Among the mammals, Sumatran Rhino (*Dicerorhinus sumatrensis*), Javan Rhino (*Rhinoceros sondaicus*), Malayan Tapir (*Tapirus indicus*), Asiatic Elephant (*Elephas maximus*), Asiatic Black Bear (*Selenarctos thibethanus*), Malayan Sun Bear (*Helarctos malayanus*) were notable (Hill, 1994). The price of Asiatic Elephant ranged from US\$800-1600 and the price of Malayan Tapir was US\$800 (Hill,

1994). In Thailand, seven species of reptiles, 35 species of birds and 27 species of mammals were traded (Srikosamatara, Siripholdej and Suteethorn, 1992).

Eighteen species of wildlife have become extinct in Bangladesh in the last hundred years (Sarker, 2006). The rate of extinction is higher than that of the dinosaurs. If this situation continues, there is no doubt that Bangladesh will lose many more valuable species from nature in the near future. Therefore, the authorities and the public have to be made aware about the value of wildlife, nature and their conservation.

In Dhaka University market, the businessmen make their living from the wildlife trade. Customers also want to take animals to keep as their pets. Both sides are not aware of the importance of wildlife in the ecosystem. They do not know how wildlife keeps the balance of nature; they do not know how much we are dependent on the natural habitat; they do not know about CITES and the prohibitions against the wildlife trade; people do not even know that there is a government law against it. As a result, they continue to sell and buy animals. In a country like Bangladesh, most of the animals traded are in threatened condition and the illegal trade in them is creating more crises.

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ERRATA

In Tigerpaper Vol.36:No.3 July-September 2009, some of the photo credits were incorrectly credited.
Front cover: Background: A diverse ecosystem in Satchari NP; Left foreground: Rhesus macaque (Photo courtesy: Sharif Ahmed Mukul); Right foreground: Female & infant Hoolock gibbon in Chalta tree (Photo courtesy: Sirajul Hossain)
Back cover: Left foreground: juvenile Hoolock gibbon; Right foreground: Hoolock gibbon family (Photos courtesy: Sirajul Hossain)

VANISHING SPARROWS - POSSIBLY A SYNERGISTIC EFFECT

by Manjula Menon and R. Mohanraj

The prevailing concern over the decline of the House sparrow (*Passer domesticus*) population not only leaves naturalists in anguish, but also the common man, since they are closely associated with human habitats. The anxiety initially grew in England where the sparrow population declined by about 60% between 1979 and 1995. Declines have been greater in suburban and urban gardens. Similar reports of decline were also reported in several parts of Western Europe. Even in India, we hardly see as many sparrows as in the past. Concerns have been registered from all over the world over the declining sparrows. The late Dr. Salim Ali described these birds as being inseparable from human habitations; but today the scenario is quite different.

Sparrows usually feed on grains, insects, flower and leaf buds, young and ripe fleshy fruits, particularly cherries, grapes and peaches, flower nectar and kitchen scraps. They are social creatures and have exploited almost every available ecological niche. They are gregarious, and are often found in small flocks. Communal roosts are evidence of their social living. They feed on the ground and in vegetation and also chase insects in flight. The foraging area utilized by adult house sparrows is a radius of 1-2 km around the breeding colony. Both parents incubate the clutch of 3-5 eggs for 12-14 days and the chicks fledge after 15 days. Their maximum lifespan is 12 years.

Since sparrows have long enjoyed a close association with human beings, their decline has caused concern. Many factors have been cited by experts for the recent decline in their populations, but there are also claims that enough pairs are still breeding.

Insects form a large part of the diet for sparrows at certain seasons, especially during their initial stages, but at other times they regularly feed on grains. Sparrows that inhabit the city regions are

heavily dependent on aphids, the greenfly, for feeding their young. During some months the nestlings do not get enough aphids to feed on during their first three annual broods. This may lead to a decrease in their population levels.

Peter Ford (2002), an expert from London says, where 12 million pairs nested 30 years ago, there are no more than seven million pairs today - a drop of 10 million birds.

With modernization, the tiled houses have been replaced with concrete apartments which lack nesting sites. The absence of kitchen gardens and non-availability of larvae (*Helicoverpa armigera*) usually found in beans are other reasons for the sparrow's decline in numbers.

Urban air pollutants, which contain nearly 3,000 different elements and compounds, have a wide ranging toxic effect. The major components of these fine particles are sulfates, carbonaceous materials, nitrates, trace elements and water. Organic carbon (OC) and Elemental carbon (EC) are the major carbon fractions in the PM (Particulate Matter) responsible for much of the deleterious toxicity. OC is suspected to be mutagenic and carcinogenic, while EC is linked to a range of adverse environmental effects, including interference in the lung clearance mechanism. The presence of these pollutants in the urban atmosphere is also considered as a limiting factor for the healthy breeding of sparrows.

In a study conducted in 2001–2002 by the city of Bristol, a link was discovered between sparrow numbers and human poverty. Sparrows were found to be absent from the wealthy urban areas but were instead found around housing projects, which provided more trash and food. The older buildings with plenty of nooks and crannies provided them with perfect nesting sites. Efficient livestock management and the reduced spillover from the

farmland has also reduced the wastage of grains, making food scarcer for these little birds. According to the report "State of World 2003", ornithologists are compiling status reports for the world's approximately 9,800 bird species, and what they already have tallied is alarming. Human-related factors threaten 99% of the species in greatest danger. Prominent scientists now consider the world to be in the midst of the sixth great wave of animal extinctions. The fifth wave finished off the dinosaurs 65 million years ago. Spanish scientists also suspect that birds tend to avoid places with high levels of electromagnetic contamination.

Organic farming and the increased use of chemical pesticides and fertilizers to improve yield, are leading the birds to a state of being more endangered. For many farmers in India, sparrows are major pests that damage crops. But they often forget that these little creatures also protect the grains by feeding on insects that harm the crops, thereby reducing the need for the harmful effects of pesticides.

Taking all these instances into account, let us review some of the reasons for the decline of the species. For nestling sparrows, in the first week, the most vulnerable moment in their life cycle, they depend entirely on insects for food. What happens when the availability of insects is restricted due to rapid urbanization and growing pollution in towns and the use of drastic levels of pesticides in villages? In both cases, the scenario remains the same: the nestlings are starved, resulting in their death. To prevent such occurrences in the future the birds tend to move out from human settlements in search of food. More hygienic storage of grain has prevented the easy availability of food to these birds in and around the human settlements, thereby contributing in their drastic decline.

In India, a local survey of the species would give us a good idea about the effect slight changes in our environs have on a species and its continuity of life. In our observation, sparrows have moved from human habitations to sacred places like temples where the building structures are favorable for their nesting, coupled with the availability of food and other grains. The Guruvayur temple in

Kerala, the temples at Coimbatore (Vinayaka Temple, Peruur Temple), the Mookambika and the Dharmastala temples in Mangalore, temples in Bangalore (the Ganapati temple at Tipsandra) provide good examples of the movement of these birds to sacred places. The temples provide the birds with good nesting and breeding locations. This co-existence with nature has fostered in them the chains that will either help in the survival of the species or doom their existence.

Scientific studies are still needed to give us a clear picture of this declining species. A renewed investigation on the ecology of sparrows in all regions is needed.

Rachel Carson wrote "Our place has been a veritable bird sanctuary for over half a century. Last July we all remarked, 'There are more birds than ever.' Then, suddenly, in the second week of August, they all disappeared. I was accustomed to rising early to care for my favorite mare that had a young filly. There was not a sound of the song of a bird. It was eerie, terrifying. What was man doing to our perfect and beautiful world? Finally, five months later a blue jay appeared and a wren."

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FOREST NEWS

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Training for forestry decision makers from the Greater Mekong Subregion - Third Executive Forest Policy Short Course, 8-19 March 2010



Prepared by Marija Spirovska-Kono, FAO Forestry Consultant

***What are the elements of sound forest policy?
How to measure the success of policy decisions?
How can the forestry sector in the Greater Mekong Sub region (GMS) tackle regional challenges and contribute to solving global issues?***

These were some of the questions addressed during the two-week training organized by the Center for Forest and People (RECOFTC) and the Food and Agriculture Organization of the United Nations

(FAO), 8-19 March 2010, in Bangkok, Thailand. Building on the two previous courses, the third executive forest policy short course focused on providing up-to-date information and transferring practical skills to forestry professionals from the Greater Mekong Sub region. This year, the course had nineteen participants from Cambodia, China, Laos PDR, Myanmar, Thailand, and Vietnam, representing the government, civil society and different

forestry-related projects. The third executive forest policy short course was organized in partnership with the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet), the EU-European Forest Institute (EFI) FLEGT Asia Support Programme, the National Forest Programme Facility, and the USDA Forest Service. Sponsorships were also available through GTZ and The Nature Conservancy.

During the first week, the participants were introduced to the basic elements of the forest policy cycle, and were trained to effectively communicate forestry issues and present decisions. Different economic tools for analyzing problems and formulating informed decisions were also presented. This edition of the short course put special emphasis on discussing current “hot issues” in forestry such as climate change, ownership and resource rights, poverty alleviation through forestry, forest governance and constraints in financing sustainable forest management. These topics were addressed in daily sessions during the second week through presentations, group work and case studies. The program brought together leading experts working extensively in the GMS countries and beyond. They presented emerging concepts and field-based examples, and the participants engaged in stimulating discussions and critical

analysis of the current developments and trends in forest management.

This edition of the course made attempts at greater inclusion of the private sector, both in terms of participants as well as resource persons. Given the importance of collaboration between forestry decision makers and the private sector for ensuring sustainable, equitable and economically viable forest management, these initial attempts will most likely flourish in the future course editions.

The executive forest policy short course is organized under the umbrella of the *Asia-Pacific Forest Policy Think Tank*, an initiative born out of a collective need to better share information, knowledge, experiences and expertise. As the Think Tank accelerates its speed, we hope to increase the frequency of the short courses and target different Asia-Pacific sub regions. The course content will be constantly enriched and improved in order to reflect new challenges and approaches, as well as to incorporate participants’ feedback. However, the core of the training will remain the same - providing tools and guidance for supporting sustainable and objective forest policy decisions. Looking forward to seeing you in some of the next editions of the short course!

***Making forestry work for the poor: Adapting forest policies to poverty alleviation strategies in Asia and the Pacific
New FAO trust fund project supported by the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet)***

Prepared by Marija Spirovsk-Kono, FAO Forestry Consultant

Asia-Pacific forests are home to over 450 million poor people whose livelihoods depend on the use and availability of forest products and forests environmental services. There have been significant efforts in recent years to utilize the potential that forests and forestry have for effectively contributing to improved human well-

being. However, for forestry to meet its full potential, sound policies must be developed and implemented on the basis of high-quality, up-to-date information from both strategic and field levels.

This is the main objective of the recently initiated project “Making forestry work for the poor: Adapting forest policies to poverty alleviation strategies in Asia and the Pacific.” The project is supported by the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet) and will be implemented by the FAO Regional Office for Asia and the Pacific in collaboration with respective government agencies and civil society from the participating countries (Bhutan, Cambodia, China, India, Indonesia, Laos, Nepal, Papua New Guinea, Philippines, Thailand and Vietnam).

The project will be implemented over a one year period with a total budget of US\$ 340,000, with a strong focus on compiling and disseminating existing experiences, strengthening the capacities of government agencies and raising awareness. As

a first activity, the project supported the third executive forest policy short course which took place in Bangkok, 8 to 19 March, 2010, and enabled the participation of four forestry professionals from Laos and Myanmar to this two-week training. The activities will continue by conducting the forestry-poverty country studies, organizing regional and national workshops for strategic planning in forestry and developing policy briefs for supporting forest policy adaptation to reduce poverty in target countries.

This is the first official collaboration between FAO and APFNet and it should pave the road for new innovative activities to support sustainable forest management in the Asia-Pacific region, both under the umbrella of the Asia-Pacific Forest Policy Think Tank as well as through the expanding the APFNet network.

Increasing agricultural productivity: The key to Thailand's biofuel future

Prepared by Beau Damen, FAO Consultant, Bioenergy

Substantial increases in agricultural yields and production will be required to meet Thailand's future biofuel targets, which could result in a drop in the country's exports of key biofuel feedstock crops in the near future. This was one of the key messages that emerged from the FAO Bioenergy and Food Security (BEFS) Project Thailand Technical Consultation, which took place on 11 March 2010 in Bangkok. Around 50 agriculture and bioenergy experts from around Thailand came together at the FAO Regional Office to discuss the preliminary findings of research work undertaken as part of the FAO BEFS Thailand project.

Participants also found that while there are a number of challenges in terms of meeting Thailand's biofuel targets, biofuels production in Thailand is economically competitive and offers measurable greenhouse benefits over fossil transport fuels. But Thailand's agricultural productivity, and how to boost it, was the key issue

of the day's discussions. Participants agreed that improving the Thai farmer's productivity will not only help meet Thailand's biofuel targets as outlined in the country's 15-year Alternative Energy Development Plan, but also benefit farmers, industry and the environment. It was heard that higher yields will reduce greenhouse gas emissions per unit of production of biofuel feedstock and reduce feedstock costs.

The need for improved productivity prompted participants to cast their attention to Thailand's agricultural extension services and systems for educating farmers with good agricultural practices. While participants concurred that the Thai Government was producing good quality information regarding land suitability and agriculture practices, there was debate about whether this material is reaching farmers. Participants considered that if farmers were to use this information to guide planting decisions and

practices rather than rely solely on market prices, substantial yield increases would be possible – improving farmers’ returns per area of land, optimizing the use scarce resources and reducing harmful emissions. Participants felt that empowering Thai farmers with better agricultural practices could thus also deliver a “double dividend” for Thailand by promoting rural development and helping to combat the onset of climate change.

To resolve some of the issues identified and ensure future challenges can be met and overcome, participants highlighted the importance of being proactive by maintaining and reassessing data on bioenergy developments as circumstances change. The BEFS project has helped build the capacity of Thai Partner Organizations to analyze the interplay between natural resource availability, bioenergy production potential, rural development and food security and assess different *sustainable*

bioenergy pathways. The BEFS tools can now be adopted and used by the Thai Government in the future to assess new developments and guide or support changes in biofuel policy.

The meeting was the second BEFS Thailand event to be organized this year by the FAO Regional Office, following a smaller meeting of the BEFS Thailand Partner Organizations in January. The final BEFS Thailand event will be held 1-2 June 2010, incorporating a high-level Thai Government Policy Forum hosted by the FAO Regional Representative, and a BEFS Regional Forum to coincide with *Renewable Energy Asia 2010*.

More details on the BEFS Thailand project, including presentations, final meeting summaries and upcoming events, are available at the following website:

www.fao.org/bioenergy/foodsecurity/befs/thailand

Participation of tree plantation farmers in sustainable forest management

Prepared by Marija Spirovska-Kono, FAO Forestry Consultant

Growing long-rotation, indigenous species can bring a variety of socio-economic and environmental benefits as they provide high quality timber materials, improve soil protective functions, and enhance local biodiversity. However, utilization of long-rotation tree species in Thailand has witnessed a steady decline, particularly since the ban on logging in natural forests in 1989. Efforts to promote tree planting of selected indigenous species in reforestation projects during the 1990s have not yielded sustained results, primarily due to constraining regulations and lack of supportive mechanisms. Fast-growing tree species and annual crops appeared far more attractive due to a variety of incentives, readily available markets and less risk involved. This continues to be the case to date, and the true potentials of promoting and growing

long-rotation, indigenous species are yet to be realized.

As part of the Technical Cooperation Programme (TCP) of the Food and Agriculture Organization, a new two-year project was launched at the beginning of 2010. The project will be executed by the Royal Forest Department (RFD) with the main objective to contribute to the diversification of livelihood options, improve environmental sustainability and increase domestically available wood supply through creating enabling environments for planting, harvesting, and processing long-rotation tree species.

The project will put specific emphasis on reviewing the current regulations and incentive systems and

proposing a variety of measures which can be taken into consideration in order to directly support tree farmers interested in growing long rotation species. Capacity building is an essential component of the project, and most of the activities are designed to enhance the RFD's capacities for forest policy review and analysis, and to strengthen extension services through trainings, workshops and field visits. Tree farmers and farmers associations will be involved from the early stages of the project, thus ensuring that their views and needs are incorporated in the proposed measures, and that they receive the necessary training. The project will also pay specific attention to the needs of small scale processors, and will focus on creating the necessary market links for ensuring sustainability

and diversifying the income-generating opportunities.

Given the rising concerns over loss of global biodiversity and the significant importance tropical forests have in harboring and protecting a diverse range of species, the project hopes to directly contribute to the vitality and diversity of Thailand's forests by providing viable and sustainable options for growing a variety of long-rotation, indigenous species.

The TCP project "Participation of tree plantation farmers in sustainable forest management" has a total budget of US\$ 326,000, and is expected to operate until 2012.

Extending the lease on leasehold forestry in Nepal

Prepared by S. Appanah, nfp Advisor (Asia and the Pacific)

Leasehold Forestry in Nepal has received an extension, thanks to efforts from FAO and Nepal's Ministry of Forests and Soil Conservation, and the generous support of the Government of Finland. The term 'leasehold forestry' has remained an anomaly in forestry jargon owing to its origin. Nepal has been a pioneer in the field of community forestry. Despite three decades of work in community forestry, criticisms remained as to whether the programme is achieving its original objectives of reducing forest degradation and poverty of forest-dependent communities. The most severe criticism would be the case about how the poorest within a community were further marginalized as a result of community forestry. Equitable sharing did not materialize, as the most powerful community members – the upper classes – made the decisions generally in their favour, and gained more from the commons. Nepal tried to overcome this inequity by innovating "Leasehold Forestry" as a subcomponent of "Community Forestry". Without enacting a major regulation, the government decided to engage the existing

"Leasehold Forest Rules" which allows it to lease out forests to registered parties for economic activities. This regulation was employed instead to transfer land to the marginalized households in a community with poverty alleviation as the primary objective.

Several international agencies assisted in developing and implementing leasehold forestry as an addendum to the ongoing community forestry programme. The International Institute for Food, Agriculture and development (IIFAD) was among the first to provide support to the programme, named the "Hill Leasehold Forestry and Forage Development Project (HLFFDP)". As the name suggests, very poor households were allocated small plots of forest land to be cultivated for fodder production. This was coupled with animal husbandry as an important source of nutrition and income. The initiative also brought in other benefits that included improvement of the degraded land, fuel wood, and greater participation of women in community affairs.



(Photo courtesy Nav Raj Baral, FAO Consultant)



(Photo courtesy Nav Raj Baral, FAO Consultant)

However, the implementation of LF is still far from being trouble free. The process is still unclear to many, it faces many constraints during translation into practice, and has yet to be mainstreamed as part of the Forest Department's community forestry programme; community forestry and leasehold forestry are treated as separate activities, and the latter is not given the same level of support. To add to insults, the lands given to leasehold forest households are totally degraded compared to those allocated under the community forestry programme. Realizing these difficulties, IIFAD invited FAO to investigate some of these issues. FAO implemented a Technical Cooperation Programme (TCP) to address some of these issues (2007-2009). The TCP identified promising multipurpose fodder species for rehabilitation of degraded forests, developed operational guidelines for identifying households and transfer of lands to them, and examined the institutional and policy framework to integrate leasehold forestry with community forestry.

Following the findings under the TCP, the Government of Finland stepped in with a generous grant to mainstream leasehold forestry in Nepal. This 4-year project was launched in September 2009, and work has commenced. The main objective of the Technical Assistance (TA) is to improve the effectiveness of Leasehold Forestry and support the Department of Forest with the implementation, institutionalization and scaling up of the programme in the country. The key activities to achieve this include the following:

- integration of leasehold forestry and livestock development for poverty alleviation;

- consolidation and improvement of the extension strategies;
- follow-up the findings of the studies carried out by IIFAD and FAO;
- institutional framework for a greater contribution of forests and trees to poverty reduction;
- institutionalization of the leasehold forestry and livestock development for poverty alleviation and environmental conservation; and
- establishment and promotion of a goat breeding centre.

The expected outcomes of the TA are an improved environment for leasehold forestry and livestock development for poverty alleviation and environmental conservation, improvement of the extension and market linkages, management of knowledge and communication, and mainstreaming of issues related to women and the disadvantaged. Considerable emphasis will also be placed on integrating all the information on leasehold forestry in one platform, and also develop a monitoring and evaluation system which can be used to measure the success of the work, the quantum of benefits it brings the forest-dependent communities, and how these can be replicated under different socio-economic and climatic conditions. Of course, climate change has not been neglected – some investigations will be devoted to the contribution of leasehold forestry to climate change mitigation, and whether carbon funds would be accessible for the communities under the programme.

Forestry websites

- As one of the outputs of the project “Advancing the Application of Assisted Natural Regeneration (ANR) for Effective Low-Cost Forest Restoration” a simple web portal has been established on the FAO Forestry Home page – <http://www.fao.org/forestry/59218/en/>. The purpose is to highlight the importance of restoring degraded forests through simple, cost effective interventions to assist natural regeneration.
- Asia-Pacific Forestry Sector Outlook Study II working papers are now available at the following website: <http://www.fao.org/world/regional/rap/APFSOS/APFSOS.html>. Twenty-eight papers have been already been posted on the website and the rest will soon follow. Hard copies will also be printed soon.



APFC updates

When the 23rd session of the APFC convenes in the Bhutanese capital Thimphu this June, the aim will be to deliberate on subjects that are high in priority, and which people are confronting daily. The FAO Regional Office for Asia and the Pacific and the Bhutanese hosts are striving hard to meet this objective. The identification of the topics for the Session was arrived at through an elaborate and participatory process, to ensure they truly reflect the concerns of the forestry sector in the region as well as globally. First, the recommendations of the last APFC session were reviewed, and further discussed during the APFC Executive Committee meetings. Inputs from member states and the wishes of the host nation were further taken into consideration. Out of this process, the following agenda has been identified to match all concerns:

Climate change. This topic has taken the lead position in almost all fora on forestry, and may have even given forestry a new life in the political agenda in recent years. Forestry is being touted as one of the most efficient and economical ways to address global warming; many new programmes are being formulated, with REDD and its financing being in the forefront. Therefore, the aim is to combine these topics, REDD and financing sustainable forest management, under the Heads of Forestry dialogue.

Biodiversity. As you might be aware, 2010 has been designated as the International Year of Biodiversity by the United Nations. In light of this, we want to pay particular attention to this topic. CBD and ITTO have already signalled that they will make special efforts with regard to facilitating this session.

Forest Resources Assessment 2010. The global initiative related to stocktaking of the world's existing forests resources is drawing to a conclusion. It is therefore timely to revisit this program in further detail and discuss how the countries in the Asia-Pacific region can make use of the statistics and knowledge that FRA 2010 brings to the fore.

State of Forestry in the Asia-Pacific region and its future prospects. A session has been scheduled to assess the current state and future challenges to forests and forestry in the region. Significant time will also be devoted to the findings of the APFC Outlook Study, which outlines likely trends in the forestry sector leading up to the year 2020.

In addition to the formal agenda, there will also be numerous occasions for the participants to air pressing issues and get other perspectives. Worth noting is the "open forum" set to take place on Thursday evening, where all interested parties will be allocated roughly 10 minutes to present their mission and perspectives on forestry-related matters. This will be followed up with a "partners session" on Friday morning (day 3) during which a limited number of organizations will be able to provide in-depth presentations on ongoing activities. And, as always, delegates from different countries and organizations will find time for informal chats during coffee breaks and meals.

There should be plenty of opportunities for the participants to seek answers to the tasks and issues they are occupied with on a daily basis. This is yet another reason why you should move ahead and register for the event today! Air tickets can now be booked online at <http://www.drukair.com.bt/>. Looking forward to seeing you in Bhutan!



Beautiful Bhutan

As it is getting closer to the 23rd Session of the Asia-Pacific Forestry Commission (APFC) in Bhutan which will be held 9-11 June 2010, this would be an appropriate moment to talk about this beautiful country before going there. The Kingdom of Bhutan, sometimes referred to as “*the Last Shangrila*” or “*the Last Place on the Roof of the World*” is a very peaceful country, known for its scenic beauty and unique culture and lifestyle. Nestled in the lap of the Himalayas, it is a landlocked country situated between China and India. For more information on Bhutan, you can visit the website: <http://www.bhutan.gov.bt/foreigner/index.php>.

Bhutan is famous for its extensive forest cover, currently at 65 percent of the total land area, which makes its forest management approach an interesting model for other countries in the region. In this respect, it should also serve as the perfect location for dealing with issues related to biodiversity - as 2010 has been designated as the International Year of Biodiversity. In addition, Bhutan is the first country to adopt the concept of Gross National Happiness (GNH) as an attempt to assess the quality of life in contrast to the economy-focused term of Gross Domestic Product. GNH incorporates parameters such as health, education level and nature preservation. To further discover the application of GNH in Bhutan, and discuss its relevance for forestry, there will be a pre-session workshop on “*Forests: Moving Beyond GDP Contributions to Gross National Happiness Considerations*” on 8 June 2010.

With the aim of making your stay in Bhutan and participation in the 23rd session of APFC as complete as possible, one-day field excursions are being organized on Saturday, 12 June 2010. This will be a great opportunity to visit the magnificent forests and enjoy the beautiful scenery of the countryside. There are three choices for the excursions, listed below:

Excursion 1: Gidakom Forest Management Unit, Gidakom, Thimphu

Excursion 2: Royal Botanical Park, Lamperi, Thimphu

Excursion 3: Choekor Community Forest, Kawang, Thimphu

If you are planning to join one of the excursions, you will need to bring suitable clothing, including a warm sweater and comfortable walking shoes. You are required to fill in the registration forms for the field trip to secure preferred destinations. A brief description of the field trips will be available at the following websites: <http://www.fao.org/forestry/33587/en/> or <http://www.dof.gov.bt/apfc2010>, prior to the APFC session.

Let us take this opportunity to remind you that the travel arrangements to Bhutan are complicated and we strongly encourage you to prepare your visa application, flight tickets and hotel bookings as soon as possible, to ensure your travel to Bhutan.

If you have any additional questions, please do not hesitate to contact Mr. Patrick Durst at Patrick.Durst@fao.org.

Striving to make sustainable forest management a reality: report of the country-led initiative on “Forests for People”

Prepared by Fan Xiaojie, nfp Facility Coach (Asia-Pacific)

Forests have been providing numerous goods and services for the benefit of human beings from time immemorial. However, forests and their diverse biological resources are under tremendous stress and are at risk of permanent loss from deforestation and forest degradation in many parts of the world. The negative impacts of the loss or degradation of forests have both spatial and temporal implications from local to global scales – affecting present and future generations. Realizing the need for collective action, the international community has kept forests high on the international policy agenda for the past several years, with a focus on developing coherent policies and mechanisms to promote the management, conservation and sustainable development of all types of forests.

To provide a platform for sharing of experiences, knowledge and information among countries in the use of national forest programmes (nfps) to achieve sustainable forest management, and as a means to implement the Non-legally Binding Instrument for All Types of Forests (Forest Instrument), the Government of China hosted a Country-Led Initiative (CLI) in support of the United Nations Forum on Forests (UNFF) on “Forests for people: the role of national forest programmes and the non-legally binding instrument on all types of forests,” 17-20 November 2009, in Guilin, China, in collaboration with Austria, Finland, Germany, and the USA. The Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet), FAO, nfp Facility, WWF, and The Nature Conservancy (TNC) provided financial and technical support. The meeting was attended by 150 experts representing governments, intergovernmental and non-governmental organizations, the private sector and other major groups.

Participants first convened in plenary and subsequently formed four working groups for sessions that focused on four key subject areas:

policies, legislation and institutional frameworks; sustainable production of goods and services; national arrangements to mobilize finance; and capacity building and participatory approaches. A Co-Chairs’ summary report summarizing conclusions and recommendations for concrete action on the four thematic areas was prepared for submission to the UNFF for consideration at its ninth session in New York, to be convened 24 January to 4 February 2011. Key recommendations included the following:

Policy and legal frameworks should:

- ensure a transparent and participatory policy formulation and implementation process and provide for periodic review of forest-related policies, nfps and similar programmes, with a view to assessing impacts on local populations and responding to new challenges;
- support sustainable, forest-based livelihoods, in particular for forest-dependent populations;
- establish mechanisms for sharing experiences and information;
- strengthen capacities for forest law enforcement; and
- foster cross-sectoral coordination by identifying mutual interests, establishing appropriate inter-agency mechanisms and involving relevant sectors early in policy design.

Sustainable production of goods and services should be promoted by:

- providing appropriate financial incentives, market-based instruments and access to markets;
- improving capacity of local populations to sustainably produce goods and services using community-based training, education networks and associations;
- improving understanding of the rights and responsibilities of community groups with regard to sustainable forest management; and

- providing opportunities for key stakeholders (e.g., small producers) to learn about sustainable harvesting levels, negotiation skills, market trends and access to markets.

Strengthen national arrangements to mobilize financing by:

- facilitating support from a wide range of sources;
- balancing resource needs and developing funding mechanisms specific for different purposes and forest types within each country;
- using the non-legally binding instrument (NLBI) and nfps to establish national forest financing strategies;
- identifying innovative financing mechanisms and ways to use payments for environmental service (PES); and
- further exploring the possibilities for a global forest fund and linking forests to climate change financing options.

Building capacity and promote participatory approaches by:

- establishing mechanisms to disseminate information for better understanding the NLBI and its links to nfp processes, and elaborating and reviewing nfps to ensure their coherence with the NLBI;
- conducting consultative evaluation processes prior to starting nfps to ascertain whether adequate capacity exists for conducting meaningful stakeholder processes;
- enhancing the understanding and knowledge of indigenous peoples and communities concerning tenure rights, consistent with national legislation and multilateral environmental agreements to which countries are signatories;
- improving skills for communication, facilitation, conflict management and negotiation;
- improving capacity for valuation of forest goods and services to use PES schemes more efficiently; and
- strengthening the roles and resources of the NFP Facility in nurturing nfp processes.

Evolution of national forest programmes and the Non-legally Binding Instrument for All Types of Forests

Subsequent to the adoption of Agenda 21 and the Forest Principles in 1992, the international policy dialogue on forests concluded that national forest programmes (nfps) provide a sound framework for countries to lead and steer forest policy development and implementation. At the fourth session of the Intergovernmental Panel on Forests in February 1997, countries agreed that nfps or similar approaches to achieve sustainable forest management were long-term iterative processes, built on the principles of country leadership, broad participation, integration with national development strategies, and collaboration across sectors to address cross-cutting issues, including the need to reduce poverty and improve the livelihoods of people who live in and around forests. After long deliberations concerning a framework for international cooperation on forests, the 7th Session of the United Nations Forum on Forests (UNFF) reached an agreement in 2007 adopting the “Non-legally Binding Instrument for All Types of Forests” (Forest Instrument). The Forest Instrument is the first global agreement on forests to strengthen political commitment and action to effectively implement sustainable forest management; to enhance the contribution of forests to achieve internationally agreed development goals; and to provide a framework for national action and international cooperation. Being long-term iterative and adaptive processes, nfps are considered important tools to support operationalization of the Forest Instrument.

NEW RAP FORESTRY PUBLICATIONS

STRATEGIES AND FINANCIAL MECHANISMS FOR SUSTAINABLE USE AND CONSERVATION OF FORESTS: EXPERIENCES FROM LATIN AMERICA AND ASIA

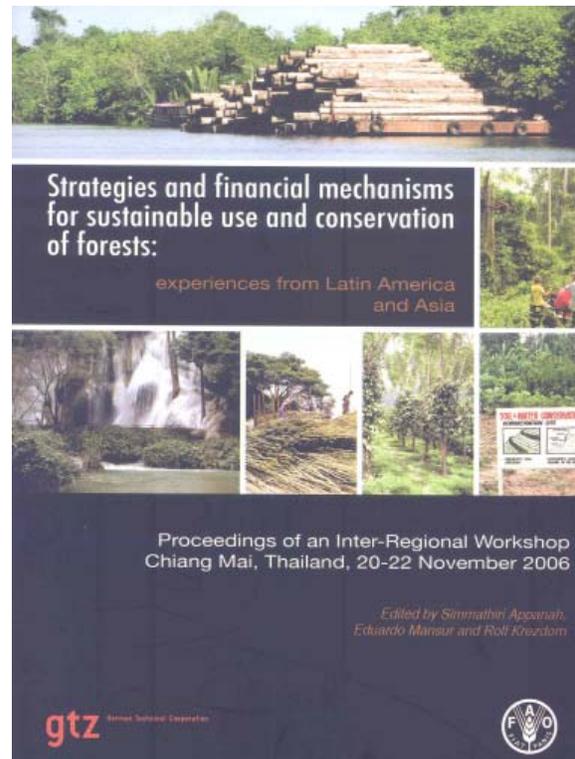
Proceedings of an inter-regional workshop, Chiang Mai, Thailand, 20-22 November 2006
 Edited by Simmathiri Appanah, Eduardo Mansur and Rolf Krezdorn

RAP Publication 2009/21

By all accounts, sustainable management of tropical forests is a daunting task. Now, with greater understanding of the critical role that tropical forests play in climate change and their potential for its mitigation, the issue of sustainable forest management is becoming even more pressing.

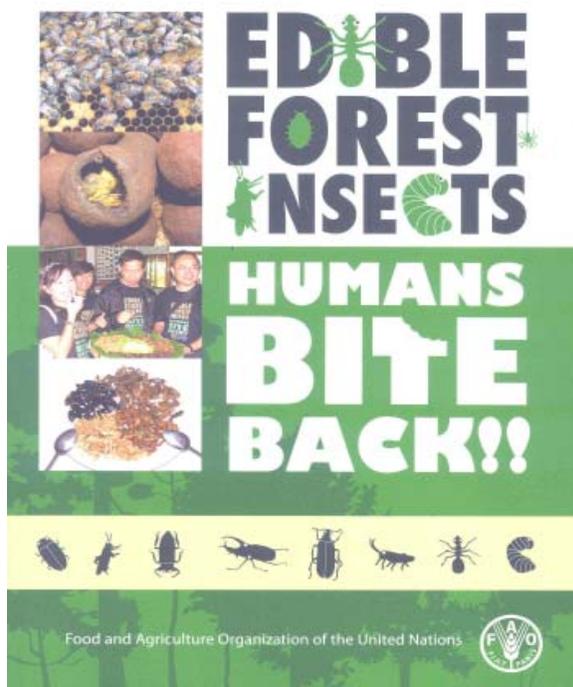
Technical solutions to managing the forest ecosystems are within reach, but in the vast majority of countries in the region they are not employed to the fullest extent. There are many reasons behind this reluctance. For one, the benefits – such as conservation of soil and hydrological processes, biodiversity, carbon sequestration, and a host of others, as a result of practicing sustainable forest management – do not generate revenue for the forest owners. Next is the higher costs and complexity that go with sustainable forest management, compared to a narrow focus on production of timber and a few other readily marketable products. The third factor is that conversion to other land uses, including agriculture, generates far more income than all the intangible benefits that accrue from sustainable forest management practices.

The solution lies with paying for the intangible forest products that bring benefits not only to the forest owners. Researchers have been pursuing a number of approaches that include payments for environmental services, trading only with products that are sourced from sustainable managed forests, marketing of non-wood forest products, bio-



prospecting fees, ecotourism, etc. At present, trading in carbon offsets is the attention grabber globally. Many new approaches are being explored, but these cannot be easily adopted without concomitant changes in legal and institutional structures.

The Proceedings represent the results of a workshop of forestry experts who were able to report on the various financing mechanisms that are being tested on the ground. The Proceedings go beyond the financing issues, and also look into the challenges of technology transfer, capacity building, and policies and legislation issues which are required for such novel innovations to take root.



EDIBLE FOREST INSECTS: HUMANS BITE BACK!!

Proceedings of a workshop on Asia-Pacific resources and their potential for development 19-21 February 2008, Chiang Mai, Thailand
Edited by Patrick B. Durst, Dennis V. Johnson, Robin N. Leslie and Kenichi Shono
 RAP Publication 2010/02

Experience across numerous fields has highlighted the value and benefits to be gained from combining customary knowledge and approaches with modern science and understanding.

Such is the case with edible forest insects. The practice of eating insects goes back thousands of years and has been documented in nearly every part of the world. In modern times, however, consumption of insects has declined in many societies and is sometimes ridiculed as old-fashioned and unhealthy. Yet, scientific analysis confirms the exceptional nutritional benefits of many forest insects and studies point to the potential to produce insects for food with far fewer negative environmental impacts than for many mainstream foods consumed today.

Aside from their nutritional and environmental benefits, experts see considerable opportunity for edible insects to provide income and jobs for rural people who capture, rear, process, transport and market insects as food.

Traditionally, most edible insects have been harvested from natural forests, but surprisingly little is known about the life cycles, population dynamics, commercial and management potential of most edible forest insects. Traditional forest dwellers and forest-dependent people often possess remarkable knowledge of the insects and their management, offering excellent opportunities for modern science and traditional knowledge to work together.

In an effort to more fully explore the various facets of edible forest insects, the FAO Regional Office for Asia and the Pacific organized an international workshop entitled “Forest Insects as Food: Humans Bite Back.” The workshop brought together many of the world’s foremost experts on entomophagy – the practice of eating insects. The three-day workshop focused specifically on the science, management, collection, harvest, processing, marketing and consumption of edible forest insects, as well as their potential to be reared commercially by farmers.

It is hoped that these edited proceedings of the workshop will help to raise awareness of the potential of edible insects to rural livelihoods and highlight linkages to sustainable forest management and conservation.



Ecotourist about to devour a live caterpillar of Xyleutes capensis (Cossidae), a borer of Cassia spp. and Ricinus communis (Marangu, Tanzania) (Photo: Courtesy H. Schabel)



FORESTRY PUBLICATIONS CD FAO Regional Office for Asia and the Pacific Forestry Department Group (RAPO)

This CD-ROM presents the publications of the FAO Regional Office for Asia and the Pacific's Forestry Department (RAPO) in electronic format. The CD contains RAPO publications for 1999-2005 which can be browsed by year or by subject.

Also included in the CD are issues of Tigerpaper/Forest News 2006-2009, APANews 2006-2010 and the APFISN Newsletter 2007-2009, plus APFISN Pest Fact Sheets.

All files on this CD are in PDF format for easy downloading and printing using the Acrobat Reader software.

STAFF MOVEMENT

Mr. He Changchui, former Assistant Director-General and FAO Regional Representative of FAO's Regional Office for Asia and the Pacific, has been appointed FAO Deputy Director-General (Operations) with effect from 1 January 2010.

Mr. Hiroyuki Konuma, former FAO Deputy Regional Representative for Asia and the Pacific, has been appointed Assistant Director-General and FAO Regional Representative for Asia and the Pacific, effective 1 March 2010.

Mr. Eduardo Rojas-Briales has been appointed Assistant Director-General of the FAO Forestry Department, effective 1 March 2010.

From 1992 to 1998, Mr. Rojas-Briales served as the Director of the Catalan Forest Owners Association. In addition to this, he also served as part-time Professor of Forestry Policy at the University of Lleida, Spain (between 1992 and 2002) and Head of Forest Policy Area with the Centre Tecnològic Forestal de Catalunya.

Since 2001, Mr. Rojas-Briales has been working with the Faculty of Agronomy of the Polytechnic University of Valencia. He was appointed Vice-Dean of the Faculty in 2004.

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

SPEEDY PROBE INTO ALLEGED ILLEGAL LOGGING PROMISED

The Sarawak Forestry Corporation (SFC) has promised to investigate reports of illegal logging near the Kubah National Park. The SFC dispatched a team of enforcement officers to the area in early January, which had uncovered evidence of some small-scale illegal logging operations. Local communities have called for the appointment of an Honorary Wildlife Ranger to monitor the forests in question and ensure they are not threatened by illegal activities.

- *BERNAMA* –

RARE MASS FRUITING OF BRUNEI PEATLANDS IN 2009

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

- *The Brunei Times* –

GREENER STOVES COOK UP HEALTH BENEFITS

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

to promote the idea that switching to low-carbon economies can save also lives and reduce medical costs.

- *scidev.net* –

ONE QUARTER OF INDIA TURNING INTO DESERT: ISRO STUDY

In November 2009, the Indian Space Research Organization (ISRO) released its first 'desertification status map' which reveals that at least one quarter of India's total geographical area (81 million hectares) is undergoing a process of desertification. ISRO has identified a number of factors behind this process including water erosion, reduction in vegetation cover and wind erosion. The map also indicates that roughly 69 percent or 228 million hectares of India's total geographical area is 'dry land'.

- *The Hindu* –

FUNDING SET ASIDE FOR NEW FOREST LEASE REVIEW BODY IN THE PHILIPPINES

The Philippine Department of Environment and Natural Resources has approved allocation of 8 million pesos for the creation of an independent body that will review the performance of forestry lease contract holders. At present, 1,936 forestry lease contract holders have rights to over 2.45 million hectares of Filipino forests. The new body is being established to help remove non-performing contract holders who fail to meet the terms of their lease contracts.

- *Manila Bulletin* –

INDONESIAN GRAFT HARMS CASE FOR FOREST CARBON OFFSETS

A new report released by Human Rights Watch indicates that corruption in Indonesia's forestry sector costs the government US\$ two billion per year and could undermine efforts to use forest conservation to offset carbon emissions. The report states that graft at every level of the country's logging industry will have to be overcome before investors can have any confidence in carbon credits linked to protected forests; particularly via any

future REDD initiatives. The report estimates that between 2003 and 2006, revenue lost due to mismanagement and corruption in the timber industry was approximately equal to total public health spending at all levels of government.

- AFP –

BEIJING EXPERT GIVES TOUCH OF LIFE TO ANCIENT TREE

In December 2009, a senior engineer from Beijing Municipal Bureau of landscape and forestry travelled to Dengfeng, Henan province to rescue a 1,400 year-old white poplar tree. The tree is located in the city's Yongtai Temple and had apparently suffered from serious insect damage. To preserve the tree the travelling expert, Cong Sheng, removed dead wood and administered a special 'drip injection' treatment.

- *Zhengzhou Evening News* –

TIGERS ENDANGERED IN HALF OF INDIAN RESERVES

India's Environment Minister Jairam Ramesh has warned that more than half the country's government-monitored tiger reserves are in a precarious state. Illegal poaching and habitat loss has reduced tiger numbers in India from about

40,000 a century ago to 1,411 in 2008. The fight against poachers in India is being made more difficult due to assistance provided by poor communities proximate to tiger populations in exchange for much needed cash. Wildlife experts indicate that if current trends continue tigers could be extinct within 20 years.

- *Reuters* –

RAINFOREST TRIBE DECLARES 'PEACE PARK' TO DEFEND LANDS FROM LOGGING IN SARAWAK

A group of the indigenous Penan people in the Upper Baram Region of Sarawak in Malaysian Borneo has declared a 'Peace Park' as part of efforts to protect the area from logging. The park covers 1,630 square kilometers around the Gunung Murud Kecil mountain range near to the Indonesian border. The Government of Sarawak has granted rights over the area to a Malaysian timber company for logging. The Penan hope that their declaration of an indigenous park will bolster their efforts to get the Malaysian government to recognize their historical presence in the area and save it from further logging-related degradation.

- *mongabay.com* -

FAO ASIA-PACIFIC FORESTRY CALENDAR

24-27 May 2010. Thailand. **Regional workshop on Development of Forest Information System**. Contact: Masahiro Otsuka, Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Masahiro.Otsuka@fao.org

1-2 June 2010. **BEFS Thailand Policy Consultation**. Bangkok, Thailand. Contact: B. Damen, Consultant (Bioenergy), FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Beau.Damen@fao.org

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

4-7 August 2010. **Asia Forest Partnership Dialogue**. Pattaya, Thailand. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

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

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

- Report of the twenty-second session of the Asia-Pacific Forestry Commission (RAP Publication 2008/06)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04)
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