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Address.

TIGERPAPER
FAO Regional Office for Asia and the Pacific
Maliwan Mansion, Phra Atit Road
Bangkok, 10200, Thailand
Tel: (662) 697-4000
E-mail: fao-rap@fao.org
Website: http://www.fao.org/world/regional/rap/tigerpaper/tigerpaper.htm

Editor: Janice Naewboonnien
Advisor: P. Durst

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FOREST NEWS

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Front and back covers: *Sundarban tiger (Panthera tigris tigris) (Photos: Courtesy of P.K. Pandit)*

SUNDARBAN TIGER (Panthera tigris tigris) - A NEW PREY SPECIES OF ESTUARINE CROCODILE (Crocodylus porosus) AT SUNDARBAN TIGER RESERVE, INDIA

by P.K. Pandit

(Photo: Courtesy of P.K. Pandit)

Introduction

The saltwater crocodile is an opportunist apex predator, the largest among all living reptiles, capable of taking nearly any animal that enters its territory either in water or on dry land, even attacking humans who enter the crocodile's territory. A large adult estuarine crocodile can potentially eat animals within his territory including monkeys, kangaroos, wild boar, dingo, birds, domestic livestock, pets, humans, buffalo, gaurs, bats and even sharks (Daniel, 1989; Das, 2002). Domestic cattle, horses, water buffalo and gaur, all of which may weigh over a ton, are considered the largest prey taken by the male crocodile. Most prey animals are killed by the great jaw pressure of the crocodile, although some animals may be incidentally drowned. Juvenile crocodiles may fall prey to tigers in certain part of their range, although encounters between these predators are rare and cats are likely to usually avoid areas with estuarine crocodiles.

In the Sundarbans, the top predators are the tiger on land and estuarine crocodile in water and both are found throughout the entire Sundarban Tiger Reserve (STR), but there are no previous records of encounters between these species as prey or others. Interspecific fights in the forest are very common and there are records of tiger killing young rhinos (Bist, 1994) and elephants. There are instances of fights between crocodile and tiger in Ranathambhore Tiger Reserve of India over prey, but in the end the tiger won the battle. Among the encounters between lions and crocodiles it was found that sometimes the lion and sometimes the crocodile won the battle.

Tigers as well as estuarine crocodiles of the Sundarbans prefer snakes, even poisonous ones, as their prey. A tiger's carcass was found in Netidhopani-I compartment on July 17th, 2009. In the post mortem of said male tiger, one king cobra (*Ophiophagus hannah*) and one monocellate cobra (*Naja naja*) was found in the stomach in a semi-digested condition. During the post mortem of a dead crocodile on 21st October, 2011,

recovered from Pirkhali-2 compartment, the tail of a monocellate cobra (*Naja naja*) was found in the stomach.

About the Sundarbans

The Sundarban Tiger Reserve is situated in the southernmost part of the state West Bengal in District South 24 Parganas and North 24 Parganas (Arbesi-I compartment only). It lies between latitudes 21°31' and 22°31' North and longitudes 88°10' and 89°51' East. It is bounded by fringe villages on the north, the Bay of Bengal on the south, Bangladesh on the east separated by the Raimangal, Kalindi and Harinbhanga Rivers and on the west by the forests of South 24 Paraganas territorial division.

It is one of the first nine tiger reserves declared under the Project Tiger scheme of the Government of India in 1973. The total area of the reserve is 2,585 km^2, out of which a 362.40 km^2 area belongs to Sajnekhali Wildlife Sanctuary (SWLS), and a 1,330.10 km^2 area falls under the Sundarban National Park. The remaining 892.43 km^2 area falls under the buffer area (Reserve Forest). The total area under critical tiger habitat is 1,699.62 km^2, which mainly constitutes the areas of Sundarban National Park and Sajnekhali Wildlife Sanctuary. Sundarban Tiger Reserve consists of 15 forest blocks, 71 compartments, 4 territorial ranges, 15 land-based camps and 10 water-based (floating) camps.

The mangrove ecosystem of the Sundarbans is very dynamic and productive. It contains 40 mammalian species, 56 species of reptiles, 156 species of fishes, 67 species of crabs, 23 species of snails, and about 217 species of birds. Moreover, during winter, 52 species of migratory birds visit the Sundarbans (Anon, 2011).

A close network of rivers, channels and creeks intersect the Sundarban Tiger Reserve, which has resulted in the formation of flat islands. In the Indian Sundarbans there are 102 islands; human habitations were found on 50 percent of the islands. These islands become almost completely submerged during high tides. The main river systems in and around the area are Matla, Bidya, Kapura, Jhilla, Raimangal, Harinbhanga, Gona, Gossaba, Gomdi and Kalindi.

Mangroves and mangrove associates constitute the dominant vegetation type of the area. As per Naskar and Mandal (1998), there are 40 species of major mangroves, 32 species of minor mangroves, 30 species of back mangroves and associates and 3 species of mangrove habitat ferns found in the Indian Sundarbans. These are grouped into 39 families, 60 genera and 83 species. Some important mangrove families are Rhizophoraceae, Avicenniaceae, Meliaceae, Sonneratiaceae, Sterculiaceae and Myrsiniaceae among others. Some characteristics of mangrove flora are the formation of lateral root systems for proper anchorage, breathing roots or pneumatophores, stilt roots or prop roots for support, root buttresses, viviparous germination, waxy-coated thick leaves, sunken stomata, etc. According to Champion and Seth's (1968) revised classification, the mangrove forests of STR belong to: i) Mangrove scrub (4B/TS1); ii) Mangrove forest (4B/TS2); iii) Saltwater mixed forest (4B/TS3); iv) Brackish water mixed forest (4B/TS4); and v) Palm Swamp (4B/E1). Some important mangrove species are: *Rhizophora* sp., *Kandelia candel, Avicennia alba, Excoecaria agallocha, Ceriops decandra, C. tagal, Bruguiera* sp., *Xylocarpus* sp., *Sonneratia* sp., *Phoenix palludosa, Nypa fruticans*, etc.

Management problems in STR include: i) killing of prey species; ii) illegal collection of honey; iii) collection of crab and tiger prawn seeds; iv) illegal fishing; v) human-tiger conflicts; vi) difficult terrain; vii) unstable nature of the land; viii) frequent natural calamities; ix) high level of resource dependency by fringe people on mangrove forests; and x) transboundary disputes.

To save the mangrove ecosystem the Tiger Project authority has started joint forest management (JFM) with the villagers of 32 nearby villages involving 855 families who are helping to protect 25,000 ha of mangrove forests. At present there are 25 JFM committees (JFMC) and more than 200 Self Help groups (SHG) have been formed. Trust building exercises and other activities have been undertaken regularly on behalf of the Tiger

Reserve authority for economic rehabilitation of JFMC members.

Significance of STR

The national park area of STR was declared a natural world heritage site in 1985. It is a part of the globally recognized Sundarban Biosphere Reserves, declared in 1989. It constitutes over 60 percent of the total mangrove forest area in the entire country and contains 90 percent of the total Indian mangrove species. It is the only mangrove landscape (including the Bangladesh part) which supports a significant tiger population.

In addition to tigers STR harbours large numbers of endangered and globally-threatened species such as fishing cat (*Felis viverrina*), estuarine crocodile (*Crocodylus porosus*) , Gangetic dolphin (*Platanista gangetica*), Irrawaddy dolphin (*Oracella brevirostris*), king cobra (*Ophiophagus hannah*), water monitor lizard (*Varanus salvator*), etc. It also harbours large populations of the river terrapin (*Batagur baska*), which was once believed to be extinct.

STR is a nesting ground for marine turtles like the olive ridley turtle (*Lepidochelys olivacea*), green sea turtle (*Chelonia mydas*) and hawksbill turtle (*Eretmochelys imbricata*).

The mangrove ecosystem serves as a nursery for shell fish and fin fishes and sustains the coastal fisheries of the entire eastern coast.

Among the avian species it is known as a kingfishers' paradise as 8 of the 12 species found in India occur here. During winter it is the home of trans-Himalayan migratory birds including the Goliath heron (*Ardea goliath*). Moreover, a number of heronries are found during the monsoon harbouring large bird populations.

The mangrove forest acts as a natural shelterbelt and protects the hinterland from storms, cyclones, tidal surges, seawater seepage and intrusion.

Characteristics of the Sunderban tiger

The tiger found in the Sundarbans is the world renowned Royal Bengal Tiger (*Panthera tigris tigris*). Its claws are adapted to strike and hold prey while the canines are designed for biting and killing. Its short strong jaws are controlled by powerful muscles and the animal's soft pads provide a stealthy approach. The tiger is capable of sudden bursts of speed and power. It has highly developed hearing and vision. However, its sense of smell is not as powerful as its hearing ability. The tiger's unique striped colours of deep yellow, orange and black are variable. The Sundarban tiger is different from any other tiger in the country and world because of its adaptability to the unique mangrove habitat. Their individual behavior is highly specific and can't be generalized or replicated (Mukherjee, 2004).

Tigers are obligate carnivores. In other parts of India they prefer hunting large ungulates such as spotted deer, sambar, gaur, and to a lesser extent barasingha, water buffalo, nilgai, serow and takin. Among the medium-size prey species they prefer to take wild boar, occasionally hog deer, muntjac, grey langur, etc. Smaller prey species include porcupines, hares and peafowl. Due to the encroachment of humans in their habitat, they also prey on domestic livestock (Bagchi *et al*., 2003; Andheria *et al*., 2007; Biswas *et al*., 2002; Prachi *et al*., 2006). But tigers in the Sundarbans eat fish, crabs, even raid bee-hives for honey, can swim very fast in the big channels, climb trees, drink salty water, take their prey in broad daylight and have a man-eating propensity. The principal prey species are spotted deer, wild boar and rhesus macaque. An analysis of 113 scats revealed the presence of prey species with a high prevalence of medium-sized ungulates viz spotted deer, wild boar, rhesus monkey, water monitor lizard, different species of turtles, fish and crabs. They prey on small and medium animals since large-sized mammals are extinct in the Sundarbans (Anon, 2011). The wide range of food diversity has enabled the tiger to adapt to the diverse and difficult environment of the Sundarbans.

Occurrence of crocodile attack

On 9 August 2011 a tigress was killed by an estuarine crocodile in STR. The carcass of the tiger was found on the mudflats of Dobanki Khal (Creeks) near Dodanki Camp (21°59'49'' North latitude and 88°45'32.7' East longitude),

approximately 250-300 m away on the opposite side of the camp at Pirkhali-5 compartment under SWLS Range, on the way to Sajnekhali. Dobanki khal is a perennial habitat of estuarine crocodile and a few large-sized crocodiles are often seen during patrolling by staff and officers. The Dobanki area is also the territory of three tigers and they frequently move from one island to other by swimming like the other tigers of the Sundarbans. A few months earlier there was an incident of a spotted deer killed by a crocodile at almost the same location as the tiger kill, which was recorded on video by a range officer, SWLS Range. It is interesting to note that on that occasion a tiger was crossing the river just 60-70 m away.

The tiger carcass was lying in a lateral recumbent position on the small mudflat of Dobanki khal and a very large estuarine crocodile approximately 14 feet in length was moving around about 150 m away from the spot, repeatedly trying to reach his victim, but forest staff prevented it from doing so. Signs of movement of crocodile on the site of the carcass of tiger were also noticed. Decomposition had not started, which clearly indicated that the incident happened only a few hours before.

Post mortem

During the post mortem examination of the carcass conducted at Dobanki Camp it was revealed (Anon, 2011a) that the carcass was of a female tiger approximately 5-6 years old. From the external appearance it was observed that the rigor mortis stage of the carcass was over so time of death was estimated to be 24-28 hours before post mortem, i.e., on the afternoon of 8 August 2011. It was observed that all 4 canines were intact, no abnormal discharges from the nasal opening or ear orifice were detected. Length of the body from nose tip to lumbar vertebra was 108 cm; height was 84 cm. On outside of the body several wounds were found which appeared to be conical in shape. Twenty-two scattered, elliptical, deep piercing wounds on the body were observed on the abdomen, right dorsal foreleg, dorsal thoracic region and dorsal posterior neck region. The body beyond the second lumbar vertebra was totally torn off and absent except for the dislocated femur up to the paw of the left hind leg which was attached to the body by a flap of skin. Both the kidneys and lungs were found to be intact and there was a large torn vent in the diaphragm. All visceral organs like heart, trachea, oesophagus were in normal condition; the pleural cavity was completely destroyed. In the pleural cavity blood-tinged fluid was observed. The morphology of the liver was normal with only a few patchy whitish marks observed. Gall bladder and ducts were identified in the carcass.

Conclusion

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Considering all observations it was concluded that the death of the tigress was due to a crocodile attack. The evidence of the mode of attack indicated that while she was swimming across the river a crocodile attacked her hind portion and killed her by repeated jerking and drowning. There were signs that the tigress tried to fight back but could not save itself.

This is the first instance of a Sundarban tiger being preyed on and killed by an estuarine crocodile (*C. porosus*) in Sundarban Tiger Reserve.

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Author's address: Deputy Field Director, Sundarban Tiger Reserve, PO-Canning town, District- South 24 Parganas, Pin-743329, West Bengal, India. Telefax-03218255280

(Photo: Courtesy of P.K. Pandit)

SOME OBSERVATIONS ON WHITE-BELLIED SEA EAGLE (*Haliaeetus leucogaster*) IN BHITARKANIKA NATIONAL PARK, EASTERN INDIA

by Hemanta K. Sahu, Sunit K. Das & N. Palei

Introduction

India's Bhitarkanika National Park is one of the rich biodiversity hotspots located in Kendrapada district of Orissa State with mangrove vegetation, estuarine crocodiles and sea turtles. It is a unique habitat and ecologically significant as it one of the largest mangroves patches, second only to the Sundarbans & Andaman mangroves. Located in the deltatic region of the Baitarini and Brahmini rivers on the northeastern coast of India, the ecosystem of Bhitarkanika represents the finest patch of mangrove forest of the entire Indian coastal belt. With two and half decades of continued conservation measures this area has emerged as one of the well known national parks and an important coastal wetland in the country that supports a wide variety of plants and animals. It is the second largest existing mangrove ecosystem in India, which also includes creeks, rivers, estuaries, accreted land and mud flats. The vegetation is mostly mangroves with associates that serve as ecotones between the forest canopy and subsurface soil (Rao & Deshmukh, 1994). A way back from the creeks where the soil and water is much less saline are trees of semi-evergreen species. The forest of Bhitarkanika belongs to category 413 tidal swamp forest, as per the classification of Champion and Seth (1968). The area is well known for the rich avifaunal diversity, and White-bellied sea eagle (*Haliaeetus leucogaster*) is one of the major raptor species found there. Among the avian community raptors, or birds of prey, are always a key part and indicator of a healthy ecosystem (Ali and Ripley, 1987). Pioneering ornithological studies in Bhitarkanika date back to Pandav (1997), Dani *et al.* (1999) and Nayak (2003, 2005). The previous studies and available literature mainly explain the overall avian community, especially paying attention to the water birds. Gopi and Pandav (2007) reported 236 species of birds from Bhitarkanika, where the family Accipitridae is represented by 20 species, including White-bellied sea eagle, but there is not much information regarding this wonderful bird species. Therefore, in the present study some baseline observations were made to gain information about their occurrence inside the park.

Plate 1: White-bellied sea eagle (juvenile) in Bhitarkanika. (Photo: Sunit Kr. Das)

Materials and methods

Methodology

Between August 2008 to January 2009, attempts to estimate the occurrence of White-bellied sea eagle were beset with problems, including the difficulty of access to areas where the birds may be present. During the study period data was

collected from 5 transects laid in five major sighting blocks of the park. The length of each transect was 5 km. The sightings were recorded using a standard transect counting method (Burnham *et al*., 1980).To determine the occurrence and encounter rate of this raptor species the direct observation method was used with the nest count. Olympus 10x50 binoculars were used to locate the bird species and their nests. Each transect was surveyed twice a month. Birds were counted during walks along selected transects in each of the five locations (Barunei, Ekakula, Satabhaya, Dangamal and Kalibhanyadiha) during the mornings from 5.30 a.m. to 9.30 a.m.

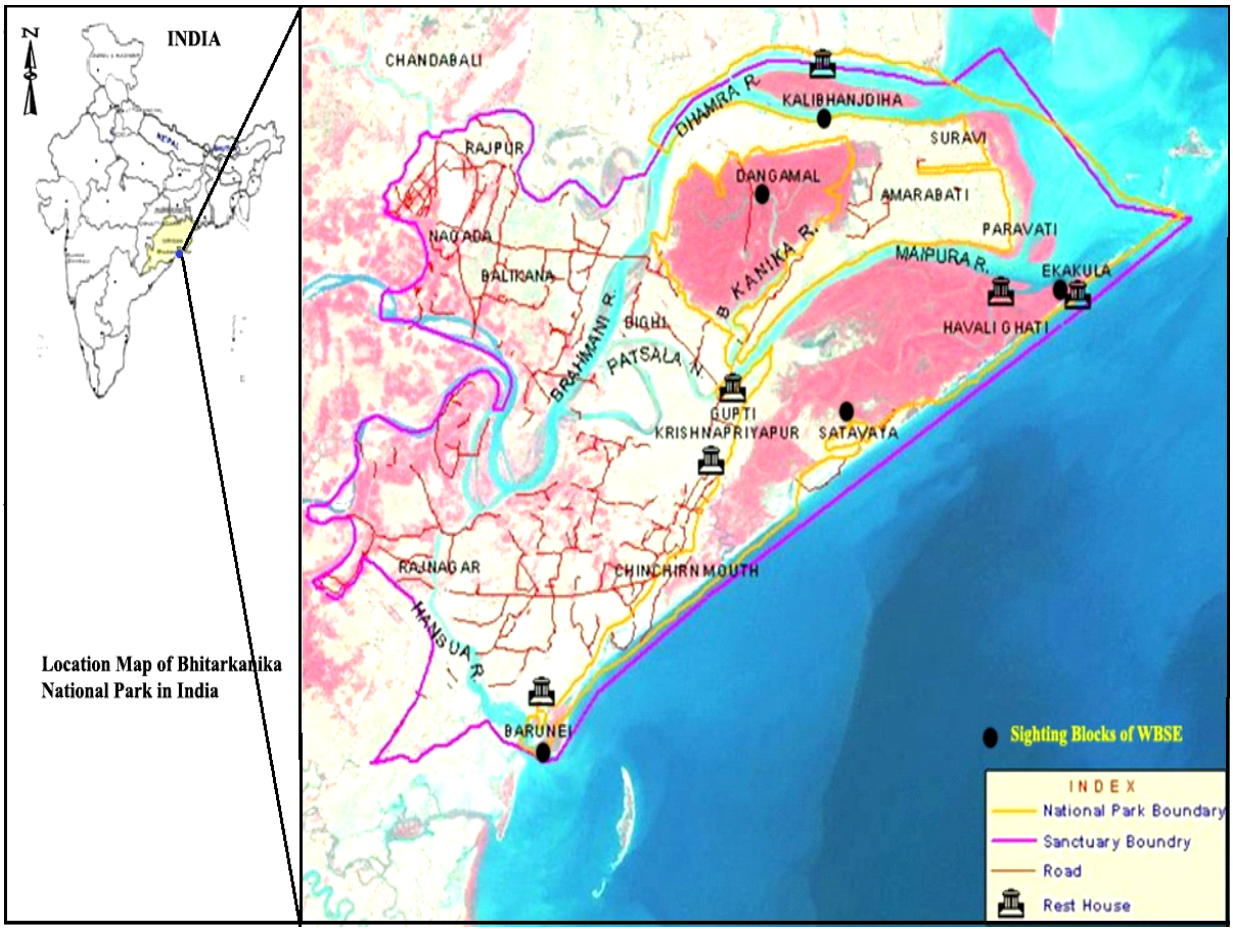

Plate 2: Map of study area with sighting blocks of WBSE (Bhitarkanika National Park)

Study blocks

Brunei block is situated in the southeastern part of the park, having a good patch of mangroves and a suitable habitat for the study species. Ekakula block faces the sea on the one side with the Maipura river on the other side and mangrove forest. It is one of the most secluded parts of the park in the northern part of the national park. Satabhaya is another block where transects were laid. It is located between Barunei and Ekakula blocks and represents the eastern part of the park. Dangmal block is located in the heart of Bhitarkanika and the place is well known for having the highest animal concentrations including herds of spotted deer, huge crocodiles along the mudflats and water monitor lizards. The last block selected for this study was Kalibhanjdiha, an island 8 km long and about 1 km wide located in the north of the national park on the Dhamara river, which has highest diversity of mangrove vegetation and is well known for King cobra. It is the largest island of Bhitarkanika. In the different blocks the maximum temperature recorded was as high as 39°C in September and October and the lowest temperature was 14°C in December during the study period.

Plate 3: A view of Bhitarkanika National Park (Dangmal Block) (Photo: Hemanta Kr. Sahu)

Results and discussion

A total of 198 sightings of White-bellied sea eagle were recorded. During the transect survey the highest number of sightings took place in October and the lowest numbers in December. The study results indicate that the occurrence of the bird species is almost the same in each month. The species was sighted in all five blocks and was found to be highest in Barunei block with an encounter rate of 0.88/km area (SE+0.07) with a percent occurrence of 26.76%; the lowest encounter rate was from Dangmal block with a 0.51/km area (SE+0.07) and an occurrence rate of 15.65%.

We also observed one nest of the studied species and during the observation the male bird was seen soaring overhead as we approached closer to the nest. The nest was mainly constructed of dried twigs and branches of *Casuarina longistifolia*. The eagles are not particularly secretive or shy, and in fact can be rather conspicuous, especially when flying or vocalizing during the breeding season. But they are widely dispersed, uncommon, and usually located in steep terrain and heavy forest where visibility and accessibility are limited (Bueser *et al*., 2003). In the park it was found that White-bellied sea eagle appears quite tolerant of humans. The two sexes are physically similar, but males are slightly smaller than females.

The range of distribution extends from northern India to China and south through Asia, New Guinea and Australia. According to the *IUCN Red list*, it is categorized in the least concern conservation status, although at the present time their numbers appear to be declining (Birdlife International, 2008).

Previous observations revealed a small residential population of 10-15 individuals of White-bellied sea eagle in the Bhitarkanika mangroves (Gopi and Pandav, 2006). They are threatened by habitat loss which affects suitable nesting sites and the potential prey base for this raptor species. there

There are also local threats such as shooting, poisoning, tree felling, accidents at fish farms and excessive disturbance to breeding due to human residential development and recreational activities. Chadha and Kar (1999) in the book 'Bhitarkanika: Myth or Reality' detailed the degradation issues. The Orissa mangroves have a serious problem of encroachments. Therefore, to conserve this magnificent bird species properly it is necessary to promote a conservation program through training and exhibitions for all levels of people including school students and especially among the local community. A well set up interpretation center is needed to teach wildlife education and create awareness about the importance of wildlife to the public.

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Authors' addresses: Dr. Hemanta Kr. Sahu, Department of Zoology, North Orissa University , Sri Ramchandra Vihar, Takatpur, Baripada-757003,Email:hks_nou@yahoo.com; Sunit Kr. Das and Nimai Palei, P.G. Department of Wildlife and Conservation Biology, North Orissa University ,Sri Ramchandra Vihar, Takatpur, Baripada-757003; Email: sunit.das219@gmail.com (Corresponding Author).

SWERTIA IN NEPAL HIMALAYA - PRESENT STATUS AND AGENDA FOR SUSTAINABLE MANAGEMENT

by Kunjani Joshi

Recently, more attention is being paid to *Swertia* sp. due to its usefulness in curing various ailments and use of the plant as raw material for the preparation of traditional and allopathic medicines. However, at present, the populations of these plants, their habitats and information relating to their indigenous utilization are being eroded as a result of habitat destruction, unsustainable land use practices and unscientific over-exploitation by collectors and traders beyond their regeneration capacity. Therefore, there is an urgent need to conserve the valuable but fast disappearing *Swertia* sp. and its habitat.

Systematics of *Swertia*

Swertia L. is a morphologically diverse but taxonomically distinct genus of the family Gentianaceae comprising 150 species. In Nepal, *Swertia* comprises 31 species with one endemic species (*Swertia acaulis* H. Sm.) which show a wide range of morphological variation within and among the populations, resulting in considerable uncertainty about the delimitation of species (Joshi and Joshi, 2008). Recently, Joshi (2008a) investigated the molecular differentiation and phylogeny of *Swertia* of the Himalayan region and reported that each of the species has unique sequences and the Internal Transcribed Spacer (ITS) of the nuclear ribosomal DNA can be used as a barcoding marker for *Swertia* in the local medicinal market.

Biogeography

Nepal's diverse geomorphology over a wide range of latitude, longitude and elevation provides an abundance of habitats and ecological niches, which helps to explain the spectacular diversity of *Swertia* growing in the region. *Swertia* sp. is widely distributed in the meadows, open forest and scrub ecosystems of the mountainous regions of the eastern, central and western regions of the country. Out of 75 districts of the country, *Swertia* sp. has been documented from 54 districts so far (Joshi and Joshi, 2008). Such wide distribution of *Swertia* sp. and other plant communities can also be explained with the help of recent evidence from the geological past of the Asian region concerning the migration of species from the neighboring continents. However, as there are no fossil records relating to *Swertia* and other species of Gentianiaceae in Nepal, it is not possible to discuss the phylogeny and bio-geographical distribution from the paleontological point of view. But the formation of the Tibetan Plateau and the upliftment of the Himalayas and other mountain ranges (Karakoram, Kunlun Shan, Tian Shan, Hengduan mountains) due to the collision of the Deccan plate with the southern Laurasia coastline about 45 million years BP in the Eocene era and the geo-botanical development of the Himalayas might have changed climatic patterns and resulted in some important changes to the dispersal and distribution of plants. Priority should be given to an integrated study of the taxa and eco-distribution for a conclusive bio-geographic interpretation.

Ethnobotanical uses

The rural people of Nepal rely heavily on plant resources for their primary healthcare and treatment of diseases. The people have developed unique indigenous knowledge related to the uses of plant resources due to constant association with the forests. The traditional knowledge related to the therapeutic uses of plants may be utilized for the improvement of the economic status of the local communities. The works relating to the ethno-botanical investigation and sustainable management of the resources including *Swertia* sp. are very limited. Recently, Joshi (2008b) documented the medicinal uses of some species

of *Swertia* (Table 1). Among the species, *S. chirayita* is important for its medicinal properties. Herbal medicines such as Diabecon, Melicon V-ointment, Ayush-64 and Mensturyl syrup contain chirata (*Swertia*) extract in different amounts for its antipyretic, hypoglycemic, antifungal and antibacterial properties (Joshi and Dhawan, 2005).

Table 1. Ethnomedicinal uses of some species of Swertia

Botanical name	Uses
Swertia angustifolia Buch.-Ham ex D. Don	Plant is crushed and boiled in water and two teaspoonfuls of the decoction are given to treat malarial fever 2-3 times a day; root juice is taken to give relief from cold and cough
Swertia chirayita (Roxb. ex Fleming) H. Karstrn	The plants are dipped in water overnight and the bitter juice is taken the next morning to cure malarial fever; decoction of the plant is used as a tonic for the digestive organs and also used as an anathelmatic, especially for children; juice of the root is taken to cure liver diseases; paste of the plant is also used to cure common ailments like cough, cold, asthma, headache and fever; a paste made of crushed roots is rubbed over joints for quick relief; leaves are warmed and a paste prepared with mustard oil is applied over boils and scabies.
Swertia ciliata (D. Don ex G. Don) B.L. Burtt	Decoction of the plant is given three times a day for 5-7 days to control cough, cold and fever. Plant is also used as a substitute for *S. chirayita*.
Swertia delatata C.B. Clarke	Paste is applied locally for relief of joint pains; extract is used to treat scabies; juice of plant is taken orally twice a day before meals to treat fever and headache.
Swertia multicaulis D. Don	Plant is ground up and the paste applied over wounds for healing; two to three teaspoonfuls of the decoction of plant is given twice a day to cure fever, cough and cold; decoction of plant is also given for 2-3 days as anthelmintic for parasites.
Swertia nervosa (Will. Ex G. Don) C.B. Clarke	Decoction of root is applied in skin diseases; plant is crushed and boiled in water and two teaspoonfuls of the decoction are given twice a day before meals to treat malarial fever; extract of the plant is also given in the morning to cure 'Gano" (Gasball) and stomach problems.
Swertia paniculata Wall.	Decoction of the plant is used as a tonic; the plant is also used as a substitute for *S. chirayita* in the treatment of malarial and other fevers.
Swertia pedicellata Banerji	Plant paste is applied externally on the forehead to give relief from headache.
Swertia racemosa (Wall. ex Griseb.) C.B. Clarke	Plant is made into a tonic; two teaspoonfuls of decoction of plant are given twice a day to treat fever and cough; paste of the plant is applied locally to treat eczema and pimples; juice of aerial part is taken orally twice a day before meals to treat jaundice.

Source: Joshi (2008)

Conservation status

Rural people collect *Swertia* directly from the wild populations of the forest, meadow, scrub or shady habitats, which are already dwindling due to over-exploitation and unsustainable land-use, thus accelerating their genetic erosion. Unsustainable collection of the species has been practiced due to their usefulness in curing various ailments, their increasing price, and increasing demand as raw materials for preparation of Ayurvedic and allopathic medicines. Every year a huge amount of medicinal plants are collected for export. The income from *Swertia* is used by collectors for foodstuffs, salt, clothes, to pay off loans and to buy cattle (Daniggelis, 1999).

The plants are collected before the seeds mature. The whole plant is pulled out, sun-dried for a few days, wrapped with a bamboo slip and sold to the local traders as dried brownish stems with root and leaves intact. Unsustainable harvesting, without considering the age of the plant and seed maturity, reduces regeneration significantly. Extensive collection of these plants and unscientific harvesting practices from the natural habitat leads to an increasing danger of extinction. Even without tree removal, extensive grazing of domestic animals in the forests can be damaging to the species. The present rate of exploitation has pushed some species to the status of threatened or endangered (Joshi and Joshi, 2005; Joshi, Joshi and Joshi, 2000; Joshi, Shrestha and Joshi, 2003; Joshi and Joshi 1991). Therefore, appropriate conservation measures for these species are urgently needed.

Swertia sp. makes up a major portion of the trade in medicinal and aromatic plants from Nepal. About nine species (*S. chirayita, S. angustifolia, S. ciliata, S. dilatata, S. multicaulis, S. racemosa, S. tetragona, S. alata, S. nervosa*) have been reported being traded in different trading centers of Nepal (Barakoti, 2002) under the common name "chiraito", except for *Swertia multicaulis* (sarmaguru). Among these species, *Swertia chirayita* plays a dominant role in trade and is considered to be superior in quality. Adulteration of chiraito with other low quality species of *Swertia* and other related species is very common in the trade of chiraito (Joshi and Li, 2008).

During the last few years, some initiatives have been taken for the conservation of plant resources in Nepal. The National Periodic Plans, National Conservation Strategy for Nepal, Master Plan for the Forestry Sector, Nepal Environment Policy and Action Plan (NEPAP), and Agricultural Perspective Plan have given top priority for ecological balance, conservation of habitats and sustainable use of biological resources. The Sustainable Development Agenda and Nepal Biodiversity Strategy have also clearly identified the need for conservation of important areas and for actions and strategies for the conservation of bio-resources.

The Government of Nepal has also introduced a legal basis for the conservation of biodiversity and habitats, i.e., Wildlife Protection Act 1958, Forest Act 1961, the Forest Protection (Special Arrangement) Act 1967, Plant Protection Act 1972, National Parks and Wildlife Conservation Act 1973 and Environment Protection Act 1997. Some species have also been proposed for legal status under Forest Regulation 1995 (amended in 2001). A clear shift in legislative provisions was initiated in the protected areas and community forests for species conservation and special provisions were made to facilitate public participation in the conservation and sustainable utilization of bio-resources. However, the issues of property rights and the fair and equitable sharing of benefits have yet to materialize by defining these terminologies.

Nepal has also ratified international conventions and agreements relevant to species conservation and habitat management such as the Plant Protection Agreement for South East Asia and the Pacific Region 1956; Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention) 1971; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 1973; and the Convention on Biological Diversity (CBD) 1992. As an obligation of a contracting party of the Biodiversity Convention, Nepal has formulated a Nepal Biodiversity Strategy and Non-wood Forest Products Policy. Within the constraints of resources and technical know-how, Nepal has been involved in various projects such as surveys and documentation of species, ethno-botany and indigenous knowledge, cultivation and conservation

of useful species, and researches on chemical components.

Agenda for sustainable management

Despite the implementation of various activities for the conservation of species and their habitats, there is a growing consensus among conservationists that the conservation of bio-resources is entering a stage of crisis, since there has been hardly any attempt to conserve these resources in an integrated manner (Joshi and Joshi, 2005). Therefore, the following agenda has been recommended for the sustainable management of *Swertia* and its habitats in an environmentally sound manner.

1. Formulation of policy, action plan and programmes

Though some initiatives have already been made for the conservation and sustainable utilization of the useful species, less priority is given to conserving these resources in an integrated manner. The existing policy related to conservation and sustainable management of useful plants is also fragmented in different sectoral policies. Therefore, priority should be given to formulating integrated national, regional and local policies, action plans and programs related to the conservation and sustainable use of the economic and useful plants, especially *Swertia* sp., taking into consideration the characteristics of ecosystems, productivity of the species, needs of the people and sustainable management of species.

2. Inventory and documentation of the species with indigenous uses, knowledge and practices

Although investigations of species have been conducted in different parts of the country, there is a paucity of quantitative and systematic data on species diversity, phylogeny and bio-geographical distribution, chemical constituents of the species and characteristics of habitats. Many bio-geographical areas of the country still remain unexplored. Therefore, it is strongly recommended that the major thrust should be given to an intensive inventory and documentation of the species with their potentials for utilization and existing indigenous knowledge and practices relating to the uses of the species.

3. Domestication, income generation and conservation of useful species

Despite the increasing demands from the herbal industry, the plant is still collected from the wild, it is sparsely cultivated and negligible efforts have been made for the development of proper agro-techniques of domestication. Therefore, emphasis should be given to implementing some pilot programmes for the domestication and cultivation of *Swertia* sp. This will help to bring in additional income and benefits to local people, thereby contributing to poverty alleviation and sustainable development of the country's resources.

For the conservation of the species, top priority should be given to *in situ* conservation. Such steps will not only contribute to protecting the habitats, but also help to maintain the ecological processes. Emphasis should also be given to conserving species *ex-situ*. The novel technique of in-vitro conservation and micro-propagation can help in the conservation and production of a large number of disease-free, true-to-type plants (Wawrosch *et al*., 1999). However, there exists a need to translate these in-vitro studies to the field for practical applications.

4. Involvement of people in integrated management of species and habitats

It is obvious that the success and sustainability of conservation activities depend upon the involvement of the local people. Emphasis should be given to initiating a special program for raising people's awareness about domestication, conservation and sustainable management of species. In this program the people should be involved from the planning phases of the activities.

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Author's address: Dr. Kunjani Joshi is Associate Professor, Department of Botany, Patan Campus, Tribhuvan University, P. O. Box 2486, Kathmandu, Nepal. E-mail: kunjanijoshi@gmail.com

MIGRATING URBAN BIRDS AND CHANGING LANDSCAPES IN INDIA

by K. Manjula Menon, R. Mohanraj and M. Prashanthi Devi

Introduction

Urbanization is one of the most dramatic and permanent forms of anthropogenic landscape change with extreme shifts in vegetation and other land covers making it a priority for research in conservation (Miller and Hobbs, 2002).Today, humans affect Earth's ecosystems at extraordinary rates through conversion of land and resource consumption (Turner *et al.*, 1991), alteration of habitats and species composition (McKinney, 2002), disruption of hydrological processes (Arnold and Gibbons, 1996), and modification of energy flow and nutrient cycles (Vitousek *et al.*, 1997a; Grimm *et al.*, 2000). Humans have radically revamped Earth's carbon cycle (Prentice *et al.*, 2001) and released into the environment vast quantities of naturally occurring trace materials (e.g.,cadmium, zinc, mercury, nickel, arsenic) and exotic new anthropogenic substances (e.g., polychlorinated biphenyls, chlorofluorocarbons) (Pacyna and Pacyna, 2001). Relative to non–human-dominated systems, urban ecosystems have low stability, different dynamics (complex and highly variable on all temporal and spatial scales), more non-native species, different species composition (often simplified, always changed), and unique energetics (antientropic in the extreme). They have rich spatial and temporal heterogeneity – a complex mosaic of biological and physical patches in a matrix of infrastructure,

human organizations, and social institutions (Machlis *et al.*, 1997).

Beyond understanding the mechanisms that are shaping communities in suburban and urban ecosystems, we can also obtain insight into how urbanization is driving biotic homogenization and the subsequent consequences of this homogenization. Biotic homogenization occurs when habitat heterogeneity decreases and habitats become more connected resulting in the extirpation of local, endemic species and the introduction of common, widespread species (McKinney and Lockwood, 2001).

Urbanization may be one the biggest drivers of homogenization, and birds have been projected to be one of the top five groups of organisms to be affected by homogenization (McKinney, 2006; Olden *et al.*, 2006).

Suburban habitats may play an important role in biodiversity conservation; however, they also present a conundrum. Typically, suburban habitats in a rural–urban habitat network of naturally forested areas contain less than half of the native woodland bird species that would exist at these sites if they were not developed (Blair, 2004). They also contain more total bird species than if these sites were left in a natural state (Blair, 2004).

Urbanization in India

Over the past half century, a great rural-to-urban population shift has occurred in India and the process of urbanization continues. Although population growth rates have slowed down in many countries, 62 percent of the world's population will live in urban areas by 2020. The Asia-Pacific region will comprise about 49 percent of that urban population, with a 55 percent level of urbanization. India, being the seventh largest country in the world, extending over 3,287,263 km, has shared the growth pattern and rapid urbanization with some of the fastest growing regions in Asia. With over 575 million people, India will have 41 percent of its population living in cities and towns by 2030 AD from the present level of 286 million and 28 percent urbanization. The landscape offers a unique diversity for birds with the Western Ghats being one of the richest centers of endemism and thereby providing a unique corridor for the movement of birds seen in the urban limits too. With a fast growing economy, suburban and rural areas are fast being replaced by urban spaces in India. Urbanization is considered to be one of the major causes of species endangerment in India. Urbanization has lead to changes in the migrational patterns, changes in circadian rhythm, and changes in nesting and feeding behaviours of birds

Urbanizing urban birds

The decline of urban birds worldwide has astonished ecologists and the common man. India is already witnessing a huge decline in House sparrows (*Passer domesticus*) with few populations residing in and around the city limits. There are also reports of the decline of Red-whiskered bulbul (*Pycnonotus jocosus*), Brahmini kite (*Haliastur indus*) and the Spotted dove (*Streptopelia chinensis*) in many parts of the country; the reasons are unknown and need to be urgently addressed. The green covers are fast being replaced by tall buildings in India. Most of these buildings hold cell towers on them which have left these birds helpless even to cope up with the pressures of urbanization. Reports have suggested that radiation from mobile towers can damage bird eggs by thinning their shells, damage embryos and also affect their navigation. In Indian culture, House sparrows are regarded as the gods of our homes.

India is well known for its cultural heritage and the co-existing religions found here. The sacred monuments, especially the temples which are thousands of years old, are unique in their architecture without any kind of transformation affecting them. Populations of House sparrows were recorded in temples in many cities in India as they provided favourable nesting sites for these birds, but they are definitely missing from the modern temples in and around the cities.

Urban birds, especially the House sparrows, have undergone a kind of localized migration from in and around human habitations to habitats which afford them food and nesting sites. The old traditional houses, still a symbol of Indian architecture, were built with crevices and holes which are suitable nesting sites for the House

sparrows. Even today, the few populations of House sparrows residing in the city limits are in and around these old architecture houses. With modernization, the tiled and thatched houses in India have been replaced with concrete apartments which lack nesting sites. The effect of the excessive use of pesticides on birds in the agriculture fields begins with the onset of their nesting period. The excess of pesticides has weakened the quality of straw making it impossible for the sparrows to build their nests. This also affects the carrying capacity of the nest and the eggs laid show thinning of the egg shells and early mortality of the nestlings. Modernized granary godowns and the reduced spillover on the roads and lack of aphids for the nestlings have affected their population tremendously.

FIG 1 The Thiruvenakoil Temple at Truchiruchirrappalli

FIG 2 House sparrows nesting in Thiruvenakoil Temple at Truchiruchirrappalli

FIG 3 Nesting of Spotted dove in the balcony of a house

(continued on p.17)

(continued from p.16)

Our ongoing research in Tiruchirrappalli in India depicts that urban birds like the House crow (*Corvus Splendens*) and Common myna (*Acridotheres tristis*), in absence of green cover, look for structural analogues of trees as their nesting sites. The iron rods that support the asbestos roof of the platform at railway stations provide unique habitats for birds, plus the fact that they get a regular supply of grains from the goods trains that carry the grain sacks. These structural analogues also provide excellent sites for communal roosting of different species of birds, with the nests of the House crow and Common myna being noticed adjacent to each other. These behavioural patterns provide a unique link to their co-evolution under the pressure of urbanization. Only those species that can withstand the pressure of urbanization survive.

FIG 4 Nesting of House crow in the asbestos roof in the railway platform at Tiruchirrappalli.

FIG 5 Nesting of Black Drongo on a electric pole

If it is the lack of tiled and thatched houses that has resulted in the decline of the House sparrow population in and around the world, then this is contrary to what was observed at the the New Bangalore International Airport at Devanahalli, Bangalore, India, forty kilometers away from the city, where hundreds of sparrows were noticed pecking the ground for food and warming their little bodies against the glass building of the airport. The new environment provided them with enormous food supplies and hence the hundreds of birds. Similar structures in the city limits are not preferred by the sparrows and this can be explained by the urban heat island effect which the birds find difficult to bear.

Our research has shown that, along an urban-rural gradient, suburban and rural areas provide better habitats for House sparrows with few populations nesting in and around rice mills that are located in agricultural landscapes at Tiruchirrappalli. A few more populations of House sparrows were also recorded along the gradient in the rural limits in the holes of small bridges for draining out water in the rainy seasons. And finally, there are some populations of sparrows in the suburban and rural gradient residing in and around old buildings with built-up cover inclusive of tiled and thatched houses. Urbanization affects community living among birds, reducing their community size and decreasing their home range. Our study has observed a reduction in the community size of sparrows from ten to twenty pairs to five or six and a reduction in their home range within the city limits to less than a kilometer. Community living of House sparrows with other urban birds like Spotted dove was observed within the city limits due to similarity of requirements and limited availability of food resources in and around the cities.

Urban birds that used to solicit in and around human habitations are undergoing synchronization in their biological cycles. Urbanization has forced some of the urban birds to undergo a local migrational pattern that has never been part of their life cycle. Thus, urban birds are undergoing a transition from a wide distribution to a restricted

one, being distributed in small pockets, moving and relocating themselves away from cities. Isn't it the kind of migration that Charles Darwin observed in the Galapagos Islands? Is a similar kind of migration being enacted in the urban settings too? Only few urban species and limited populations are able to cope and respond to the pressures of urbanization. Only those species that can respond will survive. This is nature's way of protecting the urban birds from extinction. Lack of food, loss of nesting habitats and most importantly, competition from other urban species like the Yellow-billed babbler (*Turdoides affinis*) and Blue rock pigeon (*Columba livia*) for the limited resources could have resulted in the decline of House sparrows.

FIG 6 Holes on small bridges used for nesting of House sparrows along an urban rural gradient at Tiruchirrappalli.

FIG 7 Nesting of House sparrow in the holes of small bridges at Tiruchirrappalli.

FIG 8 Bridge holes occupied by House sparrows for nesting.

Role of citizens

Environmentalists and urban planners should put forward an integrated approach to build up a city that provides suitable urban habitats for birds. Increasing green cover with native species and the integration of habitat corridors would link diversity at different patches, facilitating species diversity in the cities. Protecting or reversing the decline of urban species would help in restoring degraded habitats within the urban limits and conserving biodiversity. The concept of "Urban Bird Reserves" should be integrated into urban planning to conserve urban birds. Community projects rendering to the needs of society and value-based education at the grass root level will help in reversing the decline and increase understanding of the value of urban life.

Urbanization leads to a kind of species transformation that is evolutionarily significant. A process of irreversible change may lead to a faunal composition which is highly tolerant and versatile. Urbanization and its impacts on birds should be studied to protect, conserve and revive the ecological framework of urban habitats that host the diversity of species.

Summary

As urbanization crawls from urban to suburban areas, diversity is profoundly affected. The diversity of landscapes along this gradient provides unique habitats to a large number of life forms. With an increase in urbanization, birds tend to migrate towards suburban areas in search of food and nesting places, with suburban regions being more diverse and rich and more species abundant. The diversity of urban landscapes should be conserved and protected to safeguard our natural environment.

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Authors' addresses: K. Manjula Menon (Corresponding Author), (DST Women Scientist Scheme), Department of Environmental Management, School of Environmental Sciences, Bharathidasan University, Trichy, Tamilnadu-620024, India, Email: manjumenoncama@yahoo.co.in; Dr.R.Mohanraj, Assistant Professor, Department of Environmental Management, School of Environmental Sciences, Bharathidasan University, Trichy, Tamilnadu-620024, India; Dr.M.Prashanthi Devi, Assistant Professor, Department of Environmental Management, School of Environmental Sciences, Bharathidasan University, Trichy, Tamilnadu-620024, India

A RAPID SURVEY OF SMALL MAMMALS FROM THE NORTHERN TAMRAU NATURE RESERVE, PAPUA

by Freddy Pattiselanno and Agustina Y.S. Arobaya

Introduction

Papua, with an area of 416.000 km^2, is acknowledged to be the natural habitat of 30-50% of Indonesian biodiversity. According to Petocz (1994), Papua has a wide variety of ecosystems ranging from coastal to highland areas, providing specific habitats that may support some endemic and unique wildlife species.

Along with the government's plan for territorial division, speedy development on the basis of environmentally sound concepts is required to support the development of Papua. The ecoregion concept that was introduced by WWF Bioregion Sahul was considered as an option to be implemented for Papua Province development.

Papua has two ecoregion sites currently prioritized as working areas of WWF Bioregion Sahul. One of these sites is rainforest in the Vogelkop Mountains in the northern part of the Bird Head area. There is little available information about Papua biodiversity; consequently, sometimes threats to small mammals in their habitat have not been properly investigated and reported in order to design appropriate conservation plans. WWF Bioregion Sahul, therefore, in collaboration with the Forest Research Institute (BPK) and Papua State University (UNIPA) in Manokwari, conducted rapid assessment program (RAP) surveys on flora and fauna in the northern part of Tamrau Highland Nature Reserve to assess the conservation relevance around the protected site and provide baseline information for the future ecoregion spatial planning and comparison with other parts in New Guinea Island.

This paper is a part of the whole RAP, but we will only focus on small mammals from a sampling from two study sites around Saukorem District. Ecologically, the study site has potential significance for wildlife, and particularly for small mammals; however, the only authentic available data is mostly based on the survey carried out by Petocz (1994) and some anecdotal information from local communities. It is hoped that the study will also benefit any other wildlife species found in this site.

Description of the study site

The survey was carried out around the lowland rainforest areas closer to Saukorem District (0°33'927"S, 133°09'371"E) from 6-16 June 2001. Generally, this part of the Birdshead region study site has a wet, tropical climate and is subject to the seasonal influence of the northwest monsoon from November to March and the southeast tradewinds from June to September. Rainfall is high (probably up to 3,500 mm per year) (WWF, 2003). Rainfall data from 2000 was 2,497.9 mm with about 158 rainy days. Temperatures are uniformly high in the lowlands, ranging from 23°C to 30°C, decreasing with the increase of elevation.

The coastal site predominantly comprises coastal vegetations such as *Ipomoea peascaprae* and *Scaevola serillae* to the seaward, and in the landward area *Barringtonia asiatica, Terminalia catappa* and *Pandanus*, sp. are commonly found. Moving up to the hilly part, the dominant tree species are: *Pometia pinnata, Disoxylum octandrum, Canarium decumanum* and *Intsia palembanica*. The Wanameti River drains from the hills, creating some small streams along which freshwater vegetations such as *Metroxylon sago, Pandanus* sp. and *Casuarina equisetifolia* were observed. The study site was described as lowland tropical rain forest surrounded by primary rain forest.

Methods

Two sites were set up (see Table 1) and 120 locally-made wire mesh live traps (Kasmin)

(30x30x30cm) and 12 traditional snares were used to sample rodents and marsupials. This trap is like a small cage with one spiral spring door and is commonly used to catch house rats. Two baits (peanut butter and salt dry fish) were used and shared equally among the number of traps put out. Traps were located in selected localities around the camp and near the stream. The distance between two successive traps varied from 5 to 15 m, alternating between peanut butter traps, salt dry fish traps and empty traps respectively.

All traps were located at ground level at the bottom of the tree trunks or under fallen logs, and were baited and put in position just before sunset (16:00-17:00 pm). They were checked and collected the following morning (08:00-09:00 am). Some traps were camouflaged by covering them with dry leaves. Rodent captures were extremely rare in the afternoon; nevertheless, trap rounds were necessary to replenish the bait which was often consumed by ants. When an animal was captured, it was removed and the trap was washed and replaced. Trapping took place on four consecutive nights.

Traps were opened in the evening (4:00-5:00 p.m.) and were checked and closed the next morning between 8:00-9:00 a.m. Captured animals were identified according to Flannery (1995), Menzies and Dennis (1979). Each specimen was weighed and measurements were recorded for ear length (EL), body length (BL), tail length (TL), hind foot (HF) and forearm (FA). After identification and measurement, several species were collected as representatives and the rest were released at the point of capture.

Results and discussions

During the study, we only captured two rodent species: *Rattus jobiensis, Melomys levipes* and a marsupial species *Echymipera calubu* consisted of 5 individuals (Table 2). In spite of having a small number of captures, the abundance of rodents, particularly *Rattus jobiensis*, was more than in site 1. *Echymipera calubu* was a marsupial captured using a traditional snare that was set under a *Pandanus* tree. *Phalanger orientalis* was caught, and *Thylogale browni* was only observed, but both species were not measured. In site 2 we put more focus on bat species because the landscape was very steep and it was not suitable to set traps.

Table 1. Number of days and animals capture in study site

Plot/Site	Location	Days*	Animals**
Site 1 (200m asl)	0°37'064"S 133°07'930"E	4	5
Site 2 (500m asl)	0°37'614"S 07°973'135"E	3	35***

** Total number of days spent in each plot to capture the animals*
***Number of individual caught in each plot ***Bat species*

Table 2. Species captured and some morphometric measurements

Species	Bait	W (g)	HB (mm)	TL (mm)	HF (mm)	Sex
Rattus jobiensis	PB	290	213	196	43.31	M
R. jobiensis	PB	340	224	206	43.89	M
R. jobiensis	SF	98	165	108	35.54	M
M. levipes	PB	36.3	103.2	89.68	27.13	M
Echymipera calubu	TS	500	267	36	47.58	F

Note: W: weight, HB: body length, TL: tail length, HF: hind foot, M: male, F: female, PB: peanut butter, SF: smoked fish, TS: traditional snare without bait

The different species captured in this site, compared to the previous study at Yongsu and the Mamberamo River (Pattiselanno, 2007) indicated the diversity of small species occurring in West Papua. This agrees with Dwyer (1983) who conducted his study between 1979 and 1980 in Papua New Guinea. He indicated that altitudinal effects and long term modification of forest at the latter locality might have contributed to the differences in the mammals' diversity.

The genus *Rattus* is highly specious and has a complex taxonomy that is not fully resolved (Robins *et al.*, 2010). It has been explored that *Rattus jobiensis* was one of five native murid-rodents occuring in Biak-Supiori, shared only with the adjacent land-bridge island of Yapen (Flannery, 1995; Menzies, 1996). Therefore, the presence of this species in the study site is a new record for the Bird Head Peninsula. In the recent taxonomic study by Musser and Carleton (2005), the rats of Australia and New Guinea are divided into two groups – the Australian native rats as described by Taylor and Horner (1973) and the New Guinean species in the *Rattus leucopus* species group. *Rattus jobiensis* is one of 14 species placed under the *Rattus leucopus* species group of Musser and Carleton (2005).

The presence of *M. levipes* in this site expands the areas where the species is found at Arfak Mountains (Flannery, 1994). This species was captured using peanut butter and the trap was set on the forest floor, closer to the previous garden section. Dwyer (1983) found this species in old garden plots reverting to bush. A study by Menzies (1996) indicated that *M. levipes* (Thomas, 1987) should be included in *Melomys* Thomas (subgen. *Paramelomys* Rümmler 1936). As a result, *Melomys* is redefined to include only four species: *rufescens, leucogaster, lutillus* and *frigicola*, in New Guinea.

Echymipera kalubu is a bandicoot species caught using the traditional trap constructed from bamboo set near the fruited *Pandanus* sp. Closer to the trap, some rotten logs were found, and it was assumed that this site was used as its burrow. As Hide *et al.* (1984) found, this species was most frequently captured in deadfall traps arranged near to fruiting *Zingiber* and *Ficus* plants. This species occupied a broad type of habitat, though it was found less in the primary forests (Flannery, 1994). While *Echymipera kalubu* was caught using a traditional trap, trap methods using various kinds of facilities should be considered for use in the next survey (Boeadi and Widodo, 2000).

Phalanger orientalis was the only species caught using vocalization of sounds imitating the common cuscus by our local guide. Mophometric measurements were done, so we did not have related data of this species. As cited by Flannery (1994), the Northern Common Cuscus is very widely spread and abundant throughout New Guinea from sea level to elevations of up to 1,500 m, and is common in old gardens and primary forest. The presence of *P. orientalis* was also widely reported from different sites around the New Guinea Island, particularly in Papua of Indonesia (Sinery, 2006; Supriyantono *et al*., 2006; Fatem and Sawen, 2007; and Pattiselanno & Koibur, 2008).

Thylogale brownii was reported by a local guide just after it was killed and consumed; therefore, morpohometric measurements were not taken. As Flannery (1994) indicated, this animal prefers disturbed habitats, so it is sensitive to human predation, particularly with the use of dogs. It is further explained that this is the most widespread and common species of *Thylogale* in New Guinea. Encountering *T. brownii* is also important to fill the information gap about the absence of this species from all of the Indonesian parts of New Guinea. However, our finding supports the presence of this species around the Cyclop Mountains (Flannery, 1994).

The low catch rate possibility, both by individual and by species, compared to the northern region of Papua (Pattiselanno, 2007), suggested that the study site has possibly been disturbed. There is in fact evidence of this in that local people routinely use this site as a pathway by to the highland parts, particularly to Kebar. As informed by our local guide, people from Saukorem and Kebar have a strong lineage relationship and the study site was the shortcut connecting these two places. This agrees with the study of McPhee (1988) that habitat modification by human activity has radically affected the diversity and relative abundance of

rodent species. Amori *et al.* (2008) explained that New Guinea Island includes land-bridge islands where the generic level of rodents endemism is usually concentrated in highland areas, which retained discrete upland habitats even while lowland habitats were contiguous with larger areas across land bridges.

Some limitations in this study

We need to complete a longer study period collecting comprehensive information on small mammal species, in particular rodents. Trap distribution is not comprehensive enough to cover the different preferred habitats of the target species. Further assessment is important in order to study the abundance of small mammal populations and their conservation status at the Northern Tamrau Nature Reserve.

Conclusions

The disturbance of study site – in this case the habitat modification as the pathway from coastal to highland site – somewhat affects the small mammals' distribution around the study site.

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Authors' addresses: Freddy Pattiselanno, Wildlife Study Laboratory, Faculty of Animal Science, Papua State University, Manokwari 98314; Email: freddy.pattiselanno@fppk.unipa.ac.id; Agustina Y.S. Arobay, Forest Ecology Laboratory, Faculty of Forestry, Papua State University, Manokwari 98314

DIVERSITY OF FRESHWATER TURTLES AND THEIR POSSIBLE CONSERVATION IN AND AROUND THE ORANG NATIONAL PARK, ASSAM, INDIA

by Chittaranjan Baruah, Phallgun Chetia, Susanta Kr. Bhuyajn and D.K. Sharma

Introduction

The northeast region of India falls under the conjunction of the Indo-Burma and Himalaya biodiversity hot spots (26°10222.7922-27°39232.7922N Latitude and 91°26239.7422-96°15239.8422E Longitude). It is a major center of turtle diversity, and was recently recognized by the IUCN as a global turtle priority conservation area (Buhlmann *et al*., 2009). A total of 22 species of freshwater turtles and tortoises are recorded in this region out of the 28 species found in India (Baruah and Sharma, 2010a). Although the chelonians of the region are poorly studied, new species of turtles are being added to the Indian chelonians which were not known earlier (Pawar and Choudhury, 2000). Systematic efforts have been made to investigate the chelonians of the region (Sengupta *et al*., 2000; Praschag *et al*., 2007a, 2011; Fritz *et al*., 2008; Baruah *et al*., 2010a, b), but a major part of this still remains untouched.

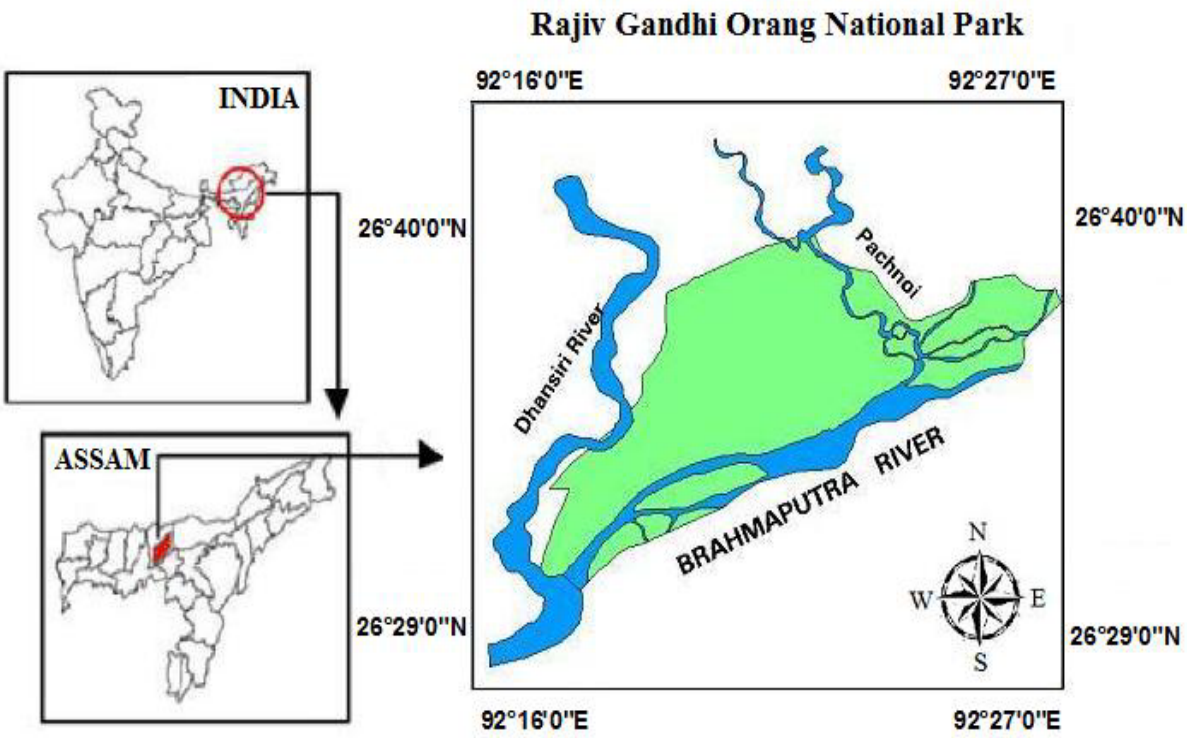
The Rajiv Gandhi Orang National Park (ONP) and its surrounding riverine areas, particularly the riverine islands (chars), represent one of the favoured turtle habitats in the region. An attempt has been made to evaluate both the diversity and conservation status of freshwater turtles and tortoises in and around the Orang National Park. Several conservation initiatives including field surveys to assess the status and threats to freshwater turtles, initiation of an *in situ* egg protection scheme, community awareness and participatory programs have been undertaken outside the protected area of ONP for the conservation of freshwater turtles.

Study area

Orang National Park (ONP), located approximately 130 km from Guwahati city, covers an area of 78.8 km^2 (92°162 to 92°272 E; 26°292 to 26°402 N) and is situated on the north bank of the Brahmaputra River in Darrang and Sonitpur districts of Assam, India. The Brahmaputra River marks the southern boundary of ONP, while tributaries such as Pachnoi, Belsiri and Dhansiri flow along its northern and eastern boundaries. Another tributary of the Dhansiri flows along the western and northern parts of the park. The habitat of ONP is composed of dry grassland (32%),

swampy grassland (31%), woodland (19%), scrub forest (5%), water bodies (7%) and river sand (6%) (Talukdar and Sarma, 2007). It is likely that ONP has had demographic and genetic exchanges with Kaziranga National Park through the Laokhowa-Burachapori forest complex along the Brahmaputra River (Ahmed *et al*., 2009b).

The study area (43-47 MSL) includes the notified areas of the national park and the fringe areas including chars comprising the alluvial floodplains of the Brahmaputra River. Most areas of the park are inundated by floods during the monsoon season every year. Numerous channels of both the Dhansiri and Panchnoi tributaries crisscross the park and are sources of water for wild animals. Due to this peculiar geographical location, the ONP provides a highly suitable habitat for many wild animals, including freshwater turtle. However, there is no literature record regarding the turtle diversity in the National Park.



Methodology

The study was carried out from May 2006 until January 2012 with the aim to record the diversity of freshwater turtles in Orang National Park (Table 1). During the extensive survey period, visual inspections of the forest floor, shrubs, grasses, wetlands, sandy river beds of the Brahmaputra River in nearby park areas and fringe riverine chars were conducted with the forest guards of the park, with prior permission.

Field surveys were carried out randomly throughout the areas and also at selected points in the Brahmaputra River, adopting three different methods: i) interrogation of people using photo sheets of turtles; ii) trapping, using nets with the help of fishermen; and iii) visual encounter surveys (VES). On some riverine islands, day and night surveys were carried out to record turtle species. Shelters like bushes, leaf litters and gaps in the roots of large trees were searched for hiding or hibernating turtles or tortoises. Fishermen and local communities were interviewed and the freshwater turtle species were identified from the catches of fishermen. Sporadic records of seizures of turtles and market surveys were conducted during the study period to assess the threat to some of the species due to trading. Basking turtles were spotted from a distance by binoculars (20x50) from boats or by walking along the river bank. Species identification was done following Daniel (1983) and Das (2002). Dead turtle specimens and turtle carapaces were identified following Smith (1933). Taxonomy and nomenclature were determined by measuring straight line carapace length (CL), carapace width (CW), plastron length (PL) and shell height (SH) with the help of Vernier Calipers. Specimens were weighed (M) to the nearest gram using digital spring balance. Scute and bone terminology of the shell followed Zangerl (1969). Subsequently, the live specimens were released in their respective natural habitats.

Awareness campaigns have been carried out in riparian village communities, including in the local schools. Various sections of the Brahmaputra River in and around the ONP were surveyed to identify locations that had evidence of nesting turtles (e.g., tracks in silt or sand, nests, predated eggs, and the presence of turtles in potential breeding areas). In such localities, local people are being encouraged to protect turtles and their nesting habitats. An *in situ* egg protection programme was initiated with the participation of local communities. An island (char) in the Brahmaputra River within Morigaon district in Assam was selected for a hatchery due its habitat suitability. During the period 2009 to 2011, using old fishing nets and a thorn brush barrier (as a defense against jackals, the primary threat to turtle nests in this area), about 250 square meters were enclosed by nylon nets with stiff support to create an *in situ* hatchery for enhancing hatching success. The nests were dug at a depth of 24 cm, at a distance of 100 cm apart in the enclosed area. A total of 51 nests were protected, including 18 for *P. sylhetensis* (91 eggs), 21 for *P. tentoria* (178 eggs), 2 for *Nilssonia nigricans* (24 eggs), 4 for *N. hurum* (32 eggs) and 1 for *N. gangetica* (10 eggs). The relative humidity was 78-82% throughout the incubation period. Plastic boards displaying clutch number, size and date of collection of each nest were fixed for identification.

Observations

During this investigation 10 species from the family Geoemydidae and 5 species from the family Trionychidae were recorded: one Critically Endangered (CR), two Endangered (EN), seven Vulnerable (VU) and five Lower Risk species. Interestingly, all four species of large softshell turtles viz. *Nilssonia gangetica, N. hurum, N. nigricans* and *Chitra indica* were encountered in and around Orang National Park (Table 1).

Table 1: Freshwater turtles recorded in and around the Orang National Park, Assam

Sl No.	Family	Common Name/ Local Name	Scientific name	Egg/cluster	WLPA schedule	CITES Appendix
Critically Endangered						
1	Trionychidae	Black soft-shell turtle Barmunia; [Om]	*Nilssonia nigricans (4M+6F)*	30-40 Spherical	IV	I
Endangered						
2	Geoemydidae	Assam roofed turtle Asomi Dura; [Om]	*Pangshura sylhetensis (8M+10F)*	oval	I	II
3	Trionychidae	Narrow-headed soft-shell turtle Baghia Kaso; [Om]	*Chitra indica (6M+4F)*	65-190 Spherical ranged	II	II
Vulnerable						
4	Geoemydiae	Tricarinate hill turtle Bamuni Dura;[Om]	*Melanochelys tricarinata(3M+3F)*	4-8	IV	I
5	Geoemydidae	Indian eyed turtle Bangla Dura;[Hb]	*Morenia petersi (4M+8F)*	6-10 Elongated	Not listed	Not listed
6	Geoemydidae	Crowned river turtle Bor Dura;[Hb]	*Hardella thurjii (4M+3F)*	8-19 Ellipsoidal	Not listed	Not listed
7	Geoemydidae	spotted pond turtle Nal Dura; [Ca]	*Geoclemys hamiltonii (5M+8F)*	18-30 Oval	IV	I
8	Geoemydidae	South Asian box turtle Jap Dura [Om]	*Cuora amboinensis (3M+5F)*	1-4 Elongated	Not listed	II
9	Trionychidae	Indian peacock soft-shell turtle Bor Kaso [Ca]	*Nilssonia hurum (2M+6F)*	20-30 Spherical	I	I
10	Trionychidae	Gangetic soft-shell turtle Ganga Kaso; [Ca]	*Nilssonia gangatica (3M+4F)*	8-85 Spherical	I	I
Near Threatened						
11	Geoemydidae	Brown roofed turtle Muga Dura;[Om]	*Pangshura smithii (8M+10F)*	6-12	Not listed	II
12	Geoemydidae	Assam leaf turtle Sepela Dura;[Om]	*Cyclemys gemeli (4M+9F)*	2-4 Elongated	I	Not listed
Least Concern						
13	Geoemydidae	Indian roofed turtle Futuki Salika Dura; [Om]	*Pangshura tecta (8M+7F)*	3-12	I	I
14	Geoemydidae	Indian tent turtle; [Om]	*Pangshura tentoria (7M+10F)*	3-8	Not listed	II
15	Trionychidae	Indian flap-shelled turtle Benga Kaso; [Om]	*Lissemys punctata andersoni (4M+9F)*	2-16	I	II

'M' = Male; 'F' = Female; 'Om'= Omnivorou; 'Ca'= Carnivorous; 'Hb'= Harbivorous

Community-based conservation efforts

Trainings on various aspects of turtle biology and conservation viz. survey techniques, egg collection, and hatchery management were offered to 20 student volunteers. Over 3,000 people from 21 villages attended the 11 awareness campaigns, and 12 local youths were introduced to field techniques. Three former poachers were employed as field assistants in the Indian turtle conservation project. The hatching successes were recorded at 60% for *P. tentoria*, 50% for *P. sylhetensis*, 21% for *N. hurum*, 10% for *N. gangetica* and 6% for *N. nigricans*. The number of success was 36 out of the total 46 nests. Most of the eggs began to hatch at the end of April or beginning of May. The hatchlings were measured and selectively photographed, and then released into the Brahmaputra River, near the hatchery area. Releases were made early in the morning (between 6 - 7 am) or in the late evenings (between 5 - 6 pm), mainly to reduce heat stress and the risk of depredations.

Family: Geoemydidae

Pangshura tentoria

P. smithii

P. tecta

P. sylhetensis

Melanochelys tricarinata

Cuora amboinensis

Geoclemys hamiltonii

Hardella thurjii

Morenia petersi

Cyclemys gemeli

Family: Trionychidae

Nilssonia hurum

N. gangetica

N. nigricans

Lissemys punctata andersoni

Chitra indica

Discussion

The presence of 15 freshwater turtle species belonging to 2 families in the ONP is indicative of an ideal turtle habitat in Northeast India. *Pangshura tentoria* appears to be the most frequently encountered turtle species, having patchy distribution in the Park, followed by *P. smithii* and *Melanochelys tricarinata* with rather widespread distribution in the park. Earlier, *P. tentoria* was reported from Kaziranga National Park (Das, 1990), Dibru-Saikhowa Wildlife Sanctuary (Choudhury, 1990); Lakhimpur District (Choudhury, 1995); Kamrup District (Choudhary *et al*.,1999); and Manas National Park (Sarma, 2007).Three subspecies have been described: *tentoria* from peninsular India, *circumdata* from the western tributaries of the Ganga as well as the Brahmaputra, and *flaviventer* from the northern tributaries of the Ganga. In the present study, 39 individuals of *P. smithii* were observed at Lohori Char of the Brahmaputra River in the possession of local fishermen, in addition to 19 in ONP.

Authors' addresses: Chittaranjan Baruah, Department of Zoology, Darrang College, Tezpur-784001, Assam, India; Phallgun Chetia and D.K. Sharma,Turtle Conservation & Research Programme, Bioinformatics Centre, Department of Zoology, Gauhati University, Guwahati – 781 014, Assam, India; Susanta Kr. Bhuyan, Department of Zoology, J.N College, Boko – 781123, Assam, India
**Corresponding author: D.K. Sharma, Coordinator, Bioinformatics Centre, Department of Zoology, Gauhati University, Guwahati – 781 014, Assam, India; Tel: 0091-0361-2700470 (O) /0091-94351-47412 (M); Email: dksgu@yahoo.co.uk*

APPENDIX-1

Species	Sex	CL	CW	PL	PW	SH	Wt (kg)
Pangshura tecta	M	9.8-12.82	7.6-9.93	8.1-11.83	4.3-6.15	4.5-6.42	0.7
	F	10.6-14.6	8.6-10.2	8.0-12.5	5.0-7.0	5.5-7.8	1.0
Pangshura tentoria	M	7.0-17.9	5.5-12.13	15.1-20.7	6.0-7.5	3.8-7.87	0.8
	F	8.5-20.4	6.7-14.8	15.1-24.8	7.1-9.29	4.1-8.4	1.4
Pangshura smithii	M	10.5-10.7	7.6-9.0	5.5-7.72	3.7-4.3	3.9-4.5	1.0
	F	9.4-18.5	7.0-15.4	10.1-14.8	5.8-7.1	6.0-7.7	1.5
Pangshura sylhetensis	M	7.2-9.7	6.0-9.5	6.9-8.2	3.0-3.7	3.6-5.0	0.7
	F	20.5-21.0	9.5-14.4	7.5-9.3	4.1-4.6	5.1-6.5	1.15
Coura amboinenesis	M	13.0-23.3	9.5-15.4	10.0-13.0	6.33-8.9	6.5-7.0	1.5
	F	20.09-25.0	14.3-14.8	11.4-16.1	8.0-10.0	6.7-8.0	2.0
Melanochelys tricarinata	M	12.3-14.7	8.0-9.6	10.2-11.3	8.5-11.2	6.7-9.0	1.0
	F	17-18.5	10.4-12.7	15.0-18.0	11.5-16.5	9.0-10.0	1.8
Cylclemys gemelli	M	18.0-19.0	14.1-16.2	15.0-18.0	12.0-14.0	10.2-11.0	1.0
	F	21.0-23.2	15.0-18.0	16.0-18.0	12.0-15.0	9.0-11.5	1.8
Geoclemys hamiltoni	M	21.1-19.2	19.0-19.7	28.3-28.8	14.8-19.0	12.0-12.4	5.2
	F	20.7-40.5	18.35-19.0	28.03-28.6	16.0-25.0	12.08	6.0
Hardella thrujii	M	15.0-16.8	13.0-15.0	14.0-16.0	13.0-15.0	12.0-13.0	8.5
	F	61.0-65.3	45.0-50.0	50.0-58.0	13.0-18.0	13.0-14.0	10.5
Morenia petersi	M	16.3-19.4	10.2-11.3	9.2-10.7	7.0-8.0	4.0-7.0	1.2
	F	20.0-26.0	11.3-15.5	10.0-16.3	7.0-8.2	4.21-7.33	1.15
Nilssonia nigricans	M	40.3-58.0	20.0-22.11	35.22-40-41	20.0-23.2	10.1-12.22	15.11
	F	54.0-54.11	34.0-36.5	38.27-42.11	28.2-33.3	10.0-14.0	35.32
Nilssonia gangetica	M	40.32-45.1	20.2-22.4	30.1-34.0	18.0-21.1	11.0-13.3	35
	F	75.5-94.0	30.0-33.0	28.4-29.5	15.4-17.11	9.0-10.5	30.3
Nilssonia hurum	M	13.0-17.0	13.6-15.2	6.4-7.2	7.6-8.8	6.6-8.5	10.2
	F	49.5-60.0	31.0-33.5	35.0-36.5	18.0-20.2	10.0-11.3	27
Chitra indica	M	51.3-55.5	47.2-50.2	25.3-26.8	25.4-27.3	8.1-9.22	15.0
	F	56.0-710	50-51.5	26.0-32.0	24.0-28.2	8.0-12.0	18.0
Lissemys punctata andersonii	M	20.2-22.5	15.33-16.4	18.1-20.0	10.1-12.2	7.0-9.2	5.0
	F	24.3-37.0	15.1-18.3	19.2-22.4	12.2-13.4	10.2-11.4	7.0

Note to Readers

In ***Tigerpaper*** Vol.38:No.4 October-December 2011, we published the paper "Study of the reptilian faunal diversity of a fragmented forest patch in Kukulugala, Ratnapura district in Sri Lanka" by D.M.S. Suranjan Karunarathna, A.A. Thasun Amarasinghe and D.M.G. Niranjan Karunarathna. We regret that D.M.G. Niranjan Karunarathna's name did not appear in the title credit, although it did appear with the authors' addresses.

We have since learned that this article was also submitted to ***Taprobanica – The Journal of Asian Biodiversity*** (ISSN:1800-427X) and published in Volume 2, Number 2, 30 April 2011. We hereby give credit to this publication.

SIGHTING OF RED-NECKED KEELBACK (Rhabdophis subminiatus) IN SIMILIPAL TIGER RESERVE, ORISSA, INDIA

by Debiprasad Sahoo, H.K. Sahu, S.K. Dutta and H.S. Upadhyay

Red-necked keelback (*Rhabdophis subminiatus*) is commonly known from north-eastern India, as well as Nepal, southern China and mainland Southeast Asia (Das, 2002). The species is distributed in the eastern Himalayas from Sikkim and Assam to Arunachal Pradesh. It is also known from Nepal, Myanmar, China, Thailand, Cambodia, Vietnam, Laos, Malaysia and Indonesia. This species is found up to 1,780 m above sea level (Whitaker, 2004).

In this note, the authors present a sighting record of *Rhabdophis subminiatus* in Similipal Tiger Reserve. Similipal Tiger Reserve is located in the Mayurbhanj District of Orissa and spreads over 2,750 km^2 of the Chotanagpur plateau and is one of the UNESCO-recognized Biosphere Reserves of India. On 13April 2011, the authors and two forest staff went to lay a transect line in Sarua beat area under Jenabil Range of Similipal Tiger Reserve. This work was involved with the estimation of ungulate density in Similipal Tiger Reserve. On the Sarua transect line (N21°41'16.7" E86°25'16.3" elevation-770.8 m) after crossing 800 m a juvenile Red-necked keelback was sighted just 1 m distance from us. The area was a hilly terrain covered with dry leaves. Photographs were taken of the specimen. The following characteristics were observed: head is distinct from neck; eyes are large with rounded pupil; head is olive-brown in color, followed by a broad black patch on the neck bordered with yellow behind. The neck and forebody was red in color and the rest of body and tail were a grayish-olive color with faint black and yellow markings. These morphological features confirmed the identity of the species as a juvenile Red-necked keelback. There was no previous record of occurrence of this species in Orissa. The species was sighted in UBK Range of Similipal Tiger Reserve for the first time as per the forest staff. This was the second sighting of this species in Jenabil Range

of Similipal Tiger Reserve. These two sightings indicate that the occurrence of Red-necked keelback in Orissa is confined to Similipal Tiger Reserve.

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Authors' addresses: Debiprasad Sahoo – Research Fellow, North Orissa University, debi.sahoo254@gmail.com; Dr. H.K. Sahu – Reader, P.G. Department of Zoology, North Orissa University; Prof. S.K. Dutta – P.G. Department of Zoology, North Orissa University; H.S. Upadhyay – Former Field Director, Similipal Tiger Reserve

(Photo: Courtesy of Debiprasad Sahoo)

FOREST NEWS

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DEVELOPING EARTH AMBASSADORS IN THE PHILIPPINES THROUGH THE KIDS-TO-FORESTS INITIATIVE

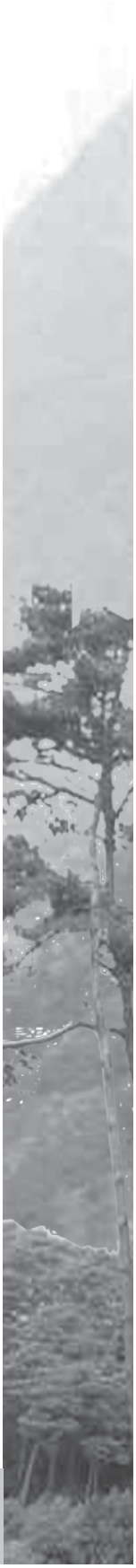
by Janet B. Martires
Yakap Kalikasan Tungo sa Kaunlaran ng Pilipinas, Inc.

"I wanted to be a doctor someday, but with my experience in the Kids-to-Forests Initiative, now I think I want to be a forester." These are the words of a 10-year-old, Grade V student after joining the Kids-to-Forest exposure.

The Kids-to-Forests Initiative (K2F) was launched by the FAO Regional Office for Asia and the Pacific in Thailand and subsequently piloted in six Asia-Pacific countries with support from the National Forest Programme Facility, in connection with the celebration of the International Year of Forests. The K2F initiative is piloting new approaches in forest management by involving the young generation and future stewards of Mother Earth.

The Philippines-K2F program is implemented by *Yakap Kalikasan* (Embrace the Environment), an environmental NGO, and the Department of Environment and Natural Resources-Forest Management Bureau (DENR-FMB). Focusing on increasing awareness and appreciation among school children and youth of the value and multi-benefits of forests through hands-on learning experiences that can lead to a better understanding of sustainable forest management, three batches (including 143 school children and out-of-school youth, teachers and parents, from nine schools and two communities) experienced three days of hands-on forest exposure. The experience was uniquely educational and exciting as participants were brought to a mangrove forest, a wildlife rescue center, the local forestry office, a botanical garden and the Forest Products Research and Development Institute. One group watched an environment concert hosted by a group of Kiddie Earth Ambassadors.

High in the natural forest of Mt. Makiling and the forest laboratory of the DENR-Ecosystems Research and Development Bureau, the kids were always "up-and-go" with a variety of interactive learning exercises. Through guided forest walks led by foresters and local farmers, and using simplified technical ideas, the kids learned about the different layers of forests, parts of a tree and their importance, and estimating the ages and heights of trees. Inter-school friendships were built amid the fun games, storytelling, cheering, cookfest of unique forest dishes, and presentations that mixed arts and culture with forestry. There were demonstrations on forest litter fertilizer production, seedling collection and potting, and tree planting. A camp-out allowed the kids to listen to nocturnal forest sounds and taste the morning dew on plants at the crack of dawn. The kids most liked their immersion with forest-foster parents. Upland families adopted the kids, shared their life stories and let the kids harvest crops from their farms and bathe in local springs. To complement the field exposure, the



program also developed practical comics in local languages.

K2F helped to build an exploring and caring heart among the kids. Now called "Earth Ambassadors," the kids have gone beyond the forest exposure to public exposure. They surprised a large audience during a Kiddie Forestry Forum with poems, songs, dances, posters, drawings, forest products and beautiful paper presentations introducing and explaining how K2F has influenced them and what they want to commit to Mother Earth. One student won a writing contest based on her K2F experience in a provincial competition of young journalists.

Parallel with the Asia-Pacific Forestry Week 2011, some kids and parents were interviewed in a radio program where they called for the active involvement of youths in preserving forests. As an 11-year-old elementary school K2F participant shared during the Kiddie Forestry Forum, "*With the Kids-to-Forests, we learned how families and kids live in the forests, what kids should know about forests and what kids can contribute to forests. Now that we are Earth Ambassadors, we are ready to do something for our forests."* K2F teachers and parents are also now working on the inclusion of additional nature exposure as alternatives to the traditional school trips to industrial parks and recreation centers.

The K2F program has also served as a bridge for partnership building and collaboration among various stakeholders including the government, NGOs, educational and research institutions, communities and the private sector.

K2F is not just a Kids-to-Forests project, but also a key to future sustainable forest management.

A BOOST FOR TEAK PLANTATIONS

Prepared by Simmithiri Appanah, NFP Advisor (Asia-Pacific)

Considering the long history and the vast experience gained with raising teak plantations, the idea of another workshop on innovations in the management of teak plantations can arrive as a surprise. Is there any room left for improving them? As the discussions in the workshop on "Innovations in the Management of Planted Teak Forests" (Thrissur, India; 31 August – 2 September 2011), organized by Teaknet, with support from FAO, conveyed, quite a lot of rethinking is emerging to boost the development of teak plantations.

Summary of workshop discussions

The workshop was attended by 42 participants. From outside of Asia, there were participants from Australia, Europe and Ghana. For teak growers, this surge of interest beyond Asia, particularly from countries like Ghana, should be a signal for changes to come – both markets and sources of teak are likely to shift in the foreseeable future. Nevertheless, participation from the private sector remained wanting, a perennial problem that Teaknet should address urgently.

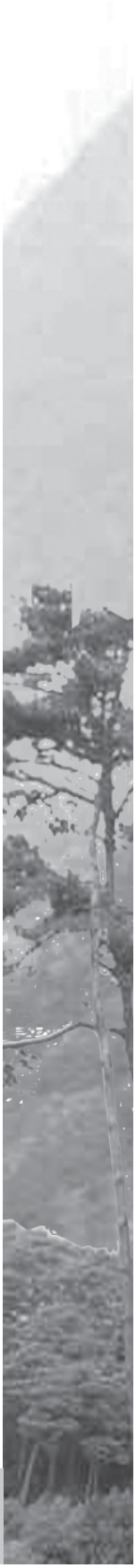
The technical presentations covered a wide range of topics:

- Supportive policies and laws for teak plantations – S. Appanah
- Forest level management planning – J. Lappi
- Choice of quality planting material for teak – J.K. Hansen
- Mass production of planting stock of teak – S. Kendurkar
- Soil management in teak plantations – B. Mohankumar
- Forest-level management planning – J. Lappi
- Health and sustainable management of teak stands – V. Sudheendrakumar
- Innovative approaches in utilization of teak wood – R. Rao
- Teak plantations for climate change mitigation and ecological services – M. Kanninen
- Teak farms – a strategy for growth and job creation in rural Asia – D. Rohadi

While a lot of terrain was covered, highlights can be summarized. It was clear that most countries are still constrained by archaic policies and regulations, limiting the opportunities for farmers and private growers to raise teak in private lands. Unless regulations are eased in Asia, the growth of private plantations in Central America and Africa may overtake Asia as the major source of teak wood in the future. Interesting research findings were presented on flowering physiology, influence of management on wood production, micro-propagation techniques, and disease management. These discussions laid bare another serious deficiency – many of these valuable innovations are not harnessed by the teak growers. From the discussions on wood utilization, it became apparent that an international grading rule or standards can greatly assist with the marketing of the timber. The variety, quality and source of wood pose problems when it comes to pricing, and the growers often get the short end of the stick.

These days, discussions in forestry are usually charged with issues of climate change. Teak plantations offer great opportunities in this respect, and unsurprisingly received their due attention as a means to provide climate change mitigation and ecological services. They were linked to the concept of REDD+. These discussions were imbued with more value when concepts of teak farms as a means to enhance the livelihoods of rural communities emerged.

In addition to the lectures, time was also allocated for group interactions and experience sharing. This was found to be quite useful, as the participants were able to discuss some of their unique field problems with experts. The final session sought additional directions on how Teaknet can meet the needs of its members.



FIRST ANNOUNCEMENT
WORLD TEAK CONFERENCE 2013 - SHARING OUR PLANET: TEAK MODEL DEVELOPMENT TOWARDS THE IMPROVEMENT OF MANKIND

Organizers:
Her Royal Highness Princess Maha Chakri Sirindhorn – Plant Genetic Conservation Foundation
Food and Agriculture Organization of the United Nations (FAO)
TEAKNET (International Teak R & D Network)

Background

The World Teak Conference is an offshoot of the commendable efforts initiated by Thailand on massive planting of teak throughout the country to commemorate the 84th birthday celebrations of H.R.H. the King of Thailand. Thailand has been executing a nationwide project to plant 8.4 million saplings of teak distributed in villages throughout the country with people's participation. This effort is laudable and serves as a model for other countries across the globe due to its social and environmental implications.

TEAKNET, initiated by FAO of the United Nations to promote teak globally, took on this spirit and decided to support the international conference in Thailand in appreciation of the highly relevant efforts the country has made.

In this conference, TEAKNET, in association with the other organizing partners, attempts to examine the multiple aspects of teak cultivation and management in the context of sustainable development with social, ecological and economic implications.

Teak (*Tectona grandis*) is indigenous to India, Laos, Myanmar and Thailand. Along with India and Indonesia, Thailand is one of the major producers of teak wood in the Asia Pacific region. Of late, there has also been much interest in planting teak in Africa and Central American countries.

Globally, planted forests are also emerging as a renewable forest resource with great potential for mitigating climate change, creating investment opportunities and eliminating poverty. The present conference thus tries to do justice to these issues by assembling the topmost experts in the field to discuss at length the details regarding the potential of utilizing teak in the aforesaid context.

Objective

The major objective of the programme is to examine the multiple aspects of teak cultivation and management in the context of sustainable development with social, ecological and economic implications.

The World Teak Conference 2013 will be convened in Bangkok and Phitsanulok, Thailand.

Contact addresses:
Dr. Paiboolya Gavinlertvatana,
Project Advisor-Coordinator, Plant Genetic Conservation Project
Thailand Email: paiboolya@rspg.org; URL: www.rspg.or.th
and
Dr. K. Jayaraman
TEAKNET Coordinator,
Kerala Forest Research Institute, Peechi, Thrissur, Kerala, India
E-mail: coordinator@teaknet.org; URL www.teaknet.org

ADVANCING REDUCED IMPACT LOGGING WITHIN EMERGING CARBON MECHANISMS

Background

Reduced impact logging (RIL) has been widely promoted for tropical forests as a means of reducing the environmental degradation caused by destructive and wasteful forms of logging. RIL is implemented through codes of practice and guidelines that cover activities such as forest management plans, road construction, tree felling, log extraction and reforestation. The benefits of RIL include reduced impacts on forest soils, hydrology, forest growth, biodiversity and improved worker safety.

Good progress has been achieved in developing codes of practice and RIL guidelines in many countries. However, the wider application of RIL has been limited by a number of factors, including weak institutional capacity, poor political commitment, concerns over the financial cost of RIL and a lack of financial incentives to account for the environmental and social benefits.

The global debate about climate change has highlighted the critical role of forests in the sequestration of carbon. The United Nations Framework Convention for Climate Change (UNFCCC) has identified REDD+ (Reducing Emissions from Deforestation and Forest Degradation) as an effective way of reducing CO_2 emissions. The main focus to date has been on reducing deforestation. Less attention has been given to the substantial gains that could be achieved by reducing forest degradation through improved forest management practices.

REDD+ and voluntary market arrangements have the potential to become major drivers for the wider uptake of RIL. For this to occur, policy-makers, forest managers and other relevant stakeholders need to have access to accurate information about the relative impact of various management options on forest carbon stocks and flows.

Workshop summary

The Asia-Pacific Workshop on Reduced Impact Logging: Challenges, Opportunities and Strategies in the Emerging Forest Carbon Economy was organized 3-4 May, in Kota Kinabalu, Sabah, Malaysia, attended by 28 international experts in the fields of reduced impact logging (RIL), forest carbon and REDD+. The workshop was jointly organized by the FAO Regional Office for Asia and the Pacific and the Lowering Emissions in Asia's Forests (LEAF) Program supported by USAID. Additional support was provided by the UN-REDD Programme, the Secretariat of the Pacific Community (SPC), GIZ, and the Sabah Forest Department.

The objectives of the workshop were to:

- Review the challenges and opportunities for the application of RIL in the emerging forest carbon economy, including REDD+;
- Review current knowledge on forest carbon measurement, reporting and verification and monitoring related to forest degradation and different management practices;
- Review the potential magnitude of financial costs and benefits of applying RIL in a forest carbon economy; and
- Develop strategies to encourage increased application of RIL as a key mechanism for improving forest management and reducing carbon emissions under REDD+.

Workshop program

The workshop was designed as a meeting of experts in the fields of RIL, forest carbon and REDD+. Lead speakers briefly reviewed the state of knowledge and presented case studies on key topics. Most of the program was devoted to group discussions and the development of strategies to promote the wider uptake of RIL. The key topics for discussion included:

- The measurement of forest carbon – a brief overview of current methods for measuring

forest carbon, including the relative costs and practicality of measuring the components of forest carbon in space and time.

- The impact of RIL on forest carbon emissions, compared with conventional logging and unlogged forests.
- Current opportunities and challenges for RIL – this topic reviewed the factors that are driving the uptake of RIL and those that are holding it back, including financial considerations, research and development, education/training, policy and regulation and infrastructure and resources.
- An action plan to promote greater uptake of RIL – the main part of the workshop was devoted to the development of actions and communication strategies for promoting RIL to policy/decision-makers, forest owners/ managers, public/media and other stakeholders.

Workshop outcomes

Key messages, conclusions and recommendations from the workshop were as follows:

- RIL is an important component of sustainable forest management (SFM), but we should not forget the importance of other key criteria such as forest regeneration, sustained yield and the maintenance of biodiversity.
- RIL significantly reduces the environmental impact of harvesting and it substantially reduces the emission of CO_2 by as much as 40 percent compared with conventional logging. Much of the carbon gain is associated with the retention of forest in buffers (streams, steep areas, etc.) under RIL, as well as from reduced waste and damage to residual growing stock.
- Several studies show that RIL results in better financial returns than conventional logging as a result of factors such as more efficient location of skid trails and better recovery of timber. However, studies are not well replicated and on some sites it is evident that RIL will result in lower financial returns from logging due to the loss of yield within the buffers and the higher costs of planning. However, these studies do not take account of the longer term economic benefits that are likely to accrue through better regeneration and productivity of RIL stands compared with conventionally logged stands.
- The wider uptake of RIL continues to be hampered by concerns over its higher cost and loss of resource compared with conventional logging. However, there are encouraging signs of progress:
  - In Indonesia, many concessionaires are voluntarily adopting RIL and conducting training programs.
  - RIL is widely seen as a first step towards forest certification.
  - Sabah intends to make RIL and certification compulsory for all concessions by 2014.
- RIL has a key role to play in reducing forest degradation under REDD+.
- Mechanisms for carbon accounting under REDD+ are most likely to apply at the national or regional scale, with monitoring systems being based on spatial imagery and growth data from field inventory and allometric equations.
- Practical methodologies have been developed for measuring forest carbon and for monitoring the losses and gains from harvesting and reforestation. The methodologies are based on normal forest mensuration and should not require substantial additional costs.
- Carbon alone is unlikely to be a major driver for RIL, but it is another important component of the multiple environmental benefits associated with RIL.
- Recommended future actions to promote the wider uptake of RIL within the Asia-Pacific region include:
  - developing additional demonstration areas across the region;
  - promoting the benefits of RIL to local communities and to logging companies through industry associations;
  - promoting the environmental and carbon benefits of RIL to policy makers and lobbyists;
  - establishing additional RIL training programs and incorporating RIL into training curricula at all operational, technical and professional levels;
  - promoting the ongoing development and adoption of regulatory frameworks for setting national standards for RIL and for

monitoring and reporting on the operational standards that are being achieved; and

- promoting the development and monitoring of national standards for SFM to incorporate RIL and other key elements such as a permanent native forest estate and sustained yield from wood production zones.

The findings of the workshop will be used to develop an action plan that will detail the strategies by which RIL can be promoted to international and national bodies, negotiators and the media as a key component of measures for reducing forest degradation and CO_2 emissions under REDD+.

SECOND FAO/WORLD BANK EXPERT MEETING: INVESTING IN AGRICULTURE AND NATURAL RESOURCES MANAGEMENT IN THE CONTEXT OF CLIMATE CHANGE IN EAST ASIA AND THE PACIFIC

Prepared by Beau Damen, FAO Consultant, Bio-Energy

From 14-16 May, a panel of experts from FAO and the World Bank gathered in Bangkok for the Second FAO/World Bank Expert Meeting on Investing in Agriculture and Natural Resources Management in the context of Climate Change in East Asia and the Pacific.

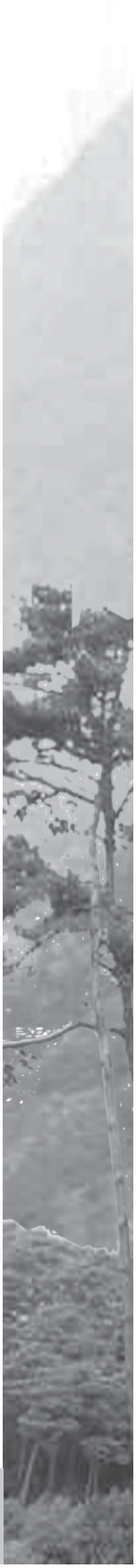
The meeting was opened by Mr. Hiroyuki Konuma, Assistant Director-General and Regional Representative of FAO in Asia and the Pacific, and Ms. Magda Lovei, Sector Manager, East Asia Sustainable Development Department, World Bank. Both stressed that the challenges posed by climate change will compound existing development problems in East Asia and the Pacific. As a result, problems such as population growth, rapid urbanization, increasing competition for natural resources, and most importantly food insecurity, will need to be addressed concurrently with those presented by a changing climate.

Experts from FAO, USAID, IRRI and the Regional Integrated Multi-Hazard Early Warning System (RIMES) highlighted new practices and technologies to strengthen the capacity of countries in the region to fight climate change. Examples included new, more tolerant crops, livestock and fish; farmer field schools; mobile crop and weather information systems and community-based adaptation.

But while the pace of innovation was found to be speeding up, participants agreed that the capacity of some countries is still lacking; particularly in their ability to implement regulatory frameworks and institutional capacity that will allow them to anticipate, plan for and manage climate variability and climate change. Discussions regarding the forestry sector highlighted the following strategies to address the sector specific challenges of climate change:

- Clarifying and strengthening forestland ownership and use rights;
- Reducing and simplifying resource access procedures;
- Maintaining a stable policy and regulatory environment;
- Strengthening sustainable production and access to markets for forest-based products; and
- Applying best practices in forest law enforcement and reducing opportunities for corruption.

More generally, climate-smart agriculture was identified as a useful umbrella to try and tackle governance gaps, mainstream climate change in the agriculture and natural resource sectors and target future investment. It was also thought to present a good opportunity for both agencies to initiate future collaborative action to tackle sector and agro-ecosystem specific issues.



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FOREST & FARM FACILITY 2012-2017: GOOD GOVERNANCE FOR MULTIPLE BENEFITS OF FORESTS

Prepared by Xiaojie Fan, FFF Regional Coordinator

The National Forest Programme Facility (NFP Facility) is evolving into the Forest & Farm Facility (FFF), a new phase that builds upon the NFP Facility's experiences of the past 10 years and elements of the Growing Forest Partnerships (GFP) initiative. The FFF will combine the strengths of these programmes in meeting the remaining challenges in NFP implementation and emerging needsbeing identified.

Mission: To promote sustainable forest and farm management by supporting local, regional, national and international organizations and platforms for effective engagement in policies and investments that meet the needs of local people.

Beneficiaries: Smallholders, women, community and indigenous peoples groups, including their networks at sub- national, national and international levels, who will receive direct support, improved access to information, capacity development in decision-making, and financing and investments for managing forests and farms in an integrated and sustainable way.

National and sub-national governments will benefit from direct support to establish or strengthen multi-sectoral channels for dialogue on forest and farm related issues and from having established an operational collaboration base with smallholders, communities and indigenous peoples.

Why a Forest & Farm Facility?

Today about 30 percent of the world's forests are managed by local people, either formally or informally, and it is these local groups – smallholders, women, community and indigenous peoples – that make many forest investments work on the ground. However, the threat remains that recent gains in local management of forests may stall or even be reversed without a strong initiative to mainstream and cement the gains. While global funding opportunities and investments are increasingly turning to forests as a means of alleviating poverty, enhancing ecosystem services and mitigating and adapting to climate change, there remains a need to address governance coordination mechanisms for stronger local voices and national ownership.

The need to include local people, their perspectives and voices and to mediate and find viable compromises between the views and perspectives of governments and civil society could not be more imperative; the stakes for forest- and farm-dependent people, and the global community overall, could not be higher. The NFP Facility has made significant contributions to increase stakeholder participation in the NFP and other processes. However, to further improve the representation of local people a more focused support to strengthen their capacity to network and organize is needed.

The FFF, framed in a context where natural resources are facing global challenges, will address the aforementioned needs by increasing its focus in promoting cross-sectoral government coordination at all levels and further enhancing the organization and capacity of local groups so they can engage in local, regional and national level policy dialogues and decision-making processes. In addition, the FFF aims to help equip these local groups with skills and opportunities to access financing mechanisms and investments for sustainable forestry and farm management.

The FFF is closely linked with the implementation of FAO's new strategic objectives at the country level relating to food security, forest and farm management, enterprise development and

financing, climate change mitigation and adaptation, biodiversity and bio-energy.

Programme activities and mechanisms

Based on demand, the FFF will develop and fund partnerships at local, national, regional and international levels. Small grants will be offered directly in support of the following activities:

- Organization and capacity of smallholder, women, community and indigenous peoples groups depending on forests and farms, for policy dialogue engagement and access to financing and investment;
- Multi-sectoral stakeholder policy platforms at local and national levels for improved government coordination; and
- Communication and dissemination of key information and learning between local, national, regional and international levels.

Organization and management

The FFF will be coordinated by a small and flexible management team and FAO has offered to continue hosting this new phase. A Steering Committee will evaluate and refresh the vision, principles, policies, strategies and basic activities of the Facility and a Donors Support Group will develop eligibility guidelines for selecting partners and criteria for grant applications respectively.

Additional information on the Forest & Farm Facility Programme Document is available at: http://www.nfp-facility.org/en/
Contacts:
Mr Jerker Thunberg, FFF Manager, FAO HQs. (E-mail: jerker.thunberg@fao.org)
Ms Xiaojie Fan, Regional Coordinator, FAO Regional Office for Asia and the Pacific (E-mail: xiaojie.fan@fao.org)

PHYTOSANITARY STANDARDS IN FORESTRY

Guide to implementation of phytosanitary standards in forestry, published by FAO, aims to help countries prevent forest-damaging pests from spreading to new areas.

"Due to climate change, previously inhospitable sites can become suitable for 'alien' pests that are accidentally transported through international trade in wood products, seeds or nursery plants – as well as trade in other commodities packaged with wood materials," said Eduardo Rojas-Briales, FAO's Assistant Director-General for Forestry. "The guide provides suggestions on how to reduce the risk of pest spread and to implement effective pest management strategies at every step of the forest commodities chain," he added.

In addition to globalization, global warming also factors into the spread of forest pests. Increases in summer temperatures generally accelerate the reproductive capacity of insects, while warmer winter temperatures improve their chances of surviving winters.

Drought conditions associated with warmer temperatures have also weakened the trees and increased their susceptibility to the beetles. Warmer temperatures have thus opened up previously climatically unsuitable mature pine stands to the pest.

Coping with such threats requires action on several fronts. Careful surveillance, the management of forest stands throughout the growing cycle and improved nursery, harvest and transport operations are important.

The FAO guide was authored by an international group of 100 scientists and phytosanitary experts from 46 countries and is intended for policy-makers, planners, managers and educators, as well as forest workers who implement policies at the ground level. It is currently available in four languages: Chinese, English, French, and Russian. Spanish and Arabic versions are expected to be published next year.
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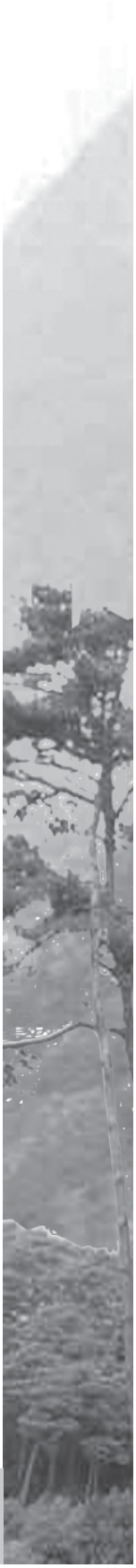


AUSTRALIAN GOVERNMENT VOLUNTEER PROGRAMS CONTRIBUTE TO FAO FORESTRY WORK IN THE REGION

This year marks the fifth consecutive year that FAO's Regional Office for Asia and the Pacific (FAO-RAP) and the Australian Youth Ambassadors for Development (AYAD) Program have worked together to provide skilled young Australians the opportunity to gain experience in working on forestry projects throughout the region.

The AYAD international volunteer program is an Australian Government/AusAID initiative designed to provide young professionals the opportunity to volunteer overseas in Asia, the Pacific and Africa. A key to this program is matching volunteer's skills and professional experiences with organizations that identify a need for a volunteer. Partner organizations such as FAO then work with AusAID to develop an AYAD assignment.

Over the years AYAD volunteers in the FAO forestry team have worked on a wide range of projects including sustainable timber harvesting, forest restoration, bioenergy and climate change policy. AYAD volunteers have also played key roles in organizing events such as the Asia-Pacific Forestry Week and the workshop on Forests and Climate Change after Copenhagen.

Michelle Hutchins, a forestry professional from Canberra, Australia, is currently volunteering in Bangkok at FAO-RAP in the Natural Resources Group, where she is assisting the "Applying assisted natural regeneration (ANR) for restoring forest ecosystem services in South East Asia" project, which is being implemented in Thailand, Cambodia, Lao PDR, and Indonesia.

This regional project is based on the experiences with ANR which have been used to rehabilitate degraded forests and weed-infested *Imperata* grasslands in the Philippines for over 30 years. The project is assisting communities and governments in developing model sites to test the effectiveness of this forest restoration technique across the region. A key component of the project is training local communities in the techniques and collecting environmental information to measure improvements in carbon sequestration, water quality and biodiversity.

This project aligns with the broader organizational goals of FAO and AusAid in the region. The project aims to increase and diversify the income of forest-dependent communities through improving the environmental stability and productivity of degraded secondary forests. At a higher policy level it contributes to the Millennium Development Goals One and Seven targeting poverty, hunger and environmental sustainability.

Having the opportunity to work as part of the FAO-RAP forestry team provides the AYAD volunteers with invaluable international forestry experience and opens their eyes to the variety of work which is taking place across the Asia-Pacific region. Michelle remarked that "The forestry sector in this region is extremely diverse and active, and I am excited to be a part of it. It has been particularly great to work with a number of NGOs on this project, including the Bagong Pagasa Foundation in the Philippines and Forest Restoration Unit (FORRU) at Chiang Mai University, Thailand. The valuable work these organizations are doing on the ground is highlighting that simple forest restoration techniques can play an important role in tropical forest restoration technology."

A personal highlight of Michelle's assignment has been working with the Akha hill tribe communities to establish Thailand's first ANR model site. "I have learnt a lot about the community and the importance of developing good relationships if you

want a project to be successful. Our project partners FORRU and IUCN have been working in this hill tribe area for a number of years and without these good relationships I don't think the initial project negotiations would have been as successful."

Michelle thinks that the more she visits the model site, the more she is able to learn and appreciate the realities of the region she is working in. "ANR presents a significant opportunity to improve environmental services of the forest and bring real benefits to the Akha community. But achieving sustainable outcomes for the long-term will take patience and sustained effort. I hope that partnerships like this with FAO and the AYAD program can continue so that future volunteers can have the opportunity to build on the positive work taking place in this area."

For more information on the AYAD Program visit: http://www.ayad.com/

Michelle at the ANR site with the FORRU crew

PROTECTING FORESTS TO PRESERVE LIVELIHOODS

An FAO programme that helps local communities in Mongolia protect their forests is being seen as a model for regional action.

The participatory forest management project (Capacity building and institutional development for participatory natural resources management and conservation in forest areas of Mongolia - GCP/MON/002/NET) has effectively stopped illegal logging and forest fires in 15 pilot districts since it began in 2007 and is set to go nationwide when the pilot programme ends in January 2012.

With funding from the government of the Netherlands, the project is helping Mongolians learn techniques to preserve the forest resources that are crucial to their well-being.

Challenges and opportunities

Mongolia holds roughly 188,000 square kilometers of forestland, occupying 12 percent of the nation's vast landscape. Yet, these forests have been shrinking due to greater demand for timber, human-induced fires, mining and overstocking of cattle. In the 1990s, as many as 400 square kilometers of forest were disappearing every year.

"Local people for many years were suffering because there was a lot of illegal logging in their areas, a lot of fires, strangers coming and doing whatever they wanted to," said Dashzeveg Tserendeleg, the national coordinator of the participatory forest management project.

Communities are now discovering that they can, in fact, do something. Through the project, forest user groups receive training in forest assessment, mapping, management planning, fire prevention and marketing of forest products. They then develop their own plans to put into action.

A sense of ownership

Batjargal, a herder in Mongolia, makes a living keeping a few hundred sheep, goats and horses in the district of Bugat, about 450 kilometers northwest of Ulaan Baatar. Until recently, he and his family could do little but watch as outsiders poached the resources of his valley. "We saw that things were going wrong when trees were logged illegally and streams and rivers started to dry up," said Batjargal. "So the local people wanted to establish a forest user group," a move that Batjargal says has given community members a "feeling of ownership."

New income

The project allows rural communities to tap into new sources of income. User groups clear dead trees from the forests and sell the wood for firewood or for use in construction. They also sell non-timber products like pine nuts and berries at local markets. Batjargal has just signed a contract to sell the district government 1,500 cubic meters of fuelwood for the winter.

"In our district we have only one state environment inspector and three rangers in three sub-districts," said Oyumaa, the Governor of Bugat district. "They give permission for felling trees, but cannot exercise permanent control over their own forests. So, the primary benefit of having forest user groups is better control over their own forests."

The next step is to scale up nationwide, a long-term task that involves drafting policy and refining the legal framework for woodland resources at the national level. Informally, the programme continues to grow, as group members share news of their success with other herders, who, in turn, start up user groups of their own.

FAO News Release 11/114

RAP FORESTRY STAFF MOVEMENT

Ben Vickers, a British national, has joined the RAP NRE group as Programme Officer (REDD+) of Project UNJP/GLO/386/UNJ (Support to Reducing Emissions from Deforestation and Forest Degradation (REDD+) Action) effective 31 May 2012, for an initial assignment duration of one year.

Mr. Vickers is a graduate in Forest Management from the University of Aberdeen, and holds an MSc in Forestry from Oxford University.

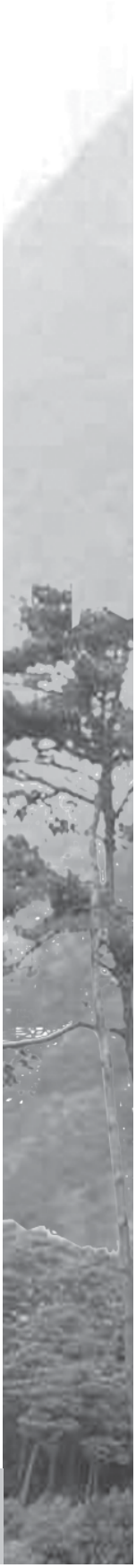
Mr. Vickers has been working in Asia since 1996 in the fields of agroforestry, social and community forestry, forestry standards and certification and, since 2007, on climate change issues in the forestry sector, particularly REDD+. He spent 8 years in Nepal, working on projects funded by GTZ, DfID and Helvetas, among others. While working for SNV in Vietnam, he initiated their engagement in REDD+, which has now grown into a sizeable global program. At RECOFTC, he launched their People, Forests and Climate Change program, developing projects in countries throughout Asia and the Pacific. Over the past 18 months he has worked as an independent consultant on behalf of all three UN-REDD partner agencies (FAO, UNDP and UNEP), as well as CARE International, contributing to regional, national and sub-national REDD+ initiatives in Bangladesh, Indonesia, Nepal, Sri Lanka and Vietnam, and the Small Island States of the Pacific. He has also been an active member of the Forest Stewardship Council, serving as a member of the working group for writing the recently-approved revised Principles and Criteria for forest management.

Dhanush Dinesh, a national of India, joined the RAP NRE group in May 2012 as a consultant on forest policy and climate change. Mr. Dinesh has an interdisciplinary background combining an MBA, and an MSc in Carbon Management from Edinburgh University. Mr. Dinesh's work focuses on operationalizing the Asia-Pacific Forest Policy Think Tank, and strengthening activities of the Forests and Climate Change initiative in the region. Prior to this assignment, Mr. Dinesh worked as Programme Assistant at UNEP's International Ecosystem Management Partnership (IEMP) in Beijing, undertaking programme development and research functions. He has also worked in the private sector, in domains including carbon management, carbon benchmarking, and wind energy. He is also a prominent advocate of youth action on climate change, and was selected as an International Climate Champion by the British Council.

Roger Steinhardt, a national of Australia, joined the RAP NRE group in June 2012 as a consultant on issues relating to forest policy and harvesting in Asia and the Pacific. His main duties involve the coordination of the "Promoting sustainable forest management by developing effective systems of forest planning, monitoring and control in Papua New Guinea" project and the "Community-based forest harvesting for poverty reduction in Vietnam" project.

Prior to joining the forestry group, Mr Steinhardt was the Forestry and Forest Carbon Manager at a private forestry and environment company in Thailand, and Forest Manager for a pulp and paper company in Lao PDR. He has also worked for an international development company in Australia as a community forestry and rural development specialist working on ADB-, AusAID- and NZAID-funded projects.

Jeremy Broadhead. After seven years at the FAO Regional Office for Asia-Pacific Office, Jeremy Broadhead is leaving to work with Climate Focus on the USAID-funded LEAF program (Lowering Emissions in Asia's Forests) as Senior Advisor, Forestry and Land Use Policy as of 2 July 2012. The project covers Cambodia, Lao PDR, Malaysia, Papua New Guinea, Thailand and Vietnam and Mr. Broadhead hopes to see future collaboration between FAO and the LEAF program.



ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

FINNISH PAPER COMPANY STORA ENSO (STERV.HE) PLANS TO INVEST 1.6 BILLION EUROS ($2.1 BILLION) TO BUILD A NEW MILL IN CHINA

Stora Enso said on Tuesday that it would build an integrated board and pulp mill in Guangxi, southern China, with a paperboard capacity of 900,000 tons. Production is scheduled to start in the fourth quarter of 2014.

Paperboard is used for everything from food to cigarette packages. Stora Enso Chief Executive Jouko Karvinen said the food packaging business is attractive as some 1.5 billion new consumers are forecast to start buying packaged food in the next 10-15 years.

Stora Enso has been raising plantations around Guangxi since 2002. The company's other operations in China include a coated fine paper mill in Suzhou and an uncoated magazine paper mill in Dawang.

The mill is due to be operated as a joint-venture with the state-owned Guangxi Forestry Group, which will hold 15 percent of the equity.
– Reuters 20 March, 2012, Helsinki –

FORESTS OFF LIMIT FOR ALL MINING?

If India's environment ministry's draft proposal for "inviolate forest areas" is accepted, large swathes of healthy forests, including national parks, wildlife sanctuaries, tiger reserves and wildlife corridors, would be out of bounds for all mining activities, and not just coal excavation.

The ministry's draft lists criteria for identifying forest patches where mining should be banned following the Group of Ministers on coal's decision to junk the no-go policy of the environment ministry. The GoM on coal instead asked the ministry to delineate 'inviolate forest areas' based on a new set of norms.

The norms proposed include forest cover, forestry type, biological richness and wildlife value of areas under review, hydrological and socio-economic benefits.
–The Times of India 13 June 2012 –

PHILIPPINES PROVINCES TO BENEFIT FROM FOREST LAND MANAGEMENT PROJECT

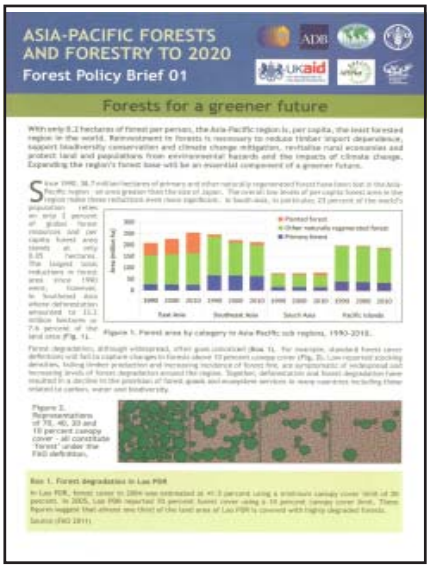
Several provinces in the Philippines will start to benefit from a forest land management project (FMP) after a loan agreement with Japan was handed over on Tuesday to the Department of Environment and Natural Resources (DENR).

Under the contract that was signed in Tokyo in March, the JICA (Japan International Cooperation Agency) is contributing P4.53 billion to the project, while the government's counterpart fund is 1.34 billion, according to details of the project released on Friday.

According to the Environment department, the 10-year program will tap the community-based forest management system to implement the undertaking in three river basins in three regions: the Upper Magat and Cagayan in the Cordillera Administrative Region, Pampanga in Region 3 (Central Luzon) and Jalaur in Region 6 (Western Visayas). During the program launch JICA Chief Representative Takahiro Salaki said "the FMP seeks to ensure the sustainability of forest cover in these provinces.

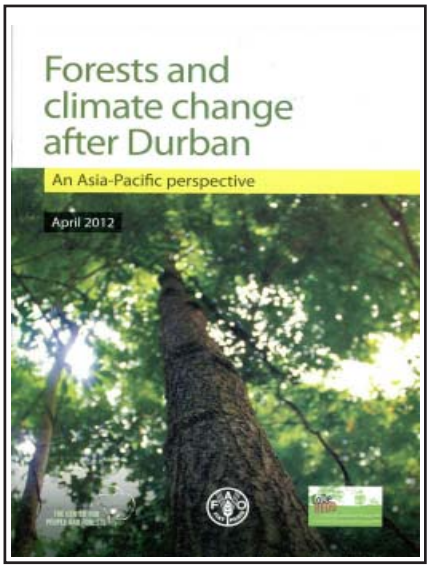
The DENR chief said that through the FMP, the department will be able to convert denuded areas to productive lands and help alleviate poverty in the key implementation areas, in cooperation with local governments.
–Business World Online 19 June 2012 –

NEW RAP FORESTRY PUBLICATIONS



FOREST POLICY BRIEFS

The past decade has been a period of unprecedented change in Asia and the Pacific. The recovery of Asia from economic crisis, the emergence of China as an economic superpower, accelerating demands on the region's forests and unprecedented levels of international interest in forest conservation and management are just a few of the major developments that are shaping the prospects for forestry. The second Asia-Pacific Forestry Sector Outlook Study (APFSOS II), launched in June 2010, takes a major stride in mapping out the future of forests and forestry towards 2020. In progress for four years, the study has involved all Asia-Pacific Forestry Commission member countries in a wide-ranging initiative to gather information, examine the evolution of key forestry issues, identify important drivers of change and review major trends. The study identifies the range of outcomes and implications for forestry that may arise from actions taken today, with the main purpose of supporting policy review and reform. As well as regional, sub-regional, country and thematic reports, eight policy briefs have been produced to help to bring the results of the study directly to those most able to influence national level forest policy and sector activities. For more about the Outlook Study please go to the following link: www.fao.org/asiapacific/forestry-outlook.



FORESTS AND CLIMATE CHANGE AFTER DURBAN: An Asia-Pacific perspective

On 21 February 2012, 13 experts and experienced commentators assembled in Quezon City in the Philippines to discuss the implications of COP17 in Durban for forestry in the Asia-Pacific region.

This was the third in a series of post-COP expert consultations that have been organized by FAO and RECOFTC – The Center for People and Forests to distil the opinions and knowledge from the region. In common with the previous two events, the outcomes of the meeting have been compiled in a booklet: "Forests and climate change after Durban: An Asia-Pacific perspective." These booklets have proved to be very popular with forest sector stakeholders throughout the region, and beyond, as a concise and accessible summary of the implications of the ongoing climate change negotiations.

The organizers encouraged discussions to range from general perceptions on the directions of negotiations, through REDD+ finance and safeguards, capacity building for MRV, and on to LULUCF, A/R CDM and the role of forests in climate change adaptation.

FAO ASIA-PACIFIC FORESTRY CALENDAR

27-28 June 2012. ***Inception Workshop: "Promoting sustainable forest management by developing effective systems of forest planning, monitoring and control in Papua New Guinea" (GCP/PNG/003/AUL).*** Port Moresby, Papua New Guinea. Contact: Roger Steinhardt, Consultant, Forest policy/ Haresting in Asia and the Pacific,
FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: roger.steinhardt@fao.org

3-4 July 2012. ***Low Emmission Land Use Planning Workshop.*** Bangkok, Thailand. Contact: Ben Vickers, Programme Officer (REDD+), Project UNJP/GLO/386/UNJ, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Ben.Vickers@fao.org or Nicole Kravec (nkravec@leafasia.org)

24-25 July 2012. ***Expert Group Meeting: An inclusive framework for enhancing investments into Asian forestry***. Bangkok, Thailand. Contact: Simmathiri Appanah, nfp Advisor (Asia-Pacific), FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Simmathiri.Appanah@fao.org

7-9 August 2012. A***ssisted Natural Regeneration (ANR) Study Tour to Philippines***. Bohol, Philippines. Contact: Michelle Hutchins, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Michelle.Hutchins@fao.org

30 August - 5 September 2012. ***Additional sessions of Ad Hoc Working Groups to the UNFCCC***. Bangkok, Thailand. Contact: Ben Vickers, Programme Officer (REDD+), Project UNJP/GLO/386/UNJ, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Ben.Vickers@fao.org

3-7 September 2012. ***2nd Global conference on agriculture, food security and climate change - "Hunger for Action."*** Hanoi, Vietnam. Contact: Ms Yuriko Shoji, FAO Representative in Vietnam, 3 Nguyen Gia Thieu Str., Hanoi, Vietnam; E-mail: yuriko.shoji@fao.org

11-13 September 2012. ***Regional Workshop on FGR - #FOM-BIO-DIVERSITY***. Kuala Lumpur, Malaysia. Contact: Simmathiri Appanah, nfp Advisor (Asia-Pacific), FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Simmathiri.Appanah@fao.org

24-28 September 2012. ***21st Session of the Committee on Forestry (COFO)***. Rome, Italy. Contact: Peter Csoka, Senior Forestry Officer, FAO Forestry Department, Via della Terme di Caracalla, 00100, Rome, Italy; E-mail: Peter.Csoka@fao.org

FOREST NEWS is issued by the FAO Regional Office for Asia and the Pacific as part of TIGERPAPER. This issue of FOREST NEWS was compiled by Patrick B. Durst, Senior Forestry Officer, FAO/RAP.

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

- East Asian forests and forestry to 2020 (RAP Publication 2010/15)
- Forests beneath the grass: Proceedings of the regional workshop on advancing the application of assisted natural regeneration for effective low-cost forest restoration (RAP Publication 2010/11)
- Forest policies, legislation and institutions in Asia and the Pacific: Trends and emerging needs for 2020 (RAP Publication 2010/10)
- Report of the Asia-Pacific Forestry Commission Twenty-third session (RAP Publication 2010/09)
- Asia-Pacific forests and forestry to 2020. Asia-Pacific Forestry Sector Outlook Study II (RAP Publication 2010/06)
- Forest law enforcement and governance: Progress in Asia and the Pacific (RAP Publication 2010/05)
- Forest insects as food: humans bite back. Proceedings of a workshop on Asia-Pacific resosurces and their potential for development (RAP Publication 2010/02)
- Strategies and financial mechanisms for sustainable use and conservation of forests: experiences from Latin America and Asia (RAP Publication 2009/21)
- Asia-Pacific Forestry Week: Forestry in a changing world (RAP Publication 2009/04)
- The future of forests: Proceedings of an international conference on the outlook for Asia-Pacific forests to 2020 (RAP Publication 2009/03)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04
- Reaching consensus. Multi-stakeholder processes in forestry: experiences from the Asia-Pacific region (RAP Publication 2007/31)
- Trees and shrubs of Maldives: An illustrated field guide (RAP Publication 2007/12)
- A cut for the poor: Proceedings of the International Conference on Managing Forests for Poverty Reduction Capturing Opportunities in Forest Harvesting and Wood Processing for the Benefit of the Poor (RAP Publication 2007/09)
- Trees and shrubs of the Maldives (RAP Publication 2007/12)
- Developing an Asia-Pacific strategy for forest invasive species: The coconut beetle problem – bridging agriculture and forestry (RAP Publication 2007/02
- The role of coastal forests in the mitigation of tsunami impacts (RAP Publication 2007/01)
- Taking stock: Assessing progress in developing and implementing codes of practice for forest harvesting in ASEAN member countries (RAP Publication 2006/10)
- Helping forests take cover (RAP Publication 2005/13)
- Elephant care manual for mahouts and camp managers (RAP Publication 2005/10)
- Forest certification in China: latest developments and future strategies (RAP Publication 2005/08)
- Forests and floods – drowning in fiction or thriving on facts? (RAP Publication 2005/03)
- In search of excellence: exemplary forest management in Asia and the Pacific (RAP Publication 2005/02)
- What does it take? The role of incentives in forest plantation development in Asia and the Pacific (RAP Publication 2004/27)
- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
- Practical guidelines for the assessment, monitoring and reporting on national level criteria and indicators for sustainable forest management in dry forests in Asia (RAP Publication: 2003/05)
- Applying reduced impact logging to advance sustainable forest management (RAP Publication: 2002/14)
- Trash or treasure? Logging and mill residues in Asia-Pacific (RAP Publication: 2001/16)
- Regional training strategy: supporting the implementation of the Code of Practice for forest harvesting in Asia-Pacific (RAP Publication: 2001/15)
- Forest out of bounds: impacts and effectiveness of logging bans in natural forests in Asia-Pacific: executive summary (RAP Publication: 2001/10)
- Trees commonly cultivated in Southeast Asia: an illustrated field guide - 2nd edition (RAP Publication: 1999/13)

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