



REGIONAL OFFICE FOR ASIA AND THE PACIFIC (RAP), BANGKOK
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

April-June 2005

TIGER PAPER

Regional Quarterly Bulletin on Wildlife and National Parks Management

Vol. XXXII : No. 2



Featuring

FOREST NEWS

Vol. XIX : No. 2



TIGERPAPER



**REGIONAL OFFICE
FOR ASIA AND THE PACIFIC**

TIGERPAPER is a quarterly news bulletin
dedicated to the exchange of information
relating to wildlife and national parks
management for the
Asia-Pacific Region.

ISSN 1014 - 2789

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Cover: Indian (or Burmese) Python (*Python molurus bivittatus*).

Found throughout India and Southeast Asia.

Photo: John Everingham

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BIOGEOGRAPHIC DISTRIBUTION OF PYTHONS

by Mohammed Ashraf

Introduction

Pythons (Pythonidae) are a family of non-venomous constricting snakes consisting of 27-30 species that are found from Australia through New Guinea, Indonesia, southern Asia to Africa (Rawlings, 2003; Zug, 1993). The family reaches its greatest generic and allelic level diversity in Australia and New Guinea. Despite the species diversity, pythons are the second largest group of snakes that have been listed in the 'near threatened' category of the World Conservation Union (IUCN) across its limited geographical areas. Pythons are large vertebrate mega-fauna that often carry 'flagship' status in its range countries. This paper explores the python's systematic classification and taxonomy, its biogeographical distribution from an evolutionary perspective, its current ecological speciation (sympatric and allopatric), and provides a brief biogeographical diagnosis of the green python (*Chondropython viridis*).

Classifying the python

Herpetologists usually prefer to classify pythons as a subfamily of Boidae (Mattison, 1998). The debate regarding python as an independent family is disputable, but morphologically, spatially and behaviourally both Boidae and Pythonidae are quite distinctive and there is little argument in this regard. Taxonomically, pythons are in complete chaos especially taking into account the species variation in Australia. Some biologists specify five genera, whereas others convincingly argue to expand the number of genera to seven (Mattison, 1998). In this report, Pythonidae is treated as an independent family following the systematic and taxonomy of Zug (1993) and adopting a conservative approach using the six most widely accepted genera (Mattison, 1998).

Biogeographical distribution/evolutionary perspective

The biogeographic distribution of snakes and the way they have dispersed, speciated and colonized different continents are potentially among the most fascinating aspects of herpetological and biogeographical study. Snakes first appeared between 100-135 million years ago during the early Cretaceous period (Bauchot, 1997). At least seven families were present, including boas but not python, during the secondary era. A hundred million years ago the shape of the land masses were utterly different from how they are now. The southern continents, South America, Africa and Australia were joined together and the pieces that were later to become Madagascar, India and South East Asia were still attached to them. The northern continents, North America, Europe and northern and central Asia formed the other landmass. Dispersal of terrestrial animals was much easier than it is now and families that were radiating into different habitats were able to move into many different parts of their respective 'continents'. Because of this, the snake fauna of North America has more in common with that of Europe and Central Asia than it does with South America, which shares similarities with Africa, southern Asia and Australia. By the time the more familiar families such as Pythonidae began to appear, the shapes of the landmasses were already beginning to change. Pythonidae evolved after certain pieces broke away, hence the opportunities for them to disperse were more limited than for those that evolved when the landmasses were together. Although it is impossible to provide an accurate account of the biogeographical sequence of events in relation to the distribution of Pythonidae and landmass fragmenta-

tion, we can speculate on how to fill in some parts of the time table. For example, the absence of pythons in Madagascar indicates that they evolved after Madagascar broke free from the main African landmass. Conversely, the presence of boas on Madagascar shows us that this family had already evolved before South America and Africa parted company. The dendrogram reflects the approximate time period of 65-68 million years ago during late cretaceous period when Pythonidae started to evolve. The vertical line on the figure reflects the time-period of 68 million years when Pythonidae evolved in the Old World continents.

Python ecology and current geographical speciation

Pythons are restricted to the Old World, but are not found on Madagascar. Their centers of evolution appear to be Africa, south and southeast Asia and Australia. Pythons occupy a variety of habitats ranging from rain forest to arid scrub and savannas. Most are terrestrial, although the green tree python (*C. viridis*) is essentially arboreal. The Australian water python (*L. fuscus*) is semi-aquatic and always near to water. All species of python lay eggs and a number are known to brood them throughout the incubation period. Pythons feed on a variety of warm blooded prey, amphibians and reptiles.

Brief phylogeographic-biogeographic analysis of green python (*Chondropython viridis*)

The green python is found throughout the island of New Guinea and its offshore islands and in a small rainforest block in northeastern Australia (Barker and Barker, 1994). From genetic and morphological points of view, the green python has two different, but not spatially separated,

populations (Rawlings, 2003). The southern population of green python dispersed and colonized the rain forest segments in northeastern Australia.

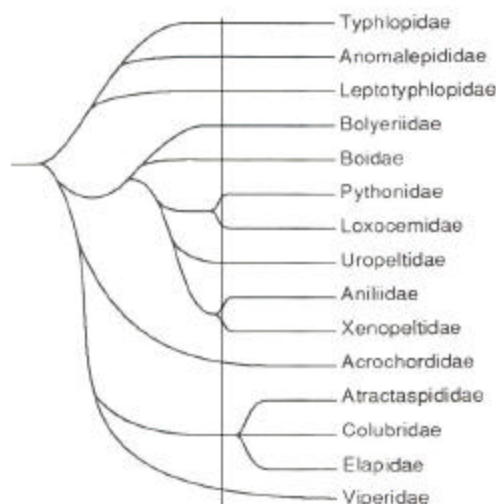
Biogeographical diagnosis

During the late Tertiary or Quaternary and throughout this period during times of lowered sea levels, a land bridge was exposed across the Torres Strait between Australia and New Guinea. Because of the shallow depth of the Torres Strait, a land bridge would have been periodically in existence over at the least the last 500,000 years with the most recent marine incursion severing the connection starting approximately 8,000 years ago. However, opportunities for rainforest-dependent species to

disperse south onto Cape York may have existed only sporadically during the late Tertiary and Quaternary, as the high rainfall/humidity conditions of the Miocene gave way to an increasingly drier atmospheric regime resulting in the present day distribution of remnant rainforest patches. However, fluctuating climatic conditions may have periodically modulated the extent of suitable rainforest on the land bridge and intervening Cape York region allowing dispersal for the green python.

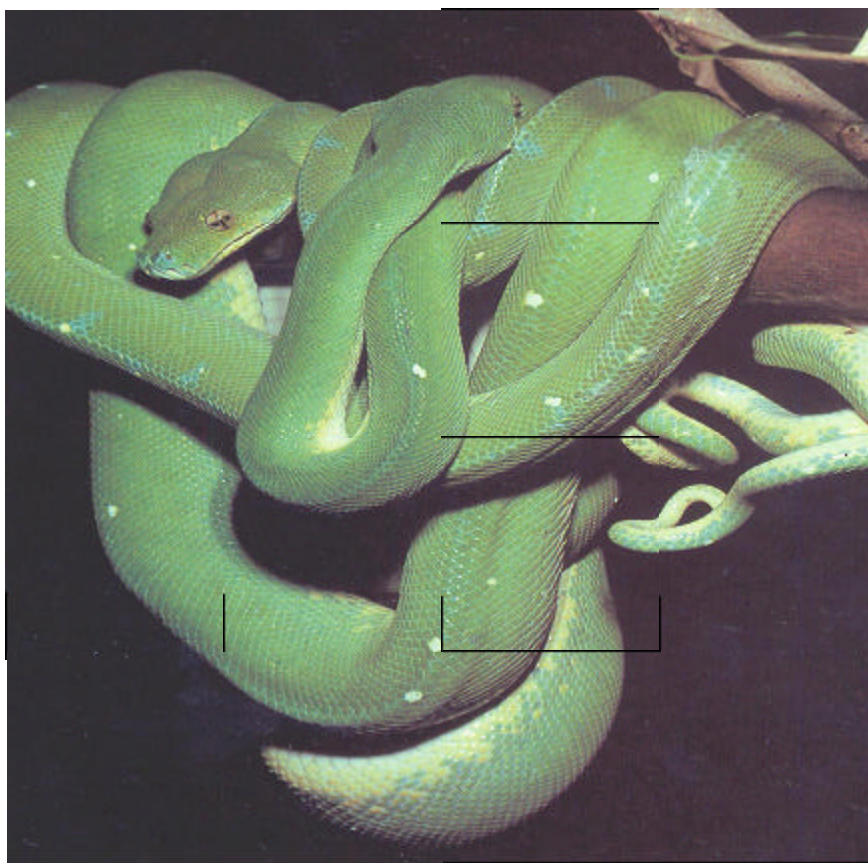
Acknowledgments

The author is grateful to Dr. Philip Pugh of Department of Life Science at Anglia Polytechnic University, Cambridge for providing the opportunity to write a report on the current biogeographical state of wild pythons in South and South East Asia, and to Dr. Francine Hughes of the same department for her tutorial help.



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Green Python

Appendix 1

Genera	No. of Species	Latin Name	Geographical Distribution
<i>Aspidites</i>	2	<i>A. melanocephalus</i> <i>A. ramsayi</i>	Australia
<i>Calabaria</i>	1	<i>C. reinhardtii</i>	West Africa
<i>Chondropython</i>	1	<i>C. viridis</i>	New Guinea & Australia
		<i>L. childreni</i> <i>L. maculosus</i> <i>L. perthensis</i> <i>L. stimsoni</i> <i>L. boa</i>	
<i>Liasis</i>	11	<i>L. alberstisii</i> <i>L. mackloti</i> <i>L. papuanus</i> <i>L. fuscus</i> <i>L. olivaceus</i> <i>L. savuensis</i> <i>M. amethystina</i> <i>M. boeleni</i>	Australia, New Guinea, Indonesian Island
<i>Morelia</i>	5	<i>M. oenpelliensis</i> <i>M. carinata</i> <i>M. spilota</i> <i>P. reticulatus</i> <i>P. molurus</i> <i>P. sebae</i>	Australia & New Guinea
<i>Python</i>	7	<i>P. regius</i> <i>P. curtus</i> <i>P. timoriensis</i> <i>P. anchietae</i>	South Asia, South East Asia, Africa

ENVIRONMENTAL AND BEHAVIORAL ENRICHMENT IN CAPTIVE ANIMALS

by J. Borah and K. Deka

A fundamental factor underlying the behavior of man and animals has been their desire and need for food. Like human beings, animals also have a variety of needs, which must be fulfilled for their welfare.

When animals are confined in enclosures with little or no opportunity to express a normal range of behavior, they tend to develop abnormal behavior, which is indicative of distress and boredom. Examples of abnormal behavior are apathy or pacing up and down, head bobbing, foot rocking, lip smacking and circling. Some bored animals exhibit aggressive behavior and try to inflict injury on themselves and on cage mates. Others show

such deviant behavior as eating their faeces or earth. Primates, elephants, bears and carnivores show more abnormal behavior in captivity than do antelopes and deer.

The lives of these animals could be improved by adding complexity to the enclosures, thus providing opportunities for a range of normal activity. Improving the enclosures in this way has been termed as environmental enrichment or behavioral engineering and has now become standard practice in good zoos.

In zoos, most of the animals have limited space at their disposal with not much variation. Animals, it

appears, prefer to work for their food and this natural instinct of the animals is not satisfied in zoos having a stipulated diet and time for meals.

Enrichment maximizes the natural behavior of an animal during its active hours of the day. The easiest and by far the most effective technique is to utilize the animals' feeding requirements. For example – providing live fish to otters in their pond serves three purposes:

- The animal gets fresh food to eat.
- In catching these fishes the otters get some exercise.
- Their predatory instincts are satisfied by catching the fish themselves.

A few guidelines for enriching the behavior of some common mammals exhibited in zoos are provided below:

Primates: Foods can be hidden away from the reach of apes and some tools like sticks can be given to them to use to get food. This gives mental exercise to the monkeys besides keeping them busy. Spreading the food around in the enclosure encourages foraging behavior and the animals spend more time feeding, thus reducing boredom and promoting activity. Where possible, let suitable vegetation grow in the enclosure to give a naturalistic look to the area.

Bears: An interesting way to give honey is to hang a sac containing honey on a tree or on a high platform and make a small hole in it through which the honey drips down. The bear really becomes enthusiastic to obtain the source and will get it after some effort. Whenever termite-infested rotten wood is offered, the bears will take the termites out one by one and eat them.

Small cats: Toys stuffed with raw feathers having the scent of prey animals can be hidden somewhere in the enclosure to keep the cats active. When they catch the smell of the toy animal they will move around in search of the food. Multiple small feedings of food also help a lot in keeping these cats busy.

Large cats: These cats remain inactive for most of the day, even in the wild. The activity is seen

when they are tracking prey, but in zoos it is not desirable to provide predatory opportunities. Nevertheless, a simulated predator-prey relationship can be created. For example, small prey can be frozen inside a cube of ice and the predator will try its best to get to the prey, which will satisfy its natural instinct to some extent. The ice will melt after a while and the prey so obtained will be the predator's reward.

Similarly, some aspects of the predatory sequence can also be provided by giving the cats whole animal carcasses, joints and bones, meat, etc. Multiple small feedings and hiding the food at different places and then encouraging the animal to find it can also prove useful in keeping the animal active. The big cat occasionally eats grass to keep its digestive tract in order, so grass may be allowed to grow in their enclosures. Live food, like poultry and fish, can be provided once in a while to reduce the monotony of eating the meat of dead animals.

Behavioral enrichment through feeding techniques or other means not only offers a more healthy environment for the animals to live in, but also provides the visitors with a better understanding of the animal by letting them see its natural behavior. This understanding leads to a better appreciation of wildlife and can substantiate involvement of the masses in wildlife conservation.

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NEW WILDLIFE SANCTUARIES IN ASSAM, NORTH-EAST INDIA

by Anwaruddin Choudhury

Three new wildlife sanctuaries were notified in Assam, north-east India in June 2004. Each is known for particular species of wildlife, as well as for their overall biodiversity values.

Amchang Wildlife Sanctuary (79 km²) is located near Guwahti, the capital city of Assam. Three small reserve forests, i.e. Amchang, South Amchang and Khanapara, constitute this sanctuary. Amchang is easily accessible from Guwahati city. This area was recommended for the first time for the protection of its isolated elephant (*Elephas maximus*) population (Choudhury, 1985) and later for its gaur (*Bos gaurus*) population and because of its proximity to a growing metropolis (Choudhury 2002). The slow loris (*Nycticebus coucang*), Assamese macaque (*Macaca assamensis*), Rhesus macaque (*M. mulatto*), capped langur (*Presbytis* (= *Trachypithecus*) *pileata*), and hoolock gibbon (*Hylobates* (= *Bunopithecus*) *hoolock*) are the main primates that have been recorded in the sanctuary. The presence of two more species – the stump-tailed macaque (*Macaca arctoides*) and pig-tailed macaque (*M. nemestrina*) – has also been reported, but needs confirmation. A few tigers (*Panthera tigris*) occur in the area and leopards (*P. pardus*) are found all over. Among the lesser cats, the presence of leopard cat (*Felis bengalensis*) and jungle cat (*F. chaus*) has been confirmed. Small carnivores recorded so far include the large Indian civet (*Viverra zibetha*), small Indian civet (*Viverricula indica*), common palm civet (*Paradoxurus hermaphroditus*), grey mongoose (*Herpestes edwardsi*), common mongoose (*H. auropunctatus*), crab-eating mongoose (*H. urva*), Eurasian otter (*Lutra lutra*), and smooth Indian otter (*Lutrogale perspicillata*). Occasionally, stray rhinos (*Rhinoceros unicornis*) from the nearby Pabitora Sanctuary come to the fringe of this sanctuary. Wild pig (*Sus scrofa*), sambar (*Cervus unicolor*) and muntjac

(*Muntiacus muntjak*) are also found in the sanctuary area. Among the threatened bird species, there are records of the occurrence of Greater Adjutant stork (*Leptoptilos dubius*) and White-backed vulture (*Gyps bengalensis*).

Barail Wildlife Sanctuary (326 km²) is located in Cachar District of southern Assam. This area was recommended for the protection of its overall biodiversity – with special focus on primates (Choudhury 1988, 1989a,b). Seven primate species are found in the sanctuary, i.e. slow loris, Assamese macaque, stump-tailed macaque, pig-tailed macaque, rhesus macaque, capped langur and hoolock gibbon. Tiger, leopard and clouded leopard (*Neofelis nebulosa*) have been recorded in the area. Among the lesser cats, leopard cat and jungle cat are common, while there is a single record of fishing cat (*Felis viverrina*) from near the Meghalaya border. Temminck's golden cat (*F. temminckii*) was also recorded, but reports of marbled cat (*F. marmorata*) need confirmation. Asiatic black bear (*Ursus thibetanus*) and Malayan sun bear (*U. malayanus*) are still found in the sanctuary despite poaching pressure for their bile. Binturong (*Arctictis binturong*), large Indian civet, small Indian civet, common palm civet, Himalayan or masked palm civet (*Paguma L=larvata*), spotted linsang (*Prionodon pardicolor*), grey mongoose, common mongoose, crab-eating mongoose, Eurasian otter, smooth Indian otter, gaur, serow (*Capricornis sumatraensis*), wild pig, sambar and muntjac are also found in the sanctuary.

Among the threatened birds, there were records of Lesser adjutant stork (*Leptoptilos javanicus*) at the edge of the plains, Rufous-necked hornbill (*Aceros nipalensis*) and Beautiful nuthatch (*Sitta formosa*). Near-threatened birds found in the sanctuary include Great Pied Hornbill (*Buceros*

bicornis) and White-cheeked Hill Partridge (*Arborophila atrogularis*). The area is hilly and mountainous, and the main vegetation type is tropical wet evergreen (rain forest) in the lower elevations and subtropical broadleaf in the higher areas.

Dihing-Patkai Wildlife Sanctuary (111 km²) consists of Upper Dihing (west block), Joypur and Dirak reserve forests in Tinsukia and Dibrugarh districts of eastern Assam. This area was recommended for the protection of primates, of which seven species are found (Choudhury, 1989b), and for its population of White-winged Wood Duck (*Cairina scutulata*) (Choudhury, 1996). The primate species that occur here are similar to those found in Barial Wildlife Sanctuary. Tiger, leopard, clouded leopard, leopard cat and jungle cat have also been recorded. Temminck's golden cat was sighted on a number of occasions in Upper Dihing (west block) and Joypur reserve forests, while one was killed and the meat sold in adjacent Deomali in 2003. There is also a record of a marbled cat that was killed at the Joypur-Arunachal Pradesh border in the late 1990s. Binturong, large Indian civet, small Indian civet, common palm civet, Himalayan or masked palm civet, small-toothed palm civet (*Arctogalidia trivirgata*), grey mongoose, common mongoose, crab-eating mongoose, Eurasian otter, smooth Indian otter and small-clawed otter (*Aonyx cinereus*) are present in the sanctuary. Gaur, serow, wild pig, sambar and muntjac are also found.

Threatened birds which were recorded include White-bellied Heron (*Ardea insignis*), Lesser Adjutant Stork, Rufous-necked Hornbill and Beautiful Nuthatch. Near-threatened birds include Great Pied Hornbill, Brown Hornbill (*Anorrhinus tickellii*) and White-cheeked Hill Partridge. The terrain is covered with low hills and flat plains;

the main vegetation type is tropical wet evergreen (rain forest).

Acknowledgements

The author would like to thank the forest officials and local villagers who helped during survey and to identify these sites as potential sanctuaries. Special thanks are due to Pradyut Bordoloi, the Environment & Forest Minister of Assam, without whose intervention these areas would not have become sanctuaries.

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ERRATA

Our regular readers will have noticed the new look of **Tigerpaper/Forest News** in Vol.32:No.1 Jan-Mar 2005. The new design was the joint effort of many people and we hope that our readers like the updated format. Unfortunately, during the switchover to the new layout, some errors slipped by us. Some we were able to correct before distribution began, but others were caught too late. On page 6, the first author's name should read "Nabin Gyawali," and we apologize for the typographical error.

J.N.

STATUS, DISTRIBUTION AND BIOECOLOGY OF KING COBRA (*Ophiophagus hannah*) IN THE SUNDARBANS MANGROVES

by Tathagata Bhattacharyya and Dipak Mitra

Introduction

A team from Pradeep Chandra Bhanj Deo Center for Ecological Sciences visited Sunderbans Tiger Reserve for a nature interpretation programme in April 2003. During a visit to the Station Office at Sajnekhali, they came across two captive King Cobras, previously believed to be extinct or extremely rare in the Sunderbans mangroves. No definite record of its occurrence has been found since 1984. Though stray information was received from the Forest Department regarding the sighting of King Cobra in that area, it was not supported by any scientific observations. The management plans of the Tiger Reserve, the Biosphere Reserve of Indian Sunderbans and the working plans of the Sunderbans Forest Divisions of Bangladesh indicate the occurrence of the species in their respective territories, but no scientific observation or monitoring of the species has been done in any of these areas.

In fact, the class of reptiles known as snakes began to diversify rapidly into numerous species during the **Miocene** period (22.5 to 5.5 million years ago). Appearing during the Miocene period were two important snake families which still exist and thrive today, i.e. the Viperidae (vipers) and the Elapidae (cobras and their related species.) It is generally accepted that there are 14 to 15 families of snakes that still exist and around 2,400 species that are contained in these families.

The sighting and record of the occurrence of the King Cobra greatly supported the idea of conducting a study on the current distribution and bioecology of the species in the Sunderbans. Accordingly, a project entitled "Survey on the Status, Dis-

tribution and bio ecology of the King Cobra" was taken up in collaboration with the Sunderbans Biosphere Reserve, Directorate of Forest, Government of West Bengal. The objective of the survey was to carry out a study on the distribution and status of the King Cobra (*Ophiophagus hannah*), as well as to determine the factors contributing to the decline of its population and possible strategies for conservation. The present survey team was comprised of the same team members (Dipak Mitra, Binda Chhetri Bhattacharyya, Kaushik Srimani and Tathagata Bhattacharyya) that undertook the pilot survey in July 2003.

The study area

The Ganges, Brahmaputra, and Meghna rivers join in Bangladesh and form a 65,000 km² delta – one of the largest in the world. Few areas in the world could have matched the standing crop biomass of the assemblage of ungulates that lived in those forests, reed beds, and grasslands two centuries ago (Eisenberg and Seidensticker, 1976). Today, the only remaining large block of forest lies at the delta's edge (Rashid, 1977; Green, 1978; Gittins and Akonda, 1982). At the edge of the delta is one of the world's largest mangrove forests – the Sunderbans – an open, dynamic, resilient, heterogeneous ecological system.

The Indian Sunderbans, encompassing an area of nearly 10,000 km², is rich in faunal diversity. A comparison of written and oral shikar descriptions of the Sunderbans as wildlife habitat made fifty to a hundred years ago with conditions prevailing now reveals a decline in

the quality of the Sundarbans as wildlife habitat as reflected in the reduced population levels of some megafauna.

Management of the Indian Sundarbans as a wildlife habitat has focused on the Sundarbans Tiger Reserve, which was established in 1973 under "Project Tiger." Of the 4,262 km² of Sundarbans in Indian territory, the tiger reserve covers 2,585 km², with a core area of 1,330 km² which is legally protected as a national park (Sanyal, 1983). No exploitation is allowed in the core area. The remaining area acts as a buffer zone and caters to the needs of the local people by allowing systematic, limited exploitation (Sanyal, 1987).

This mangrove forest is a part of the famous Sundarbans Division, which had headquarters at Khulna. When the Radcliff Commission awarded the western portion of the Sundarbans forest to West Bengal in 1947, this was named the 24-Parganas Forest Division with headquarters at Alipore. In 1973, 2,585 km² of this mangrove forest situated in the eastern part adjoining Bangladesh was declared as a Tiger Reserve.

The total Sundarbans Biosphere Reserve area encompasses nearly 9,630 km² with the following components:

1. Manipulation zone:

- Forestry: 2,263 km² where restoration of mangrove vegetation and silvicultural practices are carried out.
- Agriculture: 5,430 km² where eco-development activities provide livelihood security and welfare schemes are carried out by the communities.

2. Restoration zone: 245 km² where restoration of mangrove and other conservation work is carried out.

3. Core area: 1,692 km².

Mangroves are highly specialized organisms which constitute the most productive inter-tidal regions of the world. These are trees and shrubs which have conquered the highly inhospitable climate between the land and the sea and in doing so, through their photosynthesis, have created a rich habitat for a community of other organisms.

The extensive, harsh environment of the Sundarbans has thwarted extensive investigation by amateur naturalists. In 1944, C. L. Law, traveling as a guest of the Forest Department, and in 1946, traveling by ferry through the edge of the forest, made observations for a comprehensive and still very useful annotated list of Sundarbans birds (Law, 1953, 1954, 1956, 1959). In 1967, Anjit Kumar Mukherjee completed his dissertation on the food habits of the water birds of 24-Parganas District. His very important 1975 paper on the Sundarbans biota addressed the impact of habitat change on wildlife living in the lower delta. In 1967, Guy Mountfort (1969) undertook the first World Wildlife Fund expedition to the Sundarbans. Mountfort's enthusiasm for the conservation possibilities of this remarkable forest led to World Wildlife Fund support for Hubert Hendrichs' field studies of the tiger conducted in late 1970 and early 1971. His 1975 account includes his observations of the tiger, the abundance and distribution of deer, and annotated checklists of mammals, birds, and reptiles. The Mukherjee (1975) and Hendrichs (1975) accounts, together with the more recent observations by Sanyal (1983, 1987), provide our portrait of the wildlife assemblage living in the Sundarbans. This has been combined and presented in Seidensticker and Hai (1983). However, the Sundarbans has historically had a diverse variety of reptile populations, of which King Cobra has always gained acclaim.

Fact file about King Cobra

King Cobra belongs to Order: Squamata, Family: Elapidae and genus and species (*Ophiophagus hannah*)

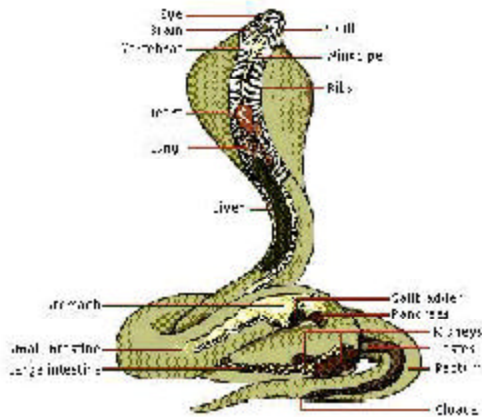
The King Cobra's average length is 10-12 feet, but can reach up to 18 feet. Adult King Cobras can be yellow, green, brown, or black. There are usually yellowish or white crossbars or chevrons on its body. The belly may be uniform in color or ornamented with bars. The throat is light yellow or cream-colored. The juveniles are jet-black, with yellow or white crossbars on the body and tail and four similar cross-bars on the head. The King Cobra is regarded as a fierce and aggressive snake, and its length and size give it an awesome

appearance. The lifespan of the King cobra is around 20 years.

Reproduction

Both males and females give off musk in the mating season. During the brood care period, the king cobra tends to be very aggressive toward approaching humans. Breeding usually occurs from January through April. King Cobras are oviparous and lay 15-16 eggs. The female pushes leaves and branches into a nest pile where the eggs are incubated by the elevated temperatures of decomposition. In the mangroves, they lay eggs in the holes of tree trunks to avoid inundation.

Morphology:



Senses

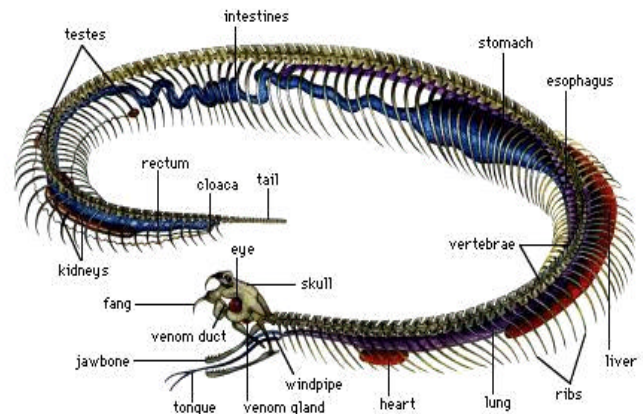
The King Cobra can't see colors. Still, its eyesight is better than most snakes and is good enough to see a moving person almost 330 feet (100 meters) away.

The snake focuses by moving the eye lens in and out, and can sleep with its eyes open, seemingly alert.

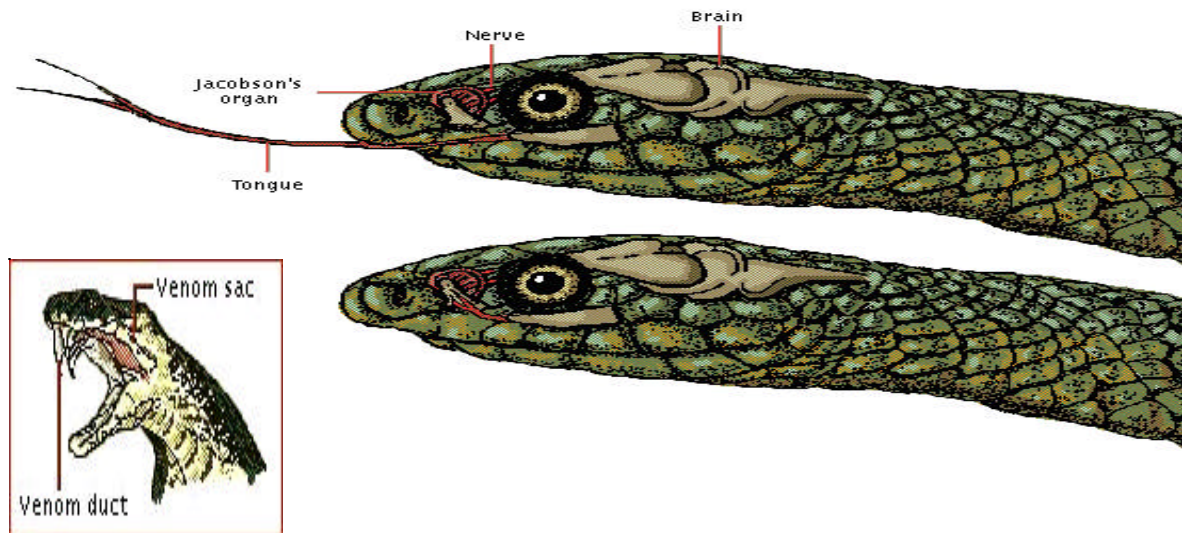
Behavior

These snakes are diurnal, whereas other cobras are commonly active in the evening but not exclusively nocturnal.

Although the King Cobra is undoubtedly a very dangerous snake, it prefers to avoid confrontations unless it is cornered or provoked. This is not true of nesting females, which may attack without provocation. When giving a threat display this snake can raise up to one-third of its total length (i.e. three to six feet or one to two meters) about one meter off the ground and is able to follow an enemy in this position over considerable distances. An upright posture without the hood extended is a non-aggressive gesture and the snake often assumes this pose to see over bushes or tall grasses.



It turns out that king cobras do hear, however. Sounds travel from the skin to the jaw muscle to the quadrate bone next to the ear bone. From there they pass to the inner ear. Nevertheless, the snake's famous response to a snake charmer's flute is due to visual cues.



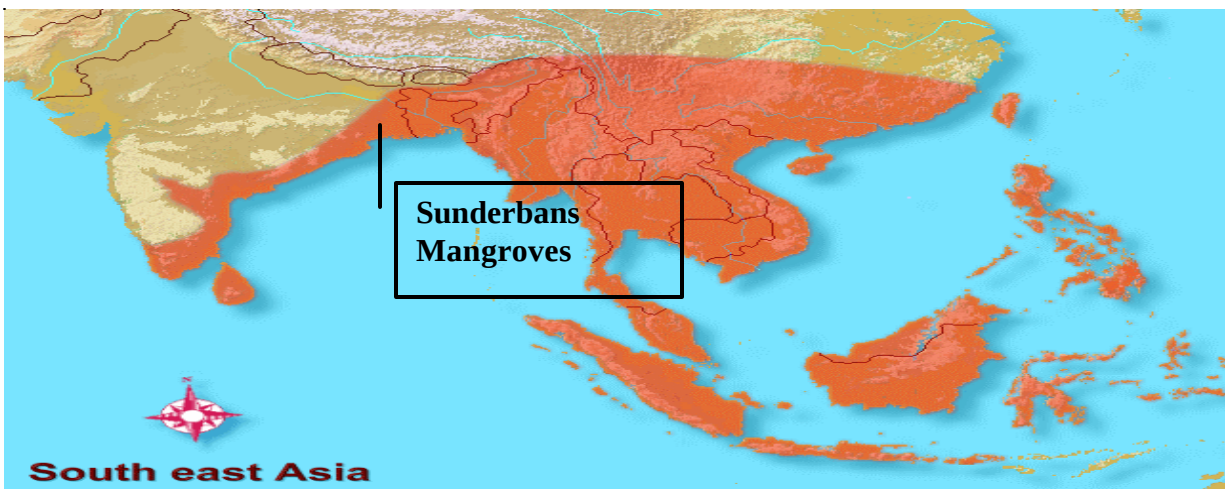
King cobras generally shed four to six times a year in a two-week shedding cycle, but in their first year they shed every month.

Despite all this shedding, the number of scales and their arrangement remains the same throughout the snake's life. Scales are a kind of thickened skin containing keratin. They protect the snake's body. They also reduce friction and make slithering easier. Scales on the under (ventral) side are larger and aligned together, like a bulldozer's tread.

Distribution and habitat

King Cobras are found in the Philippines, Malaysia, southern China, Burma, India, Thailand and the Malay Peninsula. They may live up to 2,000 meters above sea level. Its biomes include tropical rainforest, tropical deciduous forest, tropical scrub forest, tropical savanna & grasslands.

One of the King Cobra's natural habitats is the cool undergrowth of rain forests. It often stays



near streams, where the temperature and humidity are relatively constant. It spends almost a fourth of its time up in trees or bushes. It seems that this snake prefers to live near water in dense vegetation such as bamboo thickets, adjacent agricultural areas, and mangrove swamps. It is a good climber.

Previous studies

The King Cobra is a highly elusive animal of low natural density. As stated earlier, since 1984 there has been no strong evidence of its occurrence in the mangrove swamps of the Sundarbans.

The following publications indicate the occurrence of the species in the Sundarbans area: Hendrichs (1975); Mukherjee (1975); BWDB (1977); and Khan (1982a).

During the team's visit to the Sundarbans Tiger Reserve they came across two captive King Cobras in the station office at Sajnekhali in the Tiger Reserve area on 28.04.03. Sexing and measuring of the snakes were done and are summarized below:

Snake #1:

Sex -	Female
Length -	7 ' 6"
Date of rescue -	10.04.03
Place of rescue-	From a local mela (fair) at Jamespur on the fringes of the Tiger Reserve area.
Nature -	Docile, perhaps due to neck injury.

Snake #2:

Sex -	Female
Length -	7 ' 6"
Date of rescue -	17.04.03
Place of rescue -	Sajnekhali Tourist Lodge complex
Nature -	Extremely aggressive

Areas surveyed include: Jharkhali 1, Jharkhali 2, Jharkhali 3, Jharkhali 4, Kultali Station office and adjoining areas, Banchapri, Bharani Khal, Deulbari, and Kaikhali.

Methodology

1. Physical visit for actual sighting or locating/identifying indirect evidences like scales, scale markings, sloughs etc.
2. Questionnaire survey in the station offices and fringe villages.

The results the questionnaire are summarized as follows:

Jharkhali 1

No occurrence or sighting of King Cobra was recorded. Information indicated the occurrence of Green Pit Viper. A total of 38 people were interviewed.

Jharkhali 2

No occurrence or sighting of King Cobra was recorded. A total of 27 people were interviewed.

Jharkhali 3

No occurrence or sighting of King Cobra was recorded. A total of 39 people were interviewed.

Jharkhali 4

Out of 18 people surveyed, 2 had information about the occurrence of King Cobra. The observed King Cobra was seen to feed on snakes.

Kultali Station office

Out of 5 people interviewed in the Kultali station office, 3 confirmed the sighting of King Cobra. The King Cobra's feeding habit was observed to be chiefly comprised of snakes and the animal was observed to feed on rat snakes. The field staff residing at the station office identified the animal immediately from the displayed photograph. They informed the team of sightings of a large cobra as big as 11 to 12 feet which fed on snakes. The snake was a frequent visitor to the campus of the office. It had also been seen sheltering in the hedges and bushes adjoining the water tank just next to the campus. Reports indicated the occurrence of one specimen in that area. The team also collected information on the occurrence of Green Pit Viper in that area.

Banchapri:

There were no reports on the occurrence of King Cobra. Information indicated occurrence of Banded Krait and Green Pit Viper. A total of 19 people were surveyed.

Bharani Khal:

No information on the occurrence of King Cobra from the 14 people surveyed.

Deulbari:

No information on the occurrence of King Cobra from the 22 people surveyed.

Kaikhali:

Out of 30 members surveyed, 3 confirmed the presence of King Cobra. None could give any information on the feeding habit or behavior pattern of the snake.

Conclusion

A total of 212 individuals were interviewed (189 males and 23 females). Out of this number, 16 individuals were from the Forest Department (Deputy Range Officer, Forest Guard, Boatman, B.S. C.D.L., etc.) and 196 were civilians. Eight individuals, 7 of whom belonged to the Forest Department, confirmed sightings of King Cobra.

Acknowledgements

The authors would like to express their appreciation to the following people for their help and guidance during the study: Shri A.K.Raha, IFS, Chief Conservator of Forest & Director, Sunderbans Biosphere Reserve, Shri P.Sanyal, IFS, Additional Principal Chief Conservator of Forest, Government of West Bengal, Shri N.V.Raja Shekhar IFS, Conservator of Forest (S) and Jt Director, Sunderbans Biosphere Reserve, Shri P.Vyas, IFS, Field Director, Sunderbans Tiger Reserve, Shri S.Banerjee IFS, Divisional Forest Officer, Sunderbans Biosphere Reserve, Shri S.Bhaduri, Range Officer, Matla Range, Shri Arun Maulik, Range Officer Sajnekhali Range, Shri Nitai Roy, Range Officer, Raidighi Range, Shri Rabin Banerjee Deputy Range Officer, Herobhanga Station Office and many others whose co-operation has been of great help to us during the survey. We would also like to thank Shri Rajat Majumdar IPS, President of Pradeep Chandra Bhanj Deo Center for Ecological Sciences for financial support and his initiative to make the survey successful, and also our colleagues

Shri Praveen Chandra Bhanj Deo, Shri Kaushik Srimani and Smt Binda Chhetri Bhattacharyya.

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MONGOOSE TRADE IN NEPAL

by Prasanna Yonzon

Introduction

The mongoose lives in a diverse habitat which ranges from forest to open woodland, savannah, semi-desert to desert. It belongs to the Order Carnivora, Family Herpestidae and there are 35 species, 2 sub-families and 17 genera. A few are arboreal and semi-aquatic. Mongooses are close evolutionary relatives to the civet and genet family of Viverridae (MacDonald, 2001).

Mongooses have strong family bonds and a well developed hierarchical system. They are agile and resilient carnivores. In appearance, the mongoose has a long pointed face with small rounded ears and a tubular body with short legs and a tapering bushy tail. The coat color varies from species to species, e.g. dark grey, brown, yellowish, reddish brown.

The life span is 7-12 years, but the animal can live up to 19 in captivity (Hinton and Dunn, 1967). The average gestation period is 60 days, but for the small Indian mongoose and narrow striped mongoose it is 42 days and 105 days respectively.

The diet consists of insects and other invertebrates, small vertebrates, birds' eggs, crabs, fish and occasionally fruit and other vegetable matter. The mongoose's quick reflexes also enables it to eat snakes and scorpions as well.

Distribution

The mongoose is found from western Africa to Madagascar, southwest Europe, from the Near East to India and Sri Lanka to south China, Southeast Asia to Borneo and the Philippines. The small Indian mongoose was introduced to the West Indies and the Hawaiian islands in the late 1800s to control rats in sugarcane plantations. Mongooses are prolific breeders and thus are widely spread (MacDonald, 2001).

There are 7 species of mongoose found in Asia, i.e. Indian grey mongoose (*Herpestes edwardsii*), Indian brown mongoose (*H. fuscus*), Crab-eating mongoose (*H. urva*), Small Indian mongoose (*H. javanicus*), Short-tailed mongoose (*H. brachyurus*), Ruddy mongoose (*H. smithii*), and Striped-necked mongoose (*H. vitticollis*). Three species are found in Nepal, i.e. Indian grey mongoose, Indian brown mongoose and Crab-eating mongoose (Chapagain & Dhakal, 2001).

Mongooses tend to live near human settlements, where they more or less depend on human trash. In Nepal, it is an edge dwelling species, surviving on rodents, small insects and other small vertebrates.

Cultural status

The mongoose is considered to be the farmer's friend because it preys on rodents and other insects that destroy crops. The enmity between mongooses and snakes is legendary in myth and in reality. Rudyard Kipling, in his story of the loyal mongoose Rikki Tikki Tavi from his *Jungle Book* series, immortalized the mongoose as one that could dare a cobra. Similarly, Nepalese folklore is replete with stories where the mongoose is portrayed as a friend of people.

Utility

Previously, mongooses were traded live and brought in to prevent field rats, insects and snakes from destroying crops (Israel and Sinclair, 1987). Today, however, it is killed and traded for its hair. The hair is used in making paintbrushes which are pliant and soft. These paintbrushes are favored by both students and artists. Each animal yields about 10 g of hair (Source: documentary on *Mongoose Trade in India: A brush with death* – a Wildlife Trust

of India undertaking). Quality-wise, mongoose hair is considered to be a little inferior to sable, but much better than bristles of badger, pig and squirrel hair. The tip of the hair of mongoose tapers to a fine point like sable does, making it more preferred. Softer than hog bristle but stiffer than ox hair, mongoose hair makes versatile, durable brushes for oil, tempera, and acrylic painting. Mongoose hair brushes can be identified by a circular dark brown tip, cream colored center, and dark roots. The darker tip distinguishes it from badger hair, which has a white marking on the tip (MacDonald, 2001).

The mongoose is also exploited by street performers in India and Nepal who use them to stage bloody fights with snakes. Illegal trading in mongoose hair boomed in India because the mongoose was not protected by any wildlife laws.

Protection level

In Nepal, the mongoose is not included in the protected list of mammals, as they are distributed everywhere (BPP, 1995) except in the high mountain region. Farmers like them for their ability to control field rats, although sometimes they upset the farmers by burrowing in the fields.

Mongoose status and trade in Nepal

In Nepal, not as many mongooses are killed as in India, but it is evident that Nepal produces paintbrushes with mongoose hair. Since the total ban on the mongoose hair trade was introduced in India, it is probable that Nepal will meet the demand. The illicit trade in mongoose in Nepal has yet to be researched.

A survey conducted by Wildlife Conservation Nepal (WCN) in urban settings of Kathmandu found stationery shops that sold mongoose paintbrushes. Today, three factories operate in Kathmandu that deal with mongoose hair.

Previously, Indian companies supplied mongoose brushes to Nepal, but since the mongoose was put in Schedule II of the Indian Wildlife Act, the trade was restricted and local establishments have opened in Kathmandu to make mongoose paintbrushes. This means that either the illegal import

of mongoose hair from India still exists or mongoose is being hunted in Nepal. The trade seems to be thriving in Kathmandu.

Controlling trade

Actions that can be done to control the trade in mongoose:

1. An awareness campaign could be launched by the College of Fine Arts, Lalit Campus, to lobby that schools and institutions should not use brushes made of mongoose hair. With the support of line agencies such as the Department of National Parks, Department of Forests and WCN, circulars can be sent to schools asking them not to use paint brushes made from mongoose hair. This could have a big impact on the market. Awareness classes on mongoose could also be conducted on television and through other media.
2. The protected list of mammals of Nepal must be updated, as it has not been amended during the last 30 years. The mongoose must be kept in the Schedule I list so that it is not hunted any more and given total protection by the Nepalese government.

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BIRD COMMUNITY STRUCTURE IN RANTHOMBHORE NATIONAL PARK

by Sanjeev Kumar and C. Sivaperuman

Introduction

Base line information of avifauna in an area is a prerequisite to assessing the status of birds and the habitat quality with special reference to the indicator species including the rare and endemic species of the region. The community studies have been largely expressed in terms of species richness, abundance, density and diversity. All these components have been used as an indicator of habitat quality, because an increase in the value of the components is generally thought to reflect larger amounts of the necessary resources to sustain a larger population within a given area. Quantitative information on bird species abundance in different habitats is necessary for solving many fascinating ecological issues. Ali (1979) reported that the studies on the ecology as well as ethology of birds in different habitats would give valuable input for forest management. Many studies have been reported in other countries (Anderson, 1970; Beedy, 1981; and Manual, 1983), but in India, Beechler *et al.* (1987), Johnsingh *et al.* (1987), Daniels (1989), Katti (1989), Rai (1991), Johnsingh and Josha (1994), Jayson and Mathew (2000 & 2002) and Robin and Davidar (2002) have made major contributions in this field. Review of

literature reveals that only few studies have been carried out on avifauna of the Ranthombhore National Park (Ranjitsinh, 1999; Reddy, 1999 and Andheria, 2000). The present study was made to describe the bird community structure of Ranthombhore National Park and is the part of the major study conducted on the fauna of Ranthombhore National Park.

Study area

Ranthombhore National Park (RNP) is located at the junction of the rolling Vindhya and craggy Aravalli Hills. Ranthombhore National Park is situated to the east of the Sawai Madhopur with an area of 392.5 km² and lies between 25° 54' - 26° 12' N latitude and 76° 23' - 76° 36' E longitude. It is one of the major centers of Project Tiger in Rajasthan, where besides the dwindling species of tiger (*Panthera tigris*), other mammals like sambar (*Cervus unicolor*), chinkara (*Gazella bennettii*), nilgai (*Boselaphus tragocamalus*), wild boar (*Sus scrofa*), civet (*Viverricula indica*) are in abundance. The climate is subtropical with distinct cold, hot and rainy seasons. The

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summer season runs from April to June, the rainy season from July to September and the winter season from October to March. The temperature varies from 4° C in January to 47° C in May - June. The relative humidity is generally over 60 percent during the southwest monsoon. During the rest of the period the air is dry. The average annual rainfall is about 68.73 cm. Ranthambhore National Park consists of hills extending in a southwest to northeast direction. The average elevation of the park is 350 m above MSL.

The vegetation of this national park is dry deciduous and thorn forest. The steep hills have very scanty vegetation largely comprising *Sterculia urens* and *Euphorbia neriifolia*. The gentle slopes on the other hand support luxuriant vegetation. The common tree species are *Butea monosperma*, *Cassia fistula*, *Acacia catechu*, *Acacia leucophloea*, *Boswellia serrata* and *Sterculia urens* (Das and Singh, 1995).

Methods

The study was conducted during November 2002 and October 2003. Bird species were estimated

by the line transect and point count methods (Burnham *et al.*, 1980). Birds were identified based on physical features with the help of field guides and reference books (Ali and Ripley, 1983; Grimmett *et al.*, 1998). Richness Indices like R1 and R2, Hill's number N1 and N2, Diversity Indices like Shannon-Weiner (H') and Simpson's (I), Evenness measures like E1 and E2 were calculated using the computer program SPDIVERS.BAS (Ludwig and Reynolds, 1988). Density of birds was calculated using the programme DISTANCE.

Results and discussion

Species composition of avifauna: During the present study, a total of 149 species of birds belonging to 17 Orders and 53 Families were recorded from Ranthombhore National Park, Rajasthan. Out of these, 121 were resident and 28 migrants (Table 1).

Abundance of birds: Out of 149 species of birds, Rose-ringed Parakeet was highest in dominance followed by Ashy Wood Swallow, Red-wattled Lapwing, Garganey, etc. (Table 1)

Table 1. Species of birds recorded from the Ranthombhore National Park, Rajasthan

Sl. No.	Common name	Scientific name	Status*	Abundance	Dominance Index
	Podicipediformes				
	Podicipedidae				
1.	Little Grebe	<i>Tachybaptus ruficollis</i> (Pallas)	R	16	0.29
	Pelecaniformes				
	Pelecanidae				
2.	Spot-billed Pelican	<i>Pelecanus philippensis</i> Gmelin	R	2	+
	Phalacrocoracidae				
3.	Little Cormorant	<i>Phalacrocorax niger</i> (Vieillot)	R	32	0.58
	Anhingidae				
4.	Darter	<i>Anhinga melanogaster</i> Pennant	LM	2	+
	Ciconiiformes				
	Ardeidae				
5.	Grey Heron	<i>Ardea cinerea</i> Linnaeus	R	8	0.15
6.	Purple Heron	<i>Ardea purpurea</i> Linnaeus	R	2	+
7.	Little Green Heron	<i>Butorides striatus</i> (Linnaeus)	R	55	1.00
8.	Indian Pond-Heron	<i>Ardeola grayii</i> (Sykes)	R	30	0.54
9.	Cattle Egret	<i>Bubulcus ibis</i> (Linnaeus)	R	12	0.22
10.	Median Egret	<i>Mesophoyx intermedia</i> (Wagler)	R	56	1.02
11.	Little Egret	<i>Egretta garzetta</i> (Linnaeus)	R	67	1.22
12.	Black-crowned Night- Heron	<i>Nycticorax nycticorax</i> (Linnaeus)	R	12	0.22
13.	Black Bittern	<i>Dupetor flavicollis</i> (Latham)	R	9	0.16

	Ciconiidae				
14.	Painted Stork	<i>Mycteria leucocephala</i> (Pennant)	LM	8	0.15
15.	White-necked Stork	<i>Ciconia episcopus</i> (Boddaert)	R	2	+
16.	Black-necked Stork	<i>Ephippiorhynchus asiaticus</i> (Latham)	M	3	0.05
17.	Asian Openbill-Stork	<i>Anastomus oscitans</i> (Boddaert)	R	8	0.17
	Threskiornithidae				
18.	Oriental White Ibis	<i>Threskiornis melanocephalus</i> (Latham)	LM	59	1.07
19.	Eurasian Spoonbill	<i>Platalea leucorodia</i> Linnaeus	LM	2	+
	Anseriformes				
	Anatidae				
20.	Lesser Whistling-Duck	<i>Dendrocygna javanica</i> (Horsfield)	R	15	0.29
21.	Common Teal	<i>Anas crecca</i> Linnaeus	M	8	0.15
22.	Northern Pintail	<i>Anas acuta</i> Linnaeus	M	51	0.93
23.	Spot-billed Duck	<i>Anas poecilorhyncha</i> J.R. Forester	LM	31	0.56
24.	Gadwall	<i>Anas strepera</i> Linnaeus	M	250	4.54
25.	Garganey	<i>Anas querquedula</i> Linnaeus	M	335	6.08
26.	Northern Shoveller	<i>Anas clypeata</i> Linnaeus	M	14	0.25
	Falconiformes				
	Accipitridae				
27.	Black-shouldered Kite	<i>Elanus caeruleus</i> (Desfontaines)	R	2	+
28.	Black Kite	<i>Milvus migrans</i> (Boddaert)	R	4	0.07
29.	Brahminy Kite	<i>Haliastur indus</i> (Boddaert)	R	2	+
30.	Shikra	<i>Accipiter badius</i> (Gmelin)	R	6	0.11
31.	Pallid Harrier	<i>Circus macrourus</i> (S.G. Gmelin)	M	4	0.07
32.	Pied Harrier	<i>Circus melanoleucos</i> (Pennant)	M	5	0.09
33.	Western Marsh-Harrier	<i>Circus aeruginosus</i> (Linnaeus)	M	4	0.07
34.	Eurasian Sparrowhawk	<i>Accipiter nisus</i> (Linnaeus)	M	2	+
35.	Oriental Honey-Buzzard	<i>Pernis ptilorhynchus</i> (Temminck)	LM	7	0.13
	Pandionidae				
36.	Osprey	<i>Pandion haliaetus</i> (Linnaeus)	R	2	+
	Galliformes				
	Phasianidae				
37.	Grey Francolin	<i>Francolinus pondicerianus</i> (Gmelin)	R	32	0.58
38.	Painted Spurfowl	<i>Galloperdix lunulata</i> (Valenciennes)	R	5	0.09
39.	Indian Peafowl	<i>Pavo cristatus</i> (Linnaeus)	R	190	3.45
	Gruiformes				
	Turnicidae				
40.	Yellow-legged Button quail	<i>Turnix tanki</i> Blyth	R	2	+
41.	Barred Buttonquail	<i>Turnix suscitator</i> (Gmelin)	R	2	+
	Rallidae				
42.	Ruddy-breasted Crake	<i>Porzana fusca</i> (Linnaeus)	R	4	0.07
43.	Slaty-legged Crake	<i>Rallina eurizonoides</i> (Lafresnaye)	R	2	+
44.	White-breasted Waterhen	<i>Amaurornis phoenicurus</i> (Pennant)	R	2	+
45.	Watercock	<i>Gallicrex cinerea</i> (Gmelin)	M	7	0.13
46.	Common Moorhen	<i>Gallinula chloropus</i> (Linnaeus)	R	2	+
47.	Common Coot	<i>Fulica atra</i> Linnaeus	LM	32	0.58
	Charadriiformes				
	Jacaniidae				
48.	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i> (Scopoli)	LM	12	0.22
49.	Bronze-winged Jacana	<i>Metopidius indicus</i> (Latham)	R	19	0.34
	Charadriidae				
50.	Red-wattled Lapwing	<i>Vanellus indicus</i> (Boddaert)	R	391	7.09
51.	Lesser Sand Plover	<i>Charadrius mongolus</i> Pallas	M	64	1.16
52.	Little Ringed Plover	<i>Charadrius dubius</i> Scopoli	M	44	0.80
	Scolopacidae				
53.	Common Snipe	<i>Gallinago gallinago</i> (Linnaeus)	M	8	0.15
54.	Eurasian Woodcock	<i>Scolopax rusticola</i> Linnaeus	LM	5	0.09
55.	Common Redshank	<i>Tringa totanus</i> (Linnaeus)	M	8	0.15
56.	Marsh Sandpiper	<i>Tringa stagnatilis</i> (Bechstein)	M	64	1.28
57.	Common Greenshank	<i>Tringa nebularia</i> (Gunner)	M	10	0.18

58.	Green Sandpiper	<i>Tringa ochropus</i> Linnaeus	M	28	0.51
59.	Wood Sandpiper	<i>Tringa glareola</i> Linnaeus	M	27	0.49
60.	Common Sandpiper	<i>Actitis hypoleucos</i> Linnaeus	M	21	0.38
61.	Ruddy Turnstone	<i>Arenaria interpres</i> (Linnaeus)	M	33	0.60
62.	Little Stint	<i>Calidris minuta</i> (Leisler)	M	45	0.82
63.	Temminck's Stint	<i>Calidris temminckii</i> (Leisler)	M	45	0.82
Recurvirostridae					
64.	Black-winged Stilt	<i>Himantopus himantopus</i> (Linnaeus)	LM	6	0.11
65.	Pied Avocet	<i>Recurvirostra avosetta</i> Linnaeus	M	7	0.13
Burhinidae					
66.	Stone-Curlew	<i>Burhinus oedicnemus</i> (Linnaeus)	R	6	0.11
Glareolidae					
67.	Small Pratincole	<i>Glareola lactea</i> Temminck	LM	46	0.83
68.	Indian Courser	<i>Cursorius coromandelicus</i> (Gmelin)	R	4	0.07
Laridae					
69.	Whiskered Tern	<i>Chlidonias hybridus</i> (Pallas)	LM	6	0.11
70.	River Tern	<i>Sterna aurantia</i> J.E. Gray	M	4	0.07
71.	Black-bellied Tern	<i>Sterna acuticauda</i> J.E. Gray	LM	8	0.15
Columbiformes					
Pteroclididae					
72.	Painted Sandgrouse	<i>Pterocles indicus</i> (Gmelin)	R	5	0.09
Columbidae					
73.	Blue Rock Pigeon	<i>Columba livia</i> Gmelin	R	18	0.33
74.	Spotted Dove	<i>Streptopelia chinensis</i> (Scopoli)	R	45	0.82
75.	Eurasian Collared-Dove	<i>Streptopelia decaocta</i> (Frisvaldszky)	R	3	0.05
76.	Yellow-footed Green Pigeon	<i>Treron phoenicoptera</i> (Latham)	R	242	4.39
77.	Red Collared Dove	<i>Streptopelia tranquebarica</i> (Hermann)	R	2	+
Psittaciformes					
Psittacidae					
78.	Rose-ringed Parakeet	<i>Psittacula krameri</i> (Scopoli)	R	518	9.40
79.	Plum-headed Parakeet	<i>Psittacula cyanocephala</i> (Linnaeus)	LM	157	2.85
Cuculiformes					
Cuculidae					
80.	Pied Crested Cuckoo	<i>Clamator jacobinus</i> (Boddaert)	LM	4	0.07
81.	Brainfever Bird	<i>Hierococcyx varius</i> (Vahl)	LM	2	+
82.	Indian Cuckoo	<i>Cuculus micropterus</i> Gould	R	76	1.38
83.	Asian Koel	<i>Eudynamis scolopacea</i> (Linnaeus)	R	38	0.69
84.	Greater Coucal	<i>Centropus sinensis</i> (Stephens)	R	3	0.05
Strigiformes					
Strigidae					
85.	Brown Fish Owl	<i>Ketupa zeylonensis</i> Gmelin	R	2	+
86.	Collared Scops Owl	<i>Otus bakkamoena</i> Pennant	R	2	+
87.	Spotted Owlet	<i>Athene brama</i> (Temminck)	R	2	+
Caprimulgiformes					
Caprimulgidae					
88.	Grey Nightjar	<i>Caprimulgus indicus</i> Latham	R	72	1.31
Apodiformes					
Apodidae					
89.	Alpine Swift	<i>Tachymarptis melba</i> (Linnaeus)	R	56	1.02
90.	House Swift	<i>Apus affinis</i> (J.E. Gray)	R	84	1.52
Coraciiformes					
Alcedinidae					
91.	Lesser Pied Kingfisher	<i>Ceryle rudis</i> (Linnaeus)	R	3	0.05
92.	Small Blue Kingfisher	<i>Alcedo atthis</i> (Linnaeus)	R	3	0.05
93.	White-breasted Kingfisher	<i>Halcyon smyrnensis</i> (Linnaeus)	R	12	0.22
Meropidae					
94.	Small Bee-eater	<i>Merops orientalis</i> Latham	R	43	0.78
Coraciidae					
95.	Indian Roller	<i>Coracias benghalensis</i> (Linnaeus)	R	45	0.82

	Upupidae				
96.	Common Hoopoe	<i>Upupa epops</i> Linnaeus	R	37	0.67
	Piciformes				
	Capitonidae				
97.	Coppersmith Barbet	<i>Megalaima haemacephala</i> (P.L.S. Muller)	R	2	+
	Picidae				
98.	Lesser Golden-backed Woodpecker	<i>Dinopium benghalense</i> (Linnaeus)	R	28	0.51
99.	Yellow-fronted Pied Woodpecker	<i>Dendrocopos mahrattensis</i> (Latham)	R	4	0.07
	Passeriformes				
	Pittidae				
100.	Indian Pita	<i>Pitta brachyura</i> Linnaeus	R	4	0.07
	Hirundinidae				
101.	Common Swallow	<i>Hirundo rustica</i> Linnaeus	LM	2	+
102.	Red-rumped Swallow	<i>Hirundo daurica</i> Linnaeus	LM	5	0.09
	Motacillidae				
103.	Paddyfield Pipit	<i>Anthus rufulus</i> Vieillot	LM	2	+
104.	Eurasian Tree Pipit	<i>Anthus trivialis</i> (Linnaeus)	M	12	0.22
105.	Yellow Wagtail	<i>Motacilla flava</i> Linnaeus	LM	53	0.95
106.	Grey Wagtail	<i>Motacilla cinerea</i> Tunstall	M	15	0.27
107.	Large Pied Wagtail	<i>Motacilla maderaspatensis</i> Gmelin	R	116	2.10
	Pycnonotidae				
108.	Red-whiskered Bulbul	<i>Pycnonotus jocosus</i> (Linnaeus)	LM	53	0.06
109.	Red-vented Bulbul	<i>Pycnonotus cafer</i> (Linnaeus)	R	150	2.72
	Irenidae				
110.	Common Iora	<i>Aegithina tiphia</i> (Linnaeus)	R	83	1.51
111.	Gold-fronted Chloropsis	<i>Chloropsis aurifrons</i> (Temminck)	R	2	+
112.	Jerdon's Chloropsis	<i>Chloropsis cochinchinensis</i> (Gmelin)	R	34	0.62
	Laniidae				
113.	Brown Shrike	<i>Lanius cristatus</i> Linnaeus	M	2	+
	Turdinae				
114.	Black Redstart	<i>Phoenicurus ochruros</i> (Gmelin)	LM	6	0.11
115.	Oriental Magpie-Robin	<i>Copsychus saularis</i> (Linnaeus)	R	2	+
116.	Indian Robin	<i>Saxicoloides fulicata</i> (Linnaeus)	R	3	0.05
117.	Pied Bushchat	<i>Saxicola caprata</i> (Linnaeus)	R	3	0.05
118.	Desert Wheatear	<i>Oenanthe deserti</i> (Temminck)	M	6	0.11
	Timaliinae				
119.	Common Babbler	<i>Turdoides caudatus</i> (Dumont)	R	22	0.40
120.	Jungle Babbler	<i>Turdoides striatus</i> (Dumont)	R	24	0.44
	Sylviinae				
121.	Streaked Fantail-Warbler	<i>Cisticola juncidis</i> (Rafinesque)	R	6	0.11
122.	Plain Prinia	<i>Prinia inornata</i> Sykes	R	4	0.07
123.	Ashy Prinia	<i>Prinia socialis</i> Sykes	R	2	+
124.	Common Tailor Bird	<i>Orthotomus sutorius</i> (Pennant)	R	8	0.15
125.	Indian Great Reed-Warbler	<i>Acrocephalus stentoreus</i> (Hemprich & Ehrenberg)	R	14	0.25
126.	Blyth's Reed-Warbler	<i>Acrocephalus dumetorum</i> Blyth	LM	6	0.11
	Monarchinae				
127.	Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i> (Linnaeus)	LM	45	0.82
	Paridae				
128.	Great Tit	<i>Parus major</i> Linnaeus	R	22	0.40
	Dicaeidae				
129.	Tickell's Flowerpecker	<i>Dicaeum erythrorhynchos</i> (Latham)	R	30	0.54
	Nectariniidae				
130.	Purple-rumped Sunbird	<i>Nectarinia zeylonica</i> (Linnaeus)	R	6	0.11
131.	Purple Sunbird	<i>Nectarinia asiatica</i> (Latham)	R	2	+
	Estrildidae				
132.	White-throated Munia	<i>Lonchura malabarica</i> (Linnaeus)	R	4	0.07

133.	Black-throated Munia	<i>Lonchura kelaarti</i> (Jerdon)	R	8	0.15
134.	Spotted Munia	<i>Lonchura punctulata</i> (Linnaeus)	R	23	0.42
135.	Black-headed Munia	<i>Lonchura malacca</i> (Linnaeus)	R	22	0.40
Ploceinae					
136.	Baya Weaver	<i>Ploceus philippinus</i> (Linnaeus)	R	21	0.38
Sturnidae					
137.	Common Myna	<i>Acridotheres tristis</i> (Linnaeus)	R	6	0.11
138.	Jungle Myna	<i>Acridotheres fuscus</i> (Wagler)	R	2	+
139.	Grey-headed Starling	<i>Sturnus malabaricus</i> (Gmelin)	R	16	0.29
Oriolidae					
140.	Eurasian Golden Oriole	<i>Oriolus oriolus</i> (Linnaeus)	LM	2	+
141.	Black-headed Oriole	<i>Oriolus xanthornus</i> (Linnaeus)	R	17	0.31
Dicruridae					
142.	Black Drongo	<i>Dicrurus macrocercus</i> Vieillot	LM	98	1.78
143.	Ashy Drongo	<i>Dicrurus leucophaeus</i> Vieillot	R	2	+
144.	White-bellied Drongo	<i>Dicrurus caeruleus</i> (Linnaeus)	R	124	2.25
Artamidae					
145.	Ashy Woodswallow	<i>Artamus fuscus</i> Vieillot	R	391	7.09
Corvidae					
146.	Indian Treepie	<i>Dendrocitta vagabunda</i> (Latham)	R	147	2.67
147.	House Crow	<i>Corvus splendens</i> Vieillot	R	5	0.09
148.	Jungle Crow	<i>Corvus macrorhynchos</i> Wagler	R	2	+
149.	Common Raven	<i>Corvus corax</i> Linnaeus	R	3	0.05

*R = Resident, M = Migrant, LM = Local Migrant; + = dominance less than 0.05

Highest number of birds was recorded in insectivores (50) followed by aquatic feeders (20), omnivores (29), granivores (18), carnivores (13), frugivores (9) and nectar-frugivores (3) (Table 2).

Table 2. Order and status of birds recorded from RNP

Sl. No.	Order	Status			Feeding guilds						
		R	M	Total	A	I	G	N/F	C	F	O
1.	Podicipediformes	01	-	01	1	-	-	-	-	-	-
2.	Pelecaniformes	03	-	03	3	-	-	-	-	-	-
3.	Ciconiiformes	14	01	15	15	-	-	-	-	-	-
4.	Anseriformes	02	05	07	7	-	-	-	-	-	-
5.	Falconiformes	06	04	10	-	-	-	-	10	-	-
6.	Galliformes	03	-	03	-	3	-	-	-	-	-
7.	Gruiformes	07	01	08	-	-	8	-	-	-	-
8.	Charadriiformes	10	14	24	-	-	-	-	-	-	24
9.	Columbiformes	06	-	06	-	-	6	-	-	-	-
10.	Psittaciformes	02	-	02	-	-	-	-	-	2	-
11.	Cuculiformes	05	-	05	-	-	-	-	-	5	-
12.	Strigiformes	03	-	03	-	-	-	-	3	-	-
13.	Caprimulgiformes	01	-	01	-	1	-	-	-	-	-
14.	Apodiformes	02	-	02	-	2	-	-	-	-	-
15.	Coraciiformes	06	-	06	3	3	-	-	-	-	-
16.	Piciformes	03	-	03	-	3	-	-	-	-	-
17.	Passeriformes	47	03	50	-	38	4	3	-	2	3
Total		121	28	149	29	50	18	3	13	9	27

R = Resident, M = Migrants, A = Aquatic feeders, I = Insectivores, C = Carnivores, G = Granivores, F = Frugivores, N/F = Nectar-frugivores, O = Omnivores

Diversity Indices and density of birds: Most widely used diversity indices like Shannon-Weiner Index, Simpson's Index and Hill's numbers were estimated for the birds of Ranthombhore National Park. Richness Index (R1 and R2) showed the richness of birds. Shannon Index (H') showed high values of diversity, similarly Hill's number also showed high values (Table 3).

Table 3. Diversity indices of birds in the RNP

Richness Index		Simpson's Index	Shannon Index	Hill's numbers		Evenness Index	
R1	R2			N1	N2	E1	E2
17.16	1.99	0.03	3.94	51.64	28.76	0.79	0.35

Diversity index (H') was highest in Rose-ringed Parakeet followed by Red-wattled lapwing and Indian Peafowl. Rose-ringed Parakeet showed highest density followed by Blossom-headed Parakeet (Table 4).

Table 4. Diversity indices and density of selected bird species in Ranthombhore National Park

Sl. No.	Species Name	Simpson Index	Shannon Index	Density/ km ²
1.	Black Drongo	0.06	2.99	623
2.	Blossom-headed Parakeet	0.05	3.14	855
3.	Golden-backed Woodpecker	0.02	2.94	763
4.	Yellow-fronted Green Pigeon	0.06	3.06	806
5.	Asian Koel	0.02	3.24	497
6.	Large Pied Wagtail	0.06	3.05	551
7.	Little green Heron	0.05	2.85	506
8.	Asian Paradise Flycatcher	0.02	3.13	691
9.	Indian Peafowl	0.03	3.58	748
10.	Rose-ringed Parakeet	0.03	3.90	951
11.	Red-vented Bulbul	0.03	3.52	599
12.	Red-wattled Lapwing	0.02	3.82	817
13.	Small green Bee-eater	0.02	3.31	144
14.	Spotted Dove	0.01	3.44	699
15.	Tree Pie	0.03	3.74	642
16.	White-bellied Drongo	0.02	3.77	423

During the period of study 5,511 individuals were sighted. Out of the recorded species, 28 were migrants. Species like Rose-ringed Parakeet, Ashy Wood Swallow, Red-wattled Lapwing, Garganey, Yellow-footed Wood Pigeon and Indian Peafowl were the most common species in this area. The less dominant species are Black-shouldered Kite, Eurasian Golden Oriole, Gold-fronted Chloropsis, Purple Heron and Spotted Owllet. The present study showed the high species diversity (H') was 3.94, which is comparable with other areas (Johnsingh *et al.*, 1987; Daniels, 1989; Johnsingh and Josha, 1994; Gokula, 1998; Jayson and Mathew, 2000, 2002). The insectivores and omnivores were highest in species richness and dominance. The bird species diversity may be influenced by the patchiness of good habitat (Wiens

and Rottenberry, 1981). The availability of microhabitat in the study area may be persuading the bird species diversity of Ranthombhore National Park.

Acknowledgements

The authors are grateful to Dr. N.S. Rathore, Joint Director and Officer-in-Charge and Dr. Q.H. Baqri, Additional Director (Retd.), Desert Regional Station, Zoological Survey of India, Jodhpur for providing facilities and encouragement to conduct a survey of RNP. Thanks are also due to Chief Wildlife Warden, Rajasthan for giving permission to carry out the survey and to the Director, Ranthombhore National Park for help in conducting the survey.

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EXISTENCE OF INDIAN GREY WOLF (*Canis lupus pallipes* Skyes) IN ITS EASTERN LIMIT

by A.K. Roy Mahato, P.S. Bhatanagar and Ramakrishna

Introduction

The Indian grey wolf (*Canis lupus pallipes* Skyes) inhabits semi-arid and dry environments and prefers open plain, scrubland and agricultural landscapes. Grey wolves are predators of small and medium-sized ungulates (Sharma, 1978). They form packs of 4-14 individuals and litter sizes range between 4-6 (Jhala, 2003)

According to literature on the distribution range of the grey wolf in West Bengal, it is found to be from Purulia (Bhattacharya et al., 1985), while Jhala (2003) has given its eastern population in some parts of West Bengal as an exception. Similarly, no specific distribution data in West Bengal was given by Shahi (1982).

Owing to its exceptional geographical distribution in West Bengal (Jhala, 2003) and the large area

of Purulia district (6,259 km²) and also that of West Bengal (88,752 km²), as well as anthropogenic pressure on the wolf population (Shahi, 1982; Jhala, 2003) and their capability of dispersal (Mech, 1995), it became necessary to explore and pinpoint the eastern limits of its distribution in West Bengal. The present study, therefore, may facilitate management of the wolf population, threats to humans from wolves, and danger to the wolf's survival and destruction of its habitat by humans.

A thorough investigation on the distributional range of the species in West Bengal was undertaken and revealed that the wolf was found in Kowahara village, Purulia district (22°44' to 23°42'N from 85°49' to 86°E). This newly reported location may be useful in future studies for wolf conservation.

Four visits were made to the village and wolf sightings were made during two of them. The results of the study are given in the table below:

Type of evidence	Details
Sighting of individuals in its habitat	1 st observation – 1 male, 1 female 2 nd observation – 1 female
Scat	2 scats within 2 feet of the mouth of the wolf den and 4 scats at a distance of 100 m from the mouth of the den
Sighting of wolf den	A burrow having two entrances was seen
Queries with villagers	Reported the presence of wolf pack and damage to their livestock

The wolves preyed on sheep and goats and thus the villagers wanted to drive the wolves away by setting fire to their den. The situation thus warrants scientific management as suggested by Jhala (2003) by introducing night vigils, maintaining guard dogs, building thorn corrals and bringing the stock back to the villages each night. This will make it easier to prevent the wolves from attacking the sheep and goats.

Acknowledgement

The author would like to thank Dr. J.R.B. Alfred, Director, Zoological Survey of India, for his encouragement and infrastructural support.

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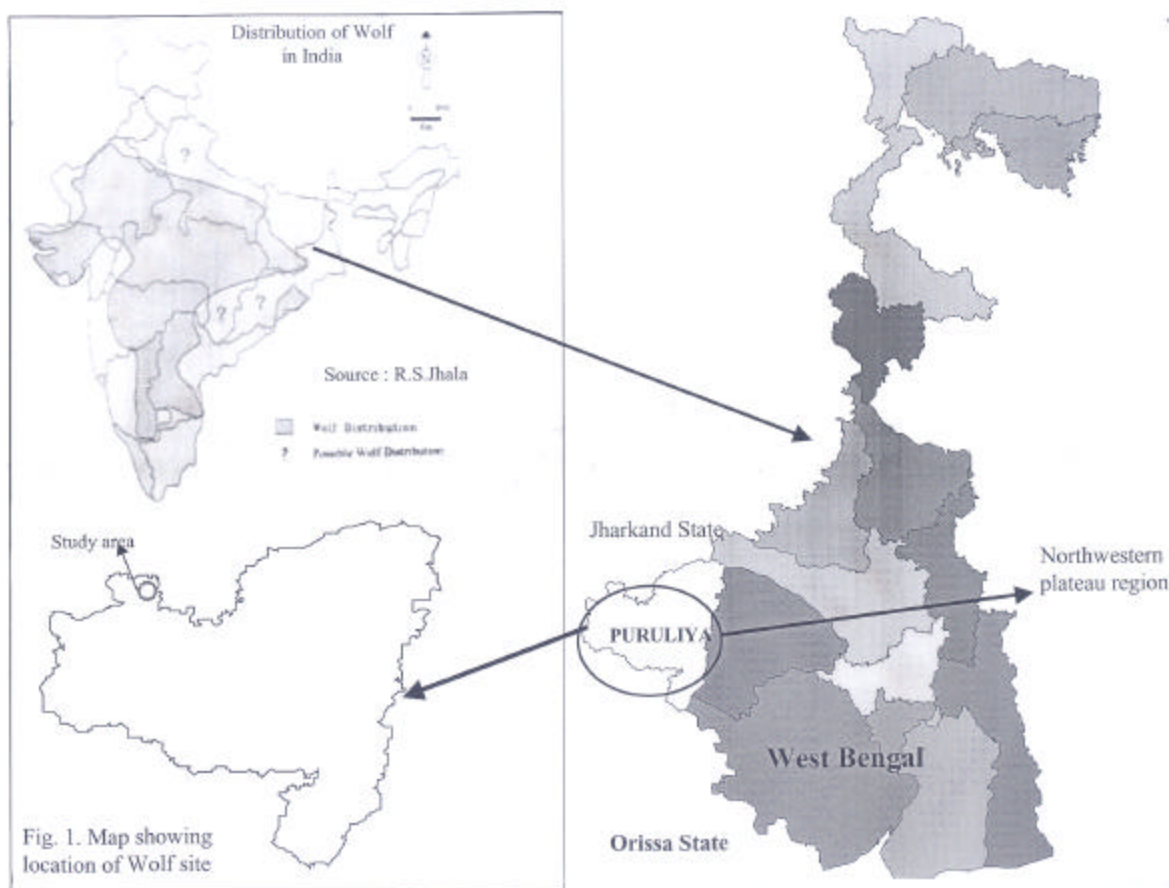
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BIOLOGICAL AND ECOLOGICAL IMPORTANCE OF NARA GAME RESERVE, SINDH-PAKISTAN

by Hussain Bux Bhaagat

Introduction

Nara Game Reserve was declared a protected area in 1981 under the Sindh Wildlife Protection Ordinance-1972. The reserve is named after Nara Canal, which emerges from Sukkur Barrage with a total length of 361 km. The game reserve is located 80 km southeast of Khairpur, 110 km from Sukkur and 515 km from Karachi.

Nara Canal is considered as a mini river, and is believed to have been constructed on the old Hakra River. However, the area with most ecological potential is between Pharhario to Head Jamrau (100 km) and 4-5 km on either side of this stretch. This mixed habitat of desert, wetland and cropland has been declared the Nara Game Reserve and covers an area of 105,228 ha. The Reserve supports a large variety of mammal, bird, reptile and plant species and harbors some resident and migratory rare and globally threatened species which also breed there.

The Reserve falls in the tropical thorn forest region and the land area of the Reserve is mainly comprised of desert, wetland, marshy and cropland ecosystems. Previously, this area was a hunting zone of the ex-rulers of Khaipur estate (from 1903 to 1956) and many forest and wild areas are still intact and key habitats for wildlife species. These areas are known as "kohas" and members of the Mir family own and manage them for conservation and hunting purposes. Land tenure of the Game Reserve area is a mix of state-owned and private land. However, with the active participation of the local people and landowners, hunting of wildlife is regulated under the Sindh Wildlife Protection Ordinance-1972 and one of the best partridge shooting areas of the country is regulated in the Game Reserve.

Protection and conservation of wildlife in this area is the sole responsibility of the estate-owned Sindh Wildlife Department. Nara Game Reserve is also considered to be internationally important because it represents an example of a natural inland wetland ecosystem with unique desert habitat and marshy and agriculture lands all along the Nara Canal. This mixed type of habitat supports a large variety of faunal and floral species and the area also has cultural, archaeological, geological, hydrological and religious values.

During the year 2000, a comprehensive baseline study of Nara Game Reserve was conducted and baseline data of all natural resources were documented. During the study 132 floral species and 197 faunal species were recorded in all four habitats.

Climate

Summers in the area are very hot and the winters dry, mild and short. The hottest period is from May to August, with a mean temperature of 48-52°C. January is the coldest month with temperatures dropping as low as 11°C. The mean rainfall ranges from 88 mm to 135 mm, with rains occurring mainly during the monsoon season from June to September. In 2004, the monsoon did not bring rainfall to the area.

Biodiversity (ecological importance)

Nara Game Reserve is famous for its rich biodiversity and mixed habitat types which house some key wildlife species. The reserve is mainly comprised of four different habitat types:

1. Desert habitat

The desert habitat is typical stable sand desert covered with sand dunes. Soils in the desert area

are sandy, silty, moderately calcareous with a Ph of 8 to 8.4 and are excessively drained. The desert area is underlain by an estimated 30 meters of sand dunes and river alluvium. The alluvial deposits date back to the time when the Hakro River flowed through this area during the Soomra and Sama period (1050 to 1525 AD) in Sindh. The Nara Canal now flows along the river's abandoned course. The desert habitat is covered with herbs/shrubs including *Calligonum polygonoides*, *Dipterygium glaucum*, *Aerva javanica* and trees such as *Tamarix aphylla*, *Prosopis cineraria*, *Salvadora oleiodes*, *Capparis decidua* and *Cassia italica*. *Farsetia hamiltonii*, *Limeum indicum*, *Tribulus longipetalus*, *Synodon dactylon* and *Stipagrostis plumose* are common herbs. However, due to a dry spell in the area over the last 6-7 years, the herbaceous communities and ephemeral species have not been emerging every year. Such species respond quickly to rainfall and emerge with the first shower, grow instantly, produce seeds and complete their life cycle within a span of 7-8 weeks. These seeds remain dormant throughout the dry period. Some of the other plant species of the desert habitat are *Prosopis juliflora*, *Acacia jacquemontii*, *Acacia nilotica*, *Aristida funiculata*, *Euphorbia prostate*, *Saccharum spontaneum*, *Saccharum bengalensis*, *Zizyphus mauritania*, *Zizyphus numularia*, *Alhagi maurorum*, *Indigofera hochstetterii*, *Phyla nodiflora*, *Typha domingensis*, *Typha elephantina*, *Achyranthes aspera*, *Calotropis procera* and *Tamarix indica*.

2. Wetland habitat

The major wetland and marshy habitats in the reserve are formed due to the presence of Nara Canal. Nara Canal itself and the Game Reserve area portion represent a major wetland habitat which is inhabited by marsh crocodile and other water-dependent wildlife and plant species. All along the Nara Canal on either side are about 100 wetlands of different sizes, shapes and depths. Basically these wetlands are formed by seepage from Nara Canal, but they support a good population of marsh crocodiles, otter and waterfowl, including the globally threatened Marbled Teal, which also breeds on these lakes during May to June. The water levels of the lakes gradually decrease and increase due to fluctuations

in the water level of Nara Canal. Low rainfall does not have a significant impact on these wetlands. Generally the water level in the area varies from 15-20 meters, depending on the distance from Nara Canal. The water quality in the area is sweet, depending on the recharge cycle through rainfall and the irrigation canal system. Ground water is recharged through Nara Canal seepages, but due to a dry spell in the region the ground water has dropped down from 5-8 meters to 15-20 meters. A water shortage in the canal system has also reduced the seepage recharge system; therefore, the wetland ecosystems of the area have become severely affected and degraded during the last decade. Some of the wetland floral species are *Phragmites karka*, *Saccharum bengalensis*, *Tamarix indica*, *Typha domingensis*, *Typha elephantina*, *Farsetia hamiltonii*, *Limeum indicum*, *Tribulus longipetalus*, *Synodon dactylon* and *Stipagrostis plumose*.

3. Marshy habitat

Marshy habitat is concentrated along the length of Nara Canal and is formed as a result of seepage from Nara Canal and its tributaries. This habitat supports a large variety of animal and bird species, hog deer, crocodiles, monitor lizards, jungle cats, turtles, snakes and a variety of resident as well as migratory birds. The most common vegetation species of the marshy area are *Phragmites karka*, *Synodon dactylon*, *Desmostachya bipinnata*, *Saccharum spontaneum*, *Crotalaria burhia*, *Saccharum bengalensis*, *Prosopis cineraria*, *Limeum indicum*, *Aeluropus lagopoides*, *Alhagi maurorum*, *Boerhavia procumbens*, *Capparis deciduas*, *Cendhrus ciliaris* (Linn), *Typha domingensis*, *Typha elephantina*, *Tamarix indica*, etc.

4. Agriculture (cropland) habitat

This habitat comprises irrigated agricultural fields lying adjacent to either side of the Nara Canal. It supports a good population of black and grey partridges, reptiles, and small mammals. Some of the common birds also perch in these fields. Use of pesticides and the clearing of lands for agricultural practices are major threats to the wildlife and their habitat in this area. Some of the

floral species are *Achyranthes aspera* (Linn), *Alhaji mourorum* (Medic), *Amaranthus viridis* (Linn), *Aristida adscensionis*, *Brachiaria eruciformis*, *Celosia argentea* (Linn), *Cenchrus ciliaris* (Linn), etc.

Nara Canal also supports indigenous fish species. There is no protected forest in the reserve area, but irrigated and canal-side plantation is practiced by the local farmers. Being rich in biodiversity and other cultural and natural resources, there is great potential for ecotourism activities, research, bird watching and boat safaris in Nara Canal. The Game Reserve area is also rich in natural gas reserves and commercially viable gas reserves of one multinational company total more than one trillion cubic feet per year.

Faunal diversity

The Game Reserve is rich in faunal diversity. Its different habitat ecosystems support a large variety of wildlife and more than 200 faunal species are recorded here. About two decades ago, gavial, sambar deer and chinkara were also common in this area, but due to habitat loss and excessive hunting pressure, they are now extinct in the area. Gavial was even found up to the 1970s. Gavial and sambar no longer occur in Pakistan now, but the last chinkara population moved to the neighboring Indian desert border, where their survival is at stake due to the long dry spell in the Nara desert and the complete sealing off of the Indo-Pak border by the Indian government. Now the only remaining key wildlife species in the area are hog deer, marsh crocodile, fishing cat, Indian smooth otter, black partridge, grey partridge, Houbara bustard, marbled teal, pond turtle and raptor species.

Future plans

Keeping in view its biodiversity richness, the area is on the priority list of the Sindh Wildlife Department for future conservation strategies. Being ecologically rich, Nara Game Reserve is being proposed as a Ramsar site and WWF-Pakistan is conducting a survey for this purpose. Nara Game Reserve is also being proposed as a biosphere reserve by the Sindh Province and data

is being collected by the Sindh Wildlife Department to meet the biosphere reserve criteria. For long-term and sustainable conservation policies, multinational companies, who are reaping financial benefits of hundreds of million of rupees from the gas reserves of this area every year, are being approached by the Sindh Wildlife Department for the preparation of a Management Plan of Nara Game Reserve. Hopefully, these companies will respond positively to this very important initiative and their support will enable the custodian department and the Government of Sindh to manage this ecologically rich area along scientific lines and conserve its biodiversity on a long-term and sustainable basis.

Threats to the wildlife of Nara Game Reserve

- Land development and habitat clearance for agriculture practices
- Hunting, poaching and netting
- Large scale developments by oil exploration companies and their activities
- Deforestation and encroachment into forest lands
- Use of pesticides in the agriculture fields
- Lack of trained manpower and poor infrastructure of the wildlife department
- Livestock farming and large scale grazing
- Road sector development and construction of jeepable tracks
- Water scarcity
- Long, dry spell

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Base Line Study of Nara Game Reserve – 2000. Halcrow Pakistan (Pvt)

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The author is Deputy Conservator Wildlife, Sindh Wildlife Department, Government of Sindh, Sukkur, Pakistan.

Table 1: List of Mammals in the Nara Game Reserve

Common Name	Scientific Name
Hog deer	<i>Axis porcinus</i>
Indian wild boar	<i>Sus scrofa</i>
Fishing cat	<i>Prionailurus viverrinus</i>
Desert Cat	<i>Felis silvestris ornata</i>
Jungle Cat	<i>Felis chaus</i>
Common red fox	<i>Vulpes vulpes pusillus</i>
Black napped hare	<i>Lepus nigricollis</i>
Jackal	<i>Canis aureus</i>
Smooth-coated otter	<i>Lutrogale perspicillata</i>
Small Indian mongoose	<i>Herpestes javanicus</i>
Common mongoose	<i>Herpestes edwardsi</i>
Indian crested porcupine	<i>Hystrix indica</i>
Longeared hedgehog	<i>Hemiechinus collaris</i>
Northern palm squirrel	<i>Funambulus pennanti</i>
Short-tailed mole rat	<i>Nesokia indica</i>
House rat	<i>Rattus rattus</i>
House mouse	<i>Mus musculus</i>
Indian gerbil	<i>Tatera indica</i>
Balochistan gerbil	<i>Gerbillus nanus</i>
Indian Desert gerbil	<i>Meriones hurrianae</i>
Anderson's shrew	<i>Suncus stoliczkanus</i>

Table 2: List of Reptiles & Amphibians in the Nara Game Reserve

Common Name	Scientific Name
Marsh crocodile	<i>Crocodylus palustris</i>
Spotted pond turtle	<i>Geoclemys hamiltonii</i>
Indian soft-shell turtle	<i>Trionyx gangeticus</i>
Indian flap-shell turtle	<i>Lissemys punctata</i>
Indian desert monitor	<i>Varanus griseus Koniecznyi</i>
Keeled rock gecko	<i>Cyrtopodion (Cyrtodactylus)</i>
Saw-scaled viper	<i>Echis carinatus</i>
Indian cobra	<i>Naja naja</i>
Sindh awl-headed snake	<i>Lytorhynchus paradoxus</i>
Skittering frog	<i>Rana cyanophlyctis</i>
Indian fringe-toed sand lizard	<i>Acanthodactylus cantoris</i>
Glossy-bellied racer	<i>Coluber ventromaculatus</i>
Indian sand swimmer	<i>Ophiomorus tridactylus</i>
Brilliant agama	<i>Agama agilis</i>
Monitor lizard	<i>Varanus bengalensis</i>

Table 3: List of Birds in the Nara Game Reserve

Common Name	Scientific Name
Houbara bustard	<i>Chlamydotis undulate</i>
Black partridge	<i>Francolinus francolinus</i>
Grey partridge	<i>Francolinus podicerianus</i>
Common sandgrouse	<i>Pterocles orientalis</i>
Rose-ringed parakeet	<i>Psittacula krameri</i>
House crow	<i>Corvus splendens</i>
Common starling	<i>Sturnus vulgaris</i>
Common myna	<i>Acridotheres tristis</i>
Bank myna	<i>Acridotheres ginginianus</i>
Collared dove	<i>Streptopelia decaocta</i>
Red turtle dove	<i>Streptopelia transquebarica</i>
Black drongo	<i>Dicrurus macrocercus</i>
Hoopoe	<i>Upupa epops</i>
House sparrow	<i>Passer domesticus</i>
Blue rock pigeon	<i>Columba livia</i>
Little brown dove	<i>Streptopelia senegalensis</i>
White-breasted kingfisher	<i>Haleyon smyrnensis</i>
Common/Blue kingfisher	<i>Alcedo atthis</i>
Pied kingfisher	<i>Ceryle rudis</i>
Greater flamingo	<i>Phoenicopterus ruber</i>
Marsh harrier	<i>Circus aeruginosus</i>
Tawny eagle	<i>Aquila rapax</i>
Honey buzzard	<i>Permis ptilorhynchus</i>
Common/Eurasian Kestrel	<i>Falco tinnunculus</i>
Common/Desert buzzard	<i>Buteo buteo</i>
Long-legged buzzard	<i>Buteo rufinus</i>
White-backed vulture	<i>Gyps bengalensis</i>
Egyptian vulture	
Brahminy kite	<i>Haliastur indus</i>
Black-shouldered kite	<i>Elanus caeruleus</i>
Spotted little owl	<i>Athene brama</i>
Indian Crow Pheasant	<i>Centropus sinensis</i>
Indian tree-pie	<i>Dendrocitta vagabunda</i>
Cattle egret	<i>Bubulcus ibis</i>
Intermediate egret	<i>Egretta intermedia</i>
Large/Great egret	<i>Egretta alba</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Black ibis	<i>Pseudibis papillosa</i>
Grey heron	<i>Ardea cinerea</i>
Purple heron	<i>Ardea purpurea</i>
Red-wattled lapwing	<i>Hoplopterus indicus</i>
Yellow-wattled lapwing	<i>Hoplopterus malabaricus</i>
Common moorhen	<i>Gallinula chloropus</i>
Purple moorhen	<i>Porphyrio porphyrio</i>
Little cormorant	<i>Phalacrocorax niger</i>
Little egret	<i>Egretta garzetta</i>
Great cormorant	<i>Phalacrocorax carbo</i>
House martin	<i>Delichon urbica</i>

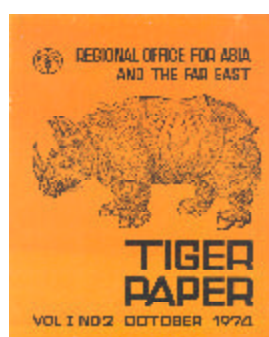
Common babbler	<i>Turdoides caudatus</i>
Jungle babbler	<i>Turdoides striatus</i>
Little grebe	<i>Tachybaptus ruficollis</i>
Darter or Snake bird	<i>Anhinga melanogaster</i>
Common teal	<i>Anas crecca</i>
Common coot	<i>Fulica atra</i>
Gadwall	<i>Anas strepera</i>
Gargeny	<i>Anas querquedula</i>
Mallard	<i>Anas platyrhynchos</i>
Marbled teal	<i>Marmaronetta angustirostris</i>
Pintail	<i>Anas acuta</i>
Ruddy shelduck	<i>Tadorna ferruginea</i>
Shoveller	<i>Anas clypeata</i>
Tufted duck	<i>Aythya fuligula</i>
White eyed pochard	<i>Aythya nyroca</i>
Wigeon	<i>Anas penelope</i>
Common pochard	<i>Aythya ferina</i>
Collared sand martin	<i>Riparia riparia</i>
Clamorous reed warbler	<i>Acrocephalus stentoreus</i>
Bay-backed shrike	<i>Lanius vittatus</i>
Little green bee-eater	<i>Merops orientalis</i>
Little stint	<i>Calidris minuta</i>
Lesser whitethroat	<i>Sylvia curruca</i>
Indian robin	<i>Sexicoloides fulicata</i>
Indian roller	<i>Coracias bengalensis</i>
Indian sand martin	<i>Riparia paludicola</i>
Indian tailor bird	<i>Orthotomus sutorius</i>
Kentish plover	<i>Charadrius alexandrinus</i>
Indian baya	<i>Ploceus philippinus</i>
Desert wheatear	<i>Oenanthe deserti</i>
Dunlin	<i>Calidris alpina</i>
Golden-backed woodpecker	<i>Dinopium bengalensis</i>
Great grey shrike	<i>Lanius excubitor</i>
Greater short-toed lark	<i>Calandrella brachydactyla</i>
Green sandpiper	<i>Tringa ochropus</i>
Green shank	<i>Tringa nebularia</i>
Curlew	<i>Numenius arquata</i>
Crested lark	<i>Galerida cristata</i>
Cream-coloured courser	<i>Cursorius cursor</i>
Common swallow	<i>Hirundo rustica</i>
Common snipe	<i>Gallinago gallinago</i>
Common sandpiper	<i>Actitis hypoleucos</i>
Black redstart	<i>Phoenicurus ochruros</i>
Black stork	<i>Ciconia nigra</i>
Black-tailed godwit	<i>Limosa limosa</i>
Black-winged stilt	<i>Himantopus himantopus</i>
Blue throat	<i>Luscinia svecica</i>
Blue-cheeked bee-eater	<i>Merops superciliosus</i>
Booted warbler	<i>Hippolais caligata</i>
Chiffchaff	<i>Phylloscopus collybita</i>
Yellow headed wagtail	<i>Motacilla citreola</i>

Yellow wagtail	<i>Motacilla flava</i>
Unwin's Nightjar	<i>Caprimulgus europaeus</i>
Whiskered tern	<i>Chlidonias hybridus</i>
White/Pied Wagtail	<i>Motacilla alba</i>
White-tailed plover	<i>Chettusia leucura</i>
White-cheeked bulbul	<i>Pycnonotus leucogenys</i>
White-throated munia	<i>Eodice malabarica</i>
White-breasted waterhen	<i>Amaurornis phoenicurus</i>
White-browed fantail/fly catcher	<i>Rhipidura aureola</i>
Tawny pipit	<i>Anthus campestris</i>
Streaked fantail warbler	<i>Cisticola juncidis</i>
Striated babbler	<i>Turdoides earlei</i>
Streaked longtail warbler	<i>Prinia gracilis</i>
River tern	<i>Sterna aurantia</i>
Ruff	<i>Philomachus pugnax</i>
Rufous fronted wren warbler	<i>Prinia buchanani</i>
Rufous warbler/bushchat	<i>Cercotrichas galactotes</i>
Rufous-backed shrike	<i>Lanius schach</i>
Stonechat	<i>Saxicola torquata</i>
Spotted crane	<i>Porzana porzana</i>
Sindh jungle sparrow	<i>Passer pyrrhonotus</i>
Sindh nightjar	<i>Caprimulgus mahrattensis</i>
Sindh pied woodpecker	<i>Dendrocopos assimilis</i>
Small skylark/Indian skylark	<i>Alauda gulgula</i>
Little tern	<i>Sterna albifrons</i>
Long-tailed grass warbler	<i>Prinia burnesii</i>
Pied wheatear	<i>Oenanthe picata</i>
Pied bushchat	<i>Saxicola caprata</i>
Paddy bird/Indian pond heron	<i>Ardeola grayii</i>
Marsh sandpiper	<i>Tringa stagnatilis</i>
Red-vented bulbul	<i>Pycnonotus cafer</i>
Purple sunbird	<i>Nectarinia asiatica</i>
Red shank	<i>Tringa totanus</i>

The Evolution of Tigerpaper



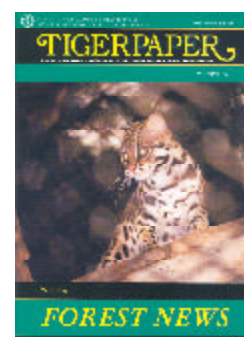
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Vol.32:No.1
Jan-Mar 2005

FOREST NEWS

Vol. XIX: No. 2 April-June 2005

SEVENTEENTH SESSION OF THE COMMITTEE ON FORESTRY

The seventeenth session of the Committee on Forestry (COFO) convened 15-19 March 2005 in Rome. Over 700 delegates registered for the event, including representatives from 138 countries and more than 35 international organizations and NGOs.

The opening COFO session was graced by the presence of the Prime Minister of Finland, H.E. Matti Vanhanen and Madame Wangari Maathai, the 2004 Nobel Peace Prize Laureate.

The COFO agenda focused on the State of the World's Forests 2005 (SOFO), regional forestry commissions in action, international cooperation in forest fire preparedness, the role of forests in contributing to the Millennium Development Goals, FAO's forestry programs and activities, and arrangements for hosting the next World Forestry Congress. The COFO session included numerous side events which convened in simultaneous gatherings each afternoon. Participants appreciated this format as an effective approach for enhancing substantive exchanges on particular topics of interest.

Of particular relevance for the Asia-Pacific region were the following COFO decisions and recommendations (extracted and slightly edited from the full COFO report). The full report is available from the FAO website at: <http://www.fao.org/docrep/meeting/009/j4876e.htm>

State of the World's Forests 2005 (SOFO)

Delegates were provided with copies of *State of the World's Forests 2005*, published in the five official FAO languages. The theme of the 2005 edition of SOFO is "realizing the economic benefits from forests." Topics covered in SOFO include opportunities and challenges associated with enhancing the economic benefits from forests; lessons learned from efforts to increase benefits from agroforestry; the economics of wood energy; invasive species; and the links between violent crime and forested regions of the world.

Regional Forestry Commissions in action

The Committee agreed that FAO Regional Forestry Commissions are a vital component of FAO's work and provide effective mechanisms to enhance regional and sub-regional cooperation, exchange lessons learned, build capacity, support networks of regional interest, and strengthen links between countries and international forest-related processes.

COFO recommended that FAO, working with member countries and other partners, take action to implement the recommendations made by the six Regional Forestry Commissions in their 2004 sessions.

The Committee recommended that FAO increase the allocation of resources and support for the work of the Regional Forestry Commissions, including strengthening the FAO Regional Offices to this end.

COFO recommended that the Regional Forestry Commissions address, among others, the following key issues: i) collaboration on forest fire management; ii) regional forest policy

dialogue; iii) forestry's contribution to poverty alleviation; iv) valuation of environmental services; v) forest invasive species; vi) forests and water; vii) illegal logging and associated trade; and viii) elevating the importance of forestry on the political agenda.

The Committee recommended that Regional Forestry Commissions continue to make use of regional and thematic working groups to deal with such issues as forest fire management, invasive species, wildlife management and bushmeat, forestry education, and illegal logging.

It was recommended that the Regional Forestry Commissions continue to facilitate country implementation of the IPF/IFF proposals for action and to provide information on developments in the international dialogue on forests.

The Committee recommended that Regional Forestry Commissions continue to provide the framework for conducting periodic regional forestry sector outlook studies.

It also recommended that the Regional Forestry Commissions build synergies with other regional and international organizations and processes.

Needs and opportunities for international collaboration on forest fire preparedness

Different views were expressed on the proposal for FAO to facilitate development of an international accord on forest fire. The Committee concluded that it was vital to strengthen existing mechanisms for collaboration on forest fire, and that existing bilateral and regional agreements are a valuable basis for international cooperation.

The Committee requested FAO, in collaboration with member countries and other partners, to develop a strategy to enhance international cooperation on wildland fire.

COFO requested FAO to provide support to countries to develop and consolidate their national fire management systems and to build technical and operational capacity for effective international cooperation.

Role of forests in contributing to the Millennium Development Goals

The Committee recommended that FAO strengthen its technical support to countries to integrate national forest programmes into their respective Poverty Reduction Strategy Papers and other national development strategies.

It was further recommended that FAO increase its technical assistance to countries to help improve governance, strengthen institutional frameworks, and promote sustainable community-based forest management.

The Committee requested FAO to assist member countries in quantifying and capturing the economic values of environmental services of forests.

The Committee recommended that FAO support countries in their efforts to improve inter-sectoral cooperation and coordination at national levels.

Shaping an action programme for FAO in forestry

The Committee recommended that FAO continue to undertake global and regional forest sector outlook studies, if possible at five-year intervals.

The Committee supported an integrated approach in addressing issues related to bioenergy, including fuelwood.

FAO was requested to continue its leadership role in the Collaborative Partnership on Forests (CPF).

COFO requested FAO to continue providing technical assistance to improve forest management policies and practices, including for implementation of the Clean Development Mechanism of the Kyoto Protocol.

The Committee recommended continued support for regional and national networks to combat fire, insects and disease in forests.

FAO was asked to give priority to key program areas dealing with forests and water, climate change, combating desertification and land degradation, bioenergy, biodiversity, agroforestry, poverty alleviation and food security, participatory forestry, and sustainable livelihoods.

COFO supported FAO's workplan related to the conservation of forests and fragile ecosystems and invasive species.

FAO was requested to increase assistance to countries in developing and implementing national forest programmes, including in partnership with the National Forest Programme Facility.

The Committee emphasized the need for policy frameworks and institutional arrangements that foster the participation of civil society in forest decision making and improve cooperation across sectors.

FAO was asked to strengthen its activities in the area of monitoring, assessment and reporting on forests.

The Committee requested FAO to increase the allocation of resources in its work programme in support of the activities of the Regional Forestry Commissions.

World Forestry Congress

The Committee acknowledged offers from Panama and Argentina to host the XIII World Forestry Congress in 2009.

Forest sector and post-tsunami rehabilitation and reconstruction

The Committee welcomed FAO's assistance to countries affected by the 26 December 2004 tsunami in the Indian Ocean and recommended that it increase its forestry-related efforts in this regard. COFO encouraged FAO to play a lead role through its regional offices in forest-related rehabilitation activities in collaboration with countries, international organizations, regional organizations, and NGOs, and to promote an integrated approach to coastal area management and livelihoods in all sectors.

MINISTERIAL MEETING ON FORESTS

More than 40 ministers responsible for forestry, and other high-level heads of delegations, participated in a 1-day Ministerial Meeting on Forests on 14 March 2004, in Rome. The meeting considered international cooperation on sustainable forest management, including on forest fires.

Ministers and other country representatives renewed their commitment to achieving sustainable forest management and to fulfilling the internationally agreed development goals outlined in the Millennium Development Declaration. They emphasized the need to improve domestic forest

law enforcement and governance, international cooperation on forest fires, forest assessment and reporting, systems for payment for environmental services, and cross-sectoral approaches. The ministers also cited the need for strengthening policies, legislation, institutions and programs, enhancing capacity in developing countries, and facilitating international forest policy dialogue.

The full text of the Ministerial Statement is accessible from the FAO website.

MEETING OF THE BUREAUX OF THE REGIONAL FORESTRY COMMISSIONS

A meeting of officers from the six Regional Forestry Commissions (RFCs) and FAO regional and headquarters forestry staff was convened 12 March 2005, prior to the COFO session. The Asia-Pacific Forestry Commission was represented by Dr. N.K. Joshi (India), Dr. Bashir Wani (Pakistan), and Dr. Romeo T. Acosta (Philippines).

Representatives of each commission presented summaries of ongoing, planned, and recently completed activities. The Asia-Pacific Forestry Commission report highlighted the following recent and ongoing activities:

- *In Search of Excellence: Exemplary Forest Management in Asia-Pacific* initiative;
- Policy study on the “evolution of devolution”;

- Study of the impacts of incentives on the development of forest plantation resources in Asia-Pacific;
- Support for the development and implementation of codes of practice for forest harvesting;
- Promotion of reduced impact logging, including the development of RILSIM;
- Establishment of the Asia-Pacific Forest Invasive Species Network (APFISN) and related network activities;
- Publication of *State of forestry in Asia and the Pacific – 2003*;
- Preparation of the report “Asia-Pacific forestry: outlook and realities five years since the Asia-Pacific Forestry Sector Outlook Study,” and preparation for the next full regional forestry outlook study;
- Preparation of a training curriculum and teaching materials for a 2-week short course in forest policy analysis.

ASSESSING FORESTRY-RELATED REQUIREMENTS FOR REHABILITATION AND RECONSTRUCTION OF TSUNAMI-AFFECTED AREAS OF SRI LANKA

The 26th December 2004 tsunami struck the coastal areas of several South and Southeast Asian countries. FAO first provided emergency assistance to the affected countries. This was followed by various technical missions to assess the damage and recovery needs of several sectors, including fisheries, agriculture and forestry. The mission to Sri Lanka assessed the damage to the coastal forests, and reviewed further the forestry-related requirements for rehabilitation and reconstruction of tsunami-affected areas. The key features of the mission were to:

- assess the major needs and opportunities in the forest sector that can

contribute to the tsunami relief and rehabilitation efforts;

- collect information on ongoing and planned programmes in forest-related assistance for the tsunami recovery efforts undertaken by international, national and local agencies;
- collect information from the national agencies and other relevant bodies on the availability of timber and other wood products in Sri Lanka to supply the demand for reconstruction of infrastructure damaged and destroyed by the tsunami;
- assess the risk of forest pest outbreaks from debris left from the tsunami; and

- prepare a forest-related project proposal for FAO's assistance to Sri Lanka for tsunami rehabilitation, and identify partners to help carry out these efforts.

Following discussions with experts and review of published material, the tsunami-affected coastal areas in the western, southern and eastern parts of the island were visited. It was possible to confirm that the impact of the tsunami was generally mitigated by mature and undisturbed coastal vegetation and physical reliefs. When these were disturbed or altered, the impact was more severe. Mitigation measures such as allowing natural regeneration to proceed, and judicious planting of coastal species as shelterbelts appear promising. There is concern about fuelwood availability in the villages and small townships following the destruction of home gardens by the tsunami. Observations suggest this may not be such a severe problem that requires external assistance.

Another issue was the need for large quantities of timber for the reconstruction of houses. If the procurement of timber is not managed carefully, there is the potential for illegal logging and destruction of forests. The government has reviewed the issue carefully. Considering that the country will be importing most of the timber from traditional sources overseas, the problem is unlikely to magnify. However, it was recognized that the existing timber mills will not be able to cope with the production of wood ready for construction purposes. This can be partially offset by setting up village-level wood milling operations.

There was also concern that the huge amount of rubble and debris may start breeding forest pests and diseases. Observations indicate the likelihood is low.

While a number of tsunami-mitigation measures can be taken, some of which can be costly and perhaps even unreliable, rehabilitation of the natural ecosystem remains perhaps the best in many circumstances. Eliminating or minimizing disturbance and letting natural rehabilitation processes to work should remain the first line of action. The next option would be planting of trees,

shrubs and creepers. The order of interventions should be to first remove or minimize disturbance and allow natural regeneration processes, followed by judicious plantings. Next, all interventions should be based on a thorough understanding of the local environment, and should be undertaken by local authorities with technical and financial support from the federal government and international agencies. The local communities should play an integral role in the rehabilitation through a participatory process and one that also incorporates livelihood issues for the tsunami-affected people. Unless ownership is with the communities, long-term sustainability is unlikely.

Based on the findings of the mission, the following proposals were made:

- Assess the impact of tsunami wave surges on the coastal forest ecosystems in order to establish their mitigating influence;
- Develop a coastal shelterbelt of exotic and native tree species in an efficient and cost-effective manner;
- Develop integrated coastal area management guidelines and promote its use by public agencies and coastal communities;
- Meet emergency demand for inexpensive housing components by promoting the establishment of village wood milling facilities; and
- Enhance livelihoods of coastal communities by promoting appropriate forestry practices.

These proposals were combined with additional proposals for the region, and submitted to the UN Flash Appeal. The Government of Finland has agreed to support the Project, which would include a regional component to be housed in FAO-RAP, and national initiatives in Indonesia and Sri Lanka. The regional component, besides providing support to all the affected countries, would also act as a clearing house for technical and other related information on the tsunami rehabilitation and reconstruction work.

For additional information, please contact:
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FAO'S POSITION REGARDING SOURCES OF WOOD FOR TSUNAMI RECONSTRUCTION IN ACEH PROVINCE, INDONESIA

The tsunami reconstruction program in Aceh will require large volumes of lumber, plywood and other wood products. The greatest volume needed will be for residential construction. This wood will need to be sourced from within the province, from other provinces in Indonesia and from wood imports. Several factors should be taken into consideration when planning the procurement of wood for Aceh's reconstruction:

- The annual consumption of wood products (not including fuelwood) in Aceh province is estimated to be around 208,000 cubic meters. The reconstruction program is estimated to require an additional 415,000 cubic meters. However, the total annual legal cut in Aceh is only 50,000 cubic meters.
- Reconstruction activities funded by international agencies are required to comply with Indonesia's laws and regulations.
- Security problems in Aceh have limited the amount of legal timber harvesting in the province, and, along with institutional weaknesses, have compounded difficulties with forest monitoring and control of illegal harvesting.
- While production of wood elsewhere in Indonesia is sufficiently high to provide for the reconstruction needs in Aceh, difficulties in determining the legality of the product pose significant problems.
- Destruction and damage to transportation infrastructure, such as roads, bridges and port facilities, is making delivery of goods for reconstruction difficult.

Options for providing wood reconstruction in Aceh Province

FAO has identified the following options for addressing the wood demand for reconstruction in Aceh:

- Use legally sourced wood from production forests in Aceh;
- Tap alternative legal sources of wood from elsewhere in Indonesia;
- Maximize the volume of wood that can be salvaged;
- Use legally sourced wood from elsewhere in Indonesia;
- Use alternative construction materials to reduce the total demand for wood; and
- Import wood products from overseas, either purchased or as in-kind donations.

Short-term strategy recommended by FAO to address Aceh's wood needs for reconstruction

FAO recommends that the following options be pursued in the short-term:

- Using legally produced wood from IPK production forests in Aceh.
- Using alternative sources of local wood, including from public forests, plantation crops (e.g. rubber and coconut) and trees outside forests.
- Salvaging wood from the tsunami-affected areas.
- Re-directing from the export market to Aceh wood products (mainly plywood but also some lumber) from legal sources elsewhere in Indonesia.
- Importing wood products, mainly lumber, from outside Indonesia. This has the greatest potential to provide large quantities of construction wood relatively quickly. The wood needs to be treated appropriately.

FAO recommends against the following actions in the short-term:

- Lifting the logging ban in natural forests in Aceh. FAO advises that the logging ban remain in force until sound forest management plans and effective monitoring and control systems are in place.

- Attempting to significantly increase wood production from HTI and IPK lands for construction. FAO advises against this until sound forest management plans and effective monitoring and control systems are in place.

Long-term solution recommended by FAO:

- Develop and implement a comprehensive integrated forest management plan for Aceh that addresses the issue of illegal logging and provides incentives for sustainable forest management. It would include a plan for sustainable production and utilization of wood from Aceh.

The full FAO statement can be accessed at the following website: www.fao.org/forestry/site/27220/en

DOES FOREST OWNERSHIP MATTER? IF SO, IN WHAT WAYS?

Excessive deforestation and forest degradation have triggered a debate not only on the effectiveness of public sector forest management, but also on potential changes in forest resource tenure and institutional arrangements.

Over the last 20 years, the commitment to empowering local communities, decentralizing decision making to local government units and increasing private sector involvement in forest management, has been growing. This development is paralleled by significant shifts in forest tenure and innovative institutional arrangements that are aiming at increasing the direct involvement of stakeholders in forest management.

Understanding the impact of tenure and recent trends is essential for governments to promote sustainable forest use. With current trends in privatization and community involvement in forest management, we are witnessing rapid changes in resource tenure patterns and increasing complexity of stakeholder relationships. These changes have social, political and economic implications, which need to be monitored and assessed. Knowledge about the impact of different tenure and institutional arrangements on forest conditions and

their potential contribution to poverty reduction is limited. Too little is known to effectively manage today's problems in many of Asia's forests.

Under the umbrella of the Asia Forest Partnership (AFP), and in collaboration with The Nature Conservancy (TNC), Tropenbos and the Centre for International Forestry Research (CIFOR), FAO has consequently initiated a new policy study. Its objective is achieving a better understanding of the relationships between forest resource tenure and forest management, and in particular of the implications for poverty alleviation. The four partners have commissioned 12 case studies from throughout the Asia-Pacific region.

Two outcomes of the regional study are envisioned:

- Better understanding on what rights and responsibilities are linked to ownership, use and management types of forest resources in Asia and, on how these rights are respected and exercised; and
- Improved forest policy/law development and implementation,

which addresses the roles of forests in poverty reduction.

The four partners are planning a three-day workshop in Lijiang (China) between 17 and 22 October, to discuss the progress of the work and to reconfirm the outcomes. The meeting is intended to be informal and small because

comparing notes and providing guidance for the completion of the studies is one of its important objectives. However, a small number of interested outside experts can be accommodated. If you are interested in participating in the workshop and/or in the studies, please contact Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific (Patrick.Durst@fao.org).

nfp UPDATE

Viet Nam launches nfp partnership.

The partnership between Viet Nam and the National Forest Programme Facility (in short Facility) was approved in November 2004. This was followed by agreement to support forestry activities through the FAO-Netherlands Partnership Programme (FNPP). Both of these agreements with Viet Nam's Ministry of Agriculture and Rural Development (MARD) were officially announced through a 1-day Launching Workshop held in Hanoi, 4 May, 2005. The workshop was attended by some 40 participants representing various international organizations, ministries and participants from provincial Departments of Agriculture and Rural Development (DARDs).

During the workshop, nfp principles and the nfp concept note were reviewed and activities for the first year were elaborated. Information on the procedures needed for Facility grant application was presented. In general there was agreement with the content of the concept note. However, additional work is needed to increase the participation by other stakeholders in the implementation of the activities. There still remains a general lack of understanding about the nfp and the role of the Facility. One way to overcome this problem is to hold the "nfps for all" workshops in as many countries in the region as possible.

Several suggestions were made during the plenary session, after the initial presentations were made. One of them was to create advisory groups at the provincial level for supporting activities relating

to formulation of legislation. This concept is in line with the Facility requirements and the objectives of FNPP. Another suggestion was to channel the funds through the Multi Donor Trust Fund for Forests (TFF). While this would be convenient, it contravenes the procedures that have been established by the NFP Facility Steering Committee for ensuring multi-stakeholder participation in the activities. There was concurrence with the proposal to make the Technical Executive Committee (TEC) of the Forestry Sector Support Program and Partnership (FSSP&P) act as the Steering Committee for the Facility activities in Viet Nam, considering the latter's makeup and functions would be the same.

The FNPP work plan was also validated, with agreement that the initial activities would include support for provincial consultations on the National Forest Strategy, enhancing Viet Nam's capacity to implement commitments under international forestry agreements, expanding the development of community forestry, and strengthening capacity in forest policy development and implementation.

Raising awareness of stakeholder roles and responsibilities in forest management in Vanuatu

The Government of Vanuatu is strongly committed to sustainable forest management. Its National Forest Policy of 1997 is to "*ensure the sustainable management of Vanuatu's forests*

to achieve greater social and economic benefits for current and future generations.” In March 1998, the Department of Forests published the *Vanuatu Code of Logging Practice*. It provides guidance to the industry and balances the needs for protection of environmental values with safety and commercial considerations. 2002 was declared the “Year of Reforestation” and saw the initiation of the national reforestation programme to ensure that efforts, from both the Government and the private sector, are refocused on *producing timber stocks for the future*. It has also been recognized that achieving sustainable forest management in the long term requires the effective participation of communities in natural forest management and the national reforestation programme.

The efforts towards achieving sustainable forest management are paved with good intentions. Yet, putting theory into practice is slowed by the weak awareness by various stakeholders of their responsibilities and different perspectives on what their roles should be.

The partnership between Vanuatu and the Facility is initially addressing this impediment with two activities. The Chamber of Commerce and Industry of Vanuatu is implementing an awareness-raising programme that is to:

- encourage communities and forestry farmers to participate in the reforestation programme through field training sessions and through dissemination of information on the establishment and management of woodlots and agroforestry systems of high value commercial timber and nut tree species, on current harvesting rates and future marketing potentials; and
- improve the Vanuatu reforestation programme by discussing constraints to and opportunities for enhancing community participation in the tree planting programme and to disseminate that information widely.

It is expected that the awareness-raising programme that will be conducted in the six provinces will increase knowledge of forestry stakeholders on how to overcome constraints

related to tree planting and the management of forest resources.

The Vanuatu National Council of Women (VNCW) is planning a similar series of events to inform women about the requirements of the Forestry Act and the National Forest Policy, and on the roles they can play in promoting improved forest management. The VNCW approach is broader in that it does not focus on reforestation only. With regard to target group it is narrower as the focus is on women. The VNCW does not view awareness raising as a one-way street where representatives of the Department of Forests inform women about their roles. Instead, two-way communication channels will enable workshop participants to negotiate their roles; not only the women's but also that of the Department of Forests.

Vanuatu has realized that meetings are effective methods of raising awareness and for facilitating the implementation of its forest programme. At the same time, stakeholders are very well aware that the meetings, of whatever nature, are also very expensive and the number of people that can be reached is small. The national steering committee that oversees the partnership has therefore requested additional support for the production of posters, brochures, radio programmes and videos.

If you would like to learn more about Vanuatu's forest programme and the activities supported by the Facility, please contact Mr. Hanington Tate (hanington_tate@yahoo.com).

For more information on nfps in the Asia-Pacific region and/or the National Forest Programme Facility, please contact:

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or

Mr. T. Enters, NFP Facilitator, Bangkok, Thailand: Tel: 66-2-697-4328; Fax: (66-2) 697-4445; EM: thomas.enters@fao.org

DEVELOPING A REGIONAL STRATEGY FOR COMBATING THE COCONUT LEAF BEETLE

The Asia-Pacific Forest Invasive Species Network (APFISN) has noted with much concern the rapid spread of the invasive coconut leaf beetle (*Brontispa longissima*) from the South Pacific islands to continental Asia. The beetle has already caused extensive damage to the coconut industry, and if left uncontrolled the losses may exceed \$US 1 billion.

In order to arrest the invasion, FAO initiated a major control program to arrest the spread of the beetle in Viet Nam, China, Cambodia, Lao PDR and Thailand. This work was reported in an "Expert Consultation" held in October 2004 in Bangkok, Thailand. Considering the threat of the beetle to the coconut industry and the speed at which it is spreading into mainland Asia, APFISN wanted to review the impact of the biological control programme, and look further into the network's activities, share experiences among forestry and agriculture specialists in handling invasive species, and to formulate an Asia-Pacific strategy to work in a multi-disciplinary manner to address invasive species management.

The workshop "Developing an Asia-Pacific Strategy for Forest Invasive Species" was held in Ho Chi Minh City, Viet Nam, through the collaboration of the Asia-Pacific Forest Invasive Species Network (APFISN), the Food and Agriculture Organization (FAO), the Asia-Pacific Association of Forest Research Institutions (APAFRI), CAB International (CABI) and the US Department of Agriculture Forest Service (USDA FS). About 30 researchers and managers from Southeast and continental Asian countries participated in the workshop.

Session I of the workshop was devoted to reviewing the status of the beetle outbreak in the Asia-Pacific region, the ecological approaches to controlling the beetle and lessons gained from the various control measures. Experts concluded that

biological control by mass-rearing a small wasp parasitoid, *Asecodes hispinarum*, which attacks the larvae of the beetle, is the most effective and economical means to control the spread of the pest. The mass-rearing of the parasitoid can be undertaken using local technology even at the farm level. Reports from Viet Nam, Cambodia, Thailand and China indicate that the parasitoid has successfully established itself, and is able to keep damage to coconut palms to economically acceptable levels.

Participating countries also outlined the future plans. Countries such as Malaysia and Philippines surprisingly stated there were still no verified sightings of the beetle, but indicated that assessments will be conducted more vigorously. Also, there was still lingering confusion about the nomenclature of the beetle, which may have delayed the identification (Later reports following the workshop have confirmed that the *Brontispa* beetle is indeed in Malaysia and the Philippines, and urgent action is needed to stem the spread – see box on the situation in the Philippines.). Discussions were further extended to how countries like Myanmar, India and Sri Lanka should prepare for the inevitable; they should start taking quarantine measures while preparing to introduce the parasitoid once the incidence of the beetle is ascertained.

Session II delved into broader issues of invasive species. First the status and impact of invasive species in the Asia-Pacific region were reviewed. This was followed with the experiences gained in managing plant and insect invasive species. The group further explored the workings of the quarantine systems, the weaknesses that must be overcome, and how countries can collaborate and share information to strengthen the quarantine systems in the countries. APFISN can assist in advancing some of the regional collaboration activities.

The coconut hispine beetle, *Brontispa longissima*, probably arrived in Manila via the ornamental palm trade. In June, 2005, the alien insect has been recorded from Metro Manila (especially around the Airport) and in Laguna. Besides coconut, the insect has been recorded on the exotic ornamental palm, *Lastillana* sp. and the endemic manila palm, *Veichia manillana*. A Brontispa Action Team has been set up to address this invasive pest problem and members come from the Philippine Coconut Authority, the Bureau of Plant Industry, the National Crop Protection Center-University of the Philippines, Los Baños, the IPM-Kasakalikasan of the Department of Agriculture and regional Crop Protection Centers.

Contributed by Peter A.H. Ooi



Session III looked deeper into the underlying ecological principles which can be used for predicting the invasiveness of an organism, how agricultural and forestry practices have introduced invasive species, and the need for databases and networks to strengthen the region's efforts to manage the occurrence of invasive species.

During the plenary discussions, the following important points were highlighted:

- There is a wealth of information available in the agriculture and forestry sectors, which needs to be integrated for more effective application;
- Besides agriculture and forestry, other sectors such as trade, fisheries, health, and tourism should also be involved in the management of invasive species;
- Forestry is a vital source for scoping natural enemies of invasive species, and more efforts should be directed into it;
- There is considerable expertise in the region, and the governments should encourage the exchange of experts to solve agri-forestry problems;
- Considering the nature of invasive alien species, classical biological control

mechanisms should be given more serious attention.

The workshop came up with several valuable recommendations, which APFISN can further promote. These include:

- adopting a regional approach to develop a programme to control the coconut leaf beetle; and
- strengthening of national databases of crop pests and natural enemies, to enhance the potential for biological control programmes.

For further information, contact:

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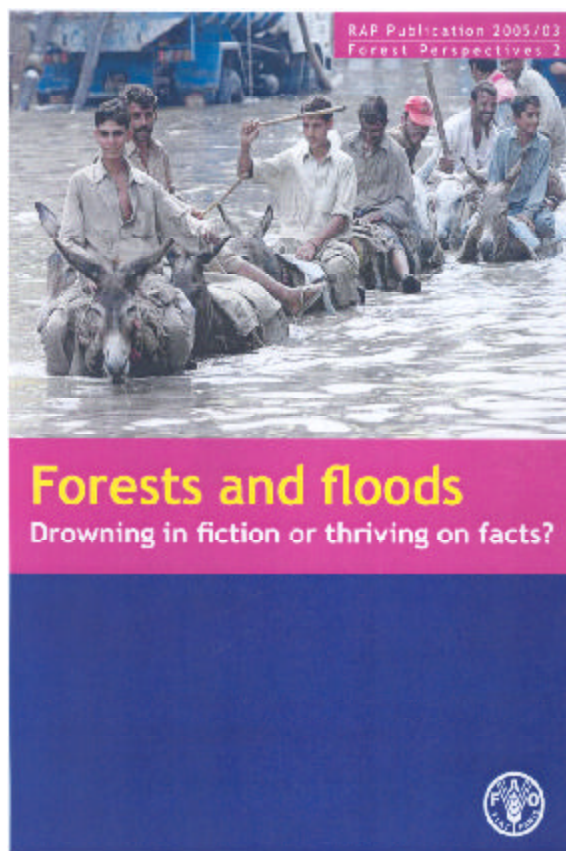
NEW RAP FORESTRY PUBLICATIONS

FORESTS AND FLOODS – DROWNING IN FICTION OR THRIVING ON FACTS? RAP Publication 2005/03

The driving force behind much environmental policy is a set of powerful assumptions on links between cause and effects and images about environmental crises. This is no more evident than in the case of devastating floods and landslides that affect the personal and economic fortunes of millions of people in the Asia-Pacific region every year. Each catastrophic flood is accompanied by images of inundated areas with people sitting on the rooftops of their houses, which sway people's and policy makers' opinions and reactions alike. Upland farmers and loggers are blamed for clearing and degrading forests. In many people's minds, the use and abuse of forests in upland watersheds represents the main cause of massive lowland floods.

According to a widely accepted understanding and conventional wisdom forests act as giant "sponges," soaking up water during heavy rainfall and releasing freshwater slowly when it is most needed, during the dry months of the year. This is easy to understand for the laypersons. Unfortunately, the reality is far more complex.

Forests and floods: drowning in fiction or thriving on facts? explores this complexity and the scientific evidence linking floods and forests. The booklet reveals that much of the perceived wisdom cannot be substantiated by science. It is often little more than myth or is patently incorrect. In the case of massive floods, such "wisdom" has often led decision-makers to implement misguided policies that lead to an over-emphasis on reforestation and forest protection at the expense of more holistic watershed and river-basin management.



Forests and floods distinguishes fact from fiction and recommends alternative approaches for effective watershed and floodplain management. This authoritative overview has been produced by a suite of renowned experts, but it should appeal to everyone with an interest in escaping the quagmire of stale and dated paradigms. Ultimately, *Forests and floods* aims to better inform policy-makers, development agencies and the media, and so constructively contribute to the development of sound watershed and river-basin management.

WAVES OF HOPE – REPORT OF THE REGIONAL COORDINATION WORKSHOP ON REHABILITATION OF TSUNAMI-AFFECTED FOREST ECOSYSTEMS: STRATEGIES AND NEW DIRECTIONS

RAP Publication 2005/07

The Regional Coordination Workshop on Rehabilitation of tsunami-affected forest ecosystems: strategies and new directions was organized by FAO and held 7-8 March 2005 in Bangkok, Thailand. The overall goal of the workshop was to enhance rehabilitation efforts in the tsunami-affected areas through better coordination of national, regional and international agencies involved in forest rehabilitation and management of tsunami-affected areas.



The workshop brought together 15 national representatives from 7 tsunami-affected countries (India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand) and about 30 representatives from international and regional organizations. The workshop served as a forum to share information, collectively assess initial findings related to rehabilitation needs and opportunities, share plans and proposals for future rehabilitation work and develop mechanisms for collaboration and joint activities. This included a proposal to form a regional partnership to foster further collaboration and coordination in undertaking forest-related rehabilitation efforts.

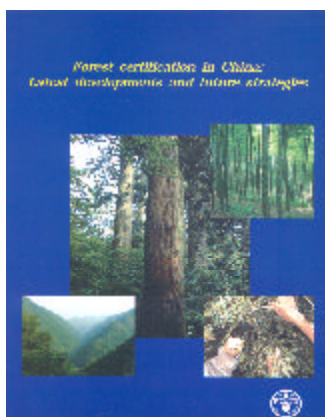
The report of the workshop can be accessed at the following website: www.fao.org/world/regional/rap/forestry.asp

FOREST CERTIFICATION IN CHINA: LATEST DEVELOPMENTS AND FUTURE STRATEGIES

RAP Publication 2005/08

Over the past decade, China has become one of the world's leading importers and exporters of wood products. Large quantities of all kinds of wood products are currently being produced, and China is quickly becoming a leading producer of value-added wood products for export. Certification is becoming an increasingly important issue for China in order to maintain and increase its market share, particularly in Europe and North America. Certification is a market-driven mechanism that promotes sustainable management in three main ways:

- by establishing standards for forest practices and management that guarantee a certain level of management performance;
- by marketing forest-derived products from sustainable managed forests; and
- by educating producers and consumers.



China is interested in developing a single, coherent national certification strategy and is exploring various options for certification. Therefore, the State Forest Administration of China requested FAO to assist in organizing a meeting in which these options could be explored with various stakeholders involved in forest management in China. The workshop was held in Hangzhou, China, 21-23 July 2004. FAO is pleased to disseminate a summary of the presentations made at the workshop as well as the recommendations made to China.

FOREST RESOURCES ASSESSMENT (FRA) IN THE ASIA-PACIFIC REGION

FAO has been conducting global forest resources assessments since 1947. In the last two decades, this task has been implemented under the global forest resources assessment (FRA) programme, which periodically reports the status and trends of forest resources, their management and uses to the countries and the international community.

The Global Forest Resources Assessment 2000 (FRA 2000), constituted the most comprehensive and accessible global reporting on forest resources to date. The main report of FRA 2000 concluded that there were still major gaps in information on forests and forestry, e.g. biomass, and multiple functions of forests across social, economic and ecological dimensions. In order to update the information of FRA 2000, FAO launched FRA 2005 in 2003, which includes seven thematic subjects, including bamboo resources assessment. The FRA 2005 process is designed to help to reduce the reporting burden of countries by globally harmonizing the information required by regional and international processes and agreements. A series of regional workshops was organized, including two in the Asia-Pacific region.

FRA 2005 review and training workshop for the Asia-Pacific region

The FRA 2005 review and training workshop for the Asia-Pacific region was organized 23-26 November 2004 at the FAO Regional Office, Bangkok, with financial support from Green Fund Japan, the Australian Government (AusAID) and the International Network for Bamboo and Rattan (INBAR). Twenty-six National Correspondents (NCs), representatives of donor agencies, and FAO staff participated in the workshop. The main objective was to assist the NCs to review and finalize their draft country reports and match the requirements of FRA 2005.

Intensive and participative group discussions and technical consultations were held with each country. However, not all countries use the same definitions and classification systems as those of FRA 2005. Other constraints were limited coverage of forest inventories, lack of information on forest fires, damages by pests and diseases and non-wood forest products, lack of sufficient time series information, etc. The thematic study on bamboo resources assessment led by INBAR was also discussed in a special session, including presentations of pilot studies in China, India and Indonesia. The session concluded with the approval of a draft country report format and request for a bamboo workshop to be held in Beijing in 2005.

The global bamboo thematic study workshop

The global bamboo thematic study workshop was held at INBAR Headquarters, 9-11 May 2005, in Beijing under the joint organization and sponsorship of FAO, INBAR, the International Fund for Agricultural Development (IFAD), the State Forest Administration of China, and the Chinese International Center for Bamboo and Rattan. Over 30 NCs for FRA 2005 and their representatives attended the workshop. They presented country reports and discussed the future of the global bamboo resources assessment within the FRA 2005 framework.

Topics of discussion included: 1) bamboo stands that extend outside the forest area and are not included in the forest assessment; 2) how to assess the bamboo resources on the ground and by remote sensing technologies; 3) the flowering phenomenon of bamboo; and 4) contributions of bamboo to the social, economic and environmental aspects. The participants were introduced to some promising technologies developed in China, e.g. bamboo cloth, paper, boards, furniture, food and beverage, medicines, etc. Some participants indicated their willingness to become members of INBAR.

During the workshop participants discussed the current status, format and need for the bamboo resources evaluation. In the resolution session, the participants emphasized the importance of bamboo for poverty alleviation, forest conservation, economic and environmental development, and called for the other bamboo producing countries

to present their bamboo studies reports to INBAR and FAO. The resolution also called for FAO and INBAR to arrange a follow-up workshop for developing on-the-ground and remote sensing techniques to validate and estimate world bamboo resources.

ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

7.87 MILLION HECTARES OF LAND CONVERTED INTO FORESTS IN THE WESTERN REGION OF CHINA

According to the State Council's Office of the Leading Group for Western Region Development, local people in China's western region have converted some 7.87 million hectares of land into forests, 11.3 million hectares of trees have been planted on barren land and mountains, and some 12.7 million hectares of seriously degenerated grassland have been rehabilitated in the western region since 2003. The west of the country is home to many of China's water sources and is the largest power provider for the nation.

– Source: <http://www.chinadaily.com.cn> –

UNDP LAUNCHES US\$ 2 MILLION FOREST PROTECTION PROJECT IN SINDH, PAKISTAN

The United Nations Development Programme (UNDP) has joined hands with the private sector to launch a project for developing a sustainable tropical forest in Sindh, Pakistan. The project will include co-financing of US\$ 1 million from both UNDP and the private sector. UNDP will administer the private sector contribution and will designate a partner civil society organization to implement the project.

– Source: <http://www.paktribune.com> –

GOVERNMENT IMPOSES ANTI-DUMPING DUTIES ON UNCOATED PAPER & PRODUCTS

The Indonesian government has imposed additional duties on uncoated writing and printing paper products from Finland, South Korea, Malaysia and India, after investigations indicated that they were dumping products on the Indonesian market. The policy is to be effective for five years.

– Source: *The Jakarta Post* –

PIONEERING PUBLIC-PRIVATE PARTNERSHIP GIVES THE POOR ACCESS TO BIODIVERSITY

The first biodiversity park of its kind in the world was officially opened by representatives of UN-ESCAP, the Government of Pakistan and the private sector in Morgah, Rawalpindi, Pakistan. The Morgah Biodiversity Park Project is the brainchild of the Bangkok-based UN Economic and Social Commission for Asia and the Pacific (UN-ESCAP). The project is a part of UN-ESCAP's Pro-Poor Public Private Partnership for poverty reduction, and is a follow-up of the World Summit on Sustainable Development, held in Johannesburg, South Africa in 2002. The project was made possible by the generous financial support of the Royal Government of the Netherlands.

– Source: *United Nations Information Services, Bangkok* –

FAO ASIA-PACIFIC FORESTRY CALENDAR

6-8 July 2005. Bangkok, Thailand. ***“nfps for All” Training Workshop***. Contact: S. Appanah, NFP Adviser (Asia-Pacific), FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4136; Fax: (662) 697-4445; E-mail: Simmathiri.Appanah@fao.org

26-28 July 2005. Kota Kinabalu, Sabah, Malaysia. ***Symposium on Tropical Rainforest Rehabilitation & Restoration – Existing Knowledge and Future Directions***. Co-organized by: FAO RAP, World Wide Fund for Nature (WWF), Yayasan Sabah and the Sabah Forestry Department. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org. More information about the symposium can be found on the following website: www.forestrehabsymposium.com

26-27 July 2005. Jakarta, Indonesia. ***RILSIM Training Course***. Contact: T. Enters, NFP Facilitator, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4328; Fax: (662) 697-4445; E-mail: Thomas.Enters@fao.org

3-4 August 2005. China. ***China Forest Dialogue Forum***. Contact: P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@fao.org

8-13 August 2005. Brisbane, Australia. ***XXII IUFRO World Congress***. Contact: The Congress Manager, PO Box 104, RBH Post Office QLD 4029, Australia; Tel: +61(0) 7 3854 1611; Fax: +61(0) 7 3854 1507; E-mail: iufro2005@ozaccomm.com.au

July/August 2005. Bangkok, Thailand. ***Elephant Care Manual Launching Workshop***. Contact: M. Kashio, Regional Forestry Resource Office, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4141; Fax: (662) 697-4445; E-mail: Masakazu.Kashio@fao.org

15-20 August 2005. Phnom Penh, Cambodia. ***Asean Senior Officials on Forestry (ASOF) meeting***. Contact: Asean Secretariat, 70A Jl. Sisingamangaraja, Jakarta 12110, Indonesia; Tel. (6221) 7262991, 7243372; Fax: (6221) 7398234, 7243504; E-mail: public@aseansec.org

31 August - 1 September 2005 (tentative). Thailand. ***APFC Executive Committee Meeting***. Contact: P. Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Phra Atit Road, Bangkok 10200, Thailand; Tel. (662) 697-4139; Fax: (662) 697-4445; E-mail: Patrick.Durst@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.

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