



FEATURING
FOREST NEWS

TIGER PAPER

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SURVEY AND STATUS OF THE CARNIVORE COMMUNITY IN NORTHEASTERN THAILAND

by Lon I. Grassman Jr., Kitti Kreetiyutanont, and Michael E. Tewes

Introduction

The carnivore community in tropical Asia is poorly represented in field research studies. One reason for this is that forest carnivores are secretive and are often difficult to observe. In response to this paucity of knowledge of carnivore ecology, the authors initiated a study in Phu Khieo Wildlife Sanctuary (PKWS), Thailand in 1998, utilizing radio-telemetry and fecal analysis as the main study methods. To date we have studied the spatial and feeding ecology of clouded leopard (*Neofelis nebulosa*), golden cat (*Catopuma temminckii*), marbled cat (*Pardofelis marmorata*), leopard cat (*Prionailurus bengalensis*), dhole (*Cuon alpinus*), binturong (*Arctictis binturong*), and yellow-throated marten (*Martes flavigula*).

In an attempt to broaden the scope of this study, we are currently undertaking a one-year camera-trapping survey. This relatively new wildlife research technique has allowed researchers to assess the status, distribution, relative abundance, and population of tropical species, which are difficult to observe (Karanth, 1995; Karanth and Nichols, 1998; Franklin *et al.*, 1999; Lynam *et al.*, 2001; Carbone *et al.*, 2001).

Study Site

Phu Khieo Wildlife Sanctuary (PKWS) is situated in Chayaphum Province (lat. 16°5'-16°35' N, long. 101°20'-101°55' E) in northeastern Thailand. Established in 1979, PKWS encompasses 1,560 km² of forests within the larger 4,550 km² Phetchabun Forest Complex. It is the largest protected area within the northeastern region and 1 of only 3 protected areas in Thailand that does not contain a permanent human settlement (Kekule, 2000).

PKWS is dominated by a mixed evergreen forested plateau at 800-1,100 m elevation. The topography consists primarily of forested hills

rising into mountains westward. The subtropical forest consists of dry and hill evergreen (82%), mixed deciduous (14%), and dry dipterocarp (4%) species (Kumsuk *et al.*, 1999). Pine forest (*Pinus kaysia*) is not uncommon between 800-900 m.

The study area is located in the central portion of the sanctuary. Encompassing approximately 110 km², the area consists of forested hills at 700-1,100 m elevation, three permanent reservoirs and 5 km² of grasslands. The main park road, smaller trails, the Phrom River and several permanent streams are included within the area.

Methods

The study area is being surveyed using 5 Trailmaster® (Lenexa, KS, USA) and 10 Camtrakker® (Winder, GA, USA) camera-traps. Active and passive-infrared camera traps consist of a small, self-winding camera and infrared sensor housed inside of a plastic box. The units trigger a photograph when an animal crosses in front of the infrared sensor. The units are placed on animal trails where tiger and other large carnivore signs occur. They are positioned approximately 40 cm above the ground so that both medium and large animals may be photographed (Lynam *et al.*, 2001). Slide 400 ISO film (36 exposures) is used for greater range at night with the camera flash. The camera-traps are configured to operate continuously so that both nocturnal and diurnal animals are photographed. Each exposure has the date and time printed.

We are using a grid system for camera placement where each 5 km² grid of the study area contains 2 camera-traps. This ensures consistent coverage throughout the study area. Camera-traps are operated for 1 month per grid, with periodic maintenance to change film and batteries as needed.



Sun bear



Sambar buck



Wild pig



Muntjak doe

(Photos: L. Grassman Jr., Feline Research Center, CKWRI, Texas A&M University-Kingsville)

Our objectives are to collect species presence/absence data in relation to habitat type, and to determine the relative abundance of cryptic carnivores, e.g. tiger (*Panthera tigris*) and clouded leopard. Camera-trap photographs will be counted as 'captures' and applied to different capture-recapture models (Karanth, 1995; Karanth and Nichols, 1998; Carbone *et al.*, 2001). Previous camera-trapping studies have rarely exceeded a sampling effort greater than 1,000 trap nights (Carbone *et al.*, 2001). However, this study will likely exceed 3,000 trap nights, thus increasing the statistical robustness of our relative abundance estimates.

Our camera-trapping efforts will conclude December 2002. The results from this study will be combined with other studies at a later date for the production of a carnivore community conservation plan.

Acknowledgments

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IDENTIFICATION AND DEVELOPMENT OF TRAITS FOR SUCCESSFUL REINTRODUCTION OF CAPTIVE BRED CHEER PHEASANT

by Zulfiqar Ahmad

Introduction

The cheer pheasant (*Catreus wallichii*) is one of the most endangered birds on the planet. It is restricted to small pockets in northern India and Pakistan, with a population estimated between 2,500-10,000 by IUCN. However, the number could be far less, as the bird has not been surveyed properly. In the late 1970s when the cheer pheasant was thought to be extinct in the wild, the World Pheasant Association (WPA) and the Government of Pakistan jointly launched a massive cheer reintroduction project, which is still in operation. The project failed drastically in terms of its output (i.e. number of released birds in the wild and their rate of survival thereafter). One of the many factors responsible for its failure was that the bird's behavior was never studied in captivity.

The aim of this paper is to pinpoint certain peculiar (physical and behavioral) features of the cheer pheasant which can be further conditioned to provide the bird with better chances of survival. The paper also establishes grounds for further or similar field studies.

Physiological Study

All species in their present form have undergone millions of years of the evolutionary process to fit in the existing ecosystems. By studying/observing the physical features of any species we gain insights about its habitat and behavior in the wild. In the case of the cheer pheasant, the following conclusions have been reached:

a. Wings: The cheer pheasant has a wing span of approximately 61 cm, which is used to support

about 2 kg of weight. By applying simple rules of aerodynamics, it can be established that the bird has to exert a tremendous amount of energy to fly. Such species of birds only use their wings under extreme conditions and usually prefer to fly down hills. They also conserve their body energy by taking short breaks between the rapid flapping of wings.

b. Legs: The cheer has extra strong legs compared to other species of pheasants having the same body weight. This attribute contributes to the dexterity of its footwork. It is a good runner, preferring to run up hill rather than to fly.

c. Plumage: The plumage of the cheer pheasant suggests that the bird does not belong to high altitude areas or thick forests like other species of pheasant. It belongs to a habitat where it can easily camouflage itself from predators. Partially vegetated foothills between the height of 900-1,600 m is considered an ideal habitat for the species.

Selective Traits

The cheer pheasant has some very peculiar traits; only those considered essential for development for subsequent reintroduction/introduction are discussed below:

a. Reactional behavior towards predators.

The cheer pheasant displays very unusual reactional behavior. According to the author's observations, amongst a number of pheasant species the cheer pheasant is usually the first one to observe and identify a predator. On observing a kite or stray dog/cat, etc., the cheer quickly adopts an alert posture. But subsequently it

allows the predator to come within close proximity without any sign of protective measures. However, on further reduction of distance, the cheer exhibits very swift and vigorous movements to escape the predator.

Some conservationists regards this as an element of tameness in the bird, but to it may be otherwise. This peculiar behavior is exhibited by a number of species of birds having a similar plumage (e.g. the partridge, see see, etc.). They rely on their camouflage until they are sure that the approaching predator has positively identified them, and then they fly off very swiftly.

b. Reluctance to fly.

The cheer pheasant has been observed to be very reluctant to fly. This particular behavior is due to three reasons. First, the physical limitations of the birds as discussed earlier. Secondly, because most cheer chicks are broody-reared, they are not encouraged to fly. The third reason is inherent behavior. The first and third reasons are interrelated.

c. Perching.

Throughout three years of closely monitoring the cheer pheasant in captivity, the author has never seen the bird perching on the branches provided for this purpose. This is probably because over the evolutionary process the cheer has adapted to a habitat without roosting facilities.

d. Hyperactivity on low-lit conditions.

In low-lit conditions, especially at dawn, dusk or cloudy weather, the cheer pheasant becomes extraordinarily active and noisy. This could be one of the causes of its low survival rate in the wild, as by doing this it catches the attention of predators.

e. Low resistance to common ailments.

Drawing from the author's personal observations, in captivity the cheer pheasant is more disease-prone than other pheasant species.

This is also true at the Dhodial pheasantry, which contains the world's largest concentration of cheer pheasants in captivity. Similarly, a large number of reintroduced cheer pheasants die of diseases in the wild. Most of the diseases are bacteria-borne and can be cured with the right antibiotics.

In the author's opinion the bird's low resistance is due to the stress induced by captive environments and the close proximity of humans. Likewise, the captive birds once released in the wild undergo stress resulting from the change in the environment. The most common disease suffered by the cheer pheasant in captivity is chronic respiratory disease (CRD).

f. Age and I.Q.

As with all fauna species, the level of intelligence of the cheer (i.e. the ability to find food and evade predators) is directly proportional to age. Cheer poults that are released in the wild have low survival rates. Although the poults have better adaptability to new environments, they lack the ability to escape predators.¹

Recommendations

The present stock of cheer pheasant in captivity possesses a fair degree of wildness or instinctive behavior. The zoology departments of Pakistan's universities and wildlife conservation agencies should thoroughly investigate and implement new strategies to make the reintroduction program a success.

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¹*In 2001, on the recommendation of the author, adult cheers were released from Dhodial Pheasantry and it is expected that better survival results will be achieved.*

THREATS TO THE EXISTENCE OF BROW-ANTLERED DEER (*Cervus eldi eldi*) IN KEIBUL LAMJAO NATIONAL PARK, MANIPUR, INDIA

by Pebam Rocky

Introduction

Keibul Lamjao National Park (24°27'-24°31' N and 93°53'-93°55' E) in Manipur State, India, is unique in being the only floating national park in the world. The park covers an area of 40 km² and occupies the southern part of Loktak Lake, which has an area of 289 km². It is an area of low-lying swamps comprising floating masses of vegetation soil mats known as phoomdi, submerged grassland, elevated ridges and sporadic hills forming islets. The altitude varies from 768 m above sea level at the water surface to 770 m above sea level at the ridges of the lake shore, to 792.5 m at the top of the hillocks.

The park is the only natural habitat of the most endangered and rarest of mammals, the brow-antlered deer (*Cervus eldi eldi* McLelland), which is endemic to the region and locally known as sangai. Two sub-species i.e. *C.e. thamin* and *C.e. siamensis* are found in Burma, Thailand, Laos, Cambodia and Vietnam. *Cervus eldi eldi* was reported to be completely extinct in 1951, but a survey conducted under the auspices of IUCN discovered a few survivors in 1953 in a small pocket of the floating park. Consequently, the government of India declared an area of about 52 km² in Keibul Lamjao as a wildlife sanctuary in 1954. Subsequent conservation measures, together with the declaration of the present 40 km² as a national park in 1977, have yielded satisfying results.

Adaptation of the deer to the park

Sangais are specially adapted to their characteristic floating habitat. The deer has divided hooves and the pasterns are greatly elongated, unlike those of the other two sub-species. The hooves are hard on the dorsal side

but tough and rubbery on the ventral side. When pressed on the phoomdi, the base can spread and flatten out. Thus, the deer can walk easily over the quaking surface. When walking on the phoomdi this deer moves in a peculiar movement so as not to sink or gets its limbs stuck in the soft phoom, which appears to be some form of dancing, hence the name 'dancing deer' given by E.P. Gee in 1959 when he was carrying out an aerial survey.

Vegetation in the park

The un-submerged area of the park is covered with a luxuriant growth of tall grasses and shrubs. A total of 237 species of plants (macrophytes) are found in the park, out of which 33 plants have been identified as food plants of sangai (Tombi and Syamananda, 1994). The most important ones are: *Zizania latifolia*, *Saccharum munja*, *Erianthus pucerus*, *Erianthus ravennae*, *Phragmites karka*, *Lersia hexandra*, *Carex* sp., etc. The deer consumes the young shoots, leaves and flowers of the plants.

Population dynamics of sangai

From Table 1 it is evident that there has been an increase in the population of the deer since the declaration of the national park. Although the population has increased more than tenfold in the last 25 years, 5 animals were lost from 1995 to 1997, possibly due to the lack of awareness among the neighboring villagers who used to poach deer for its meat. But with the creation of the Environmental Social Reformation and Sangai Protection Forum (ESRSPF), a local NGO, enough awareness campaigns have been organized and local villagers were involved in carrying out census operations under the initiative of the Forest Department and the

NGO. According to the forestry officials, the number of sangai had increased to 160 head in

2000.

Table 1: Population dynamics of sangai in the park

Year	Stags	Hinds	Fawns	Total
1975	5	6	3	14 ^a
1979	9	13	8	30 ^a
1984	20	25	6	51 ^a
1987	37	39	6	82 ^g
1991	42	54	10	106 ^g
1995	58	69	25	152 ^g
1997	58	72	17	147 ^g

^aAerial census, ^gGround census

Source: Department of Environment and Forests, Manipur

Threats to the existence of the deer in the park

There are numerous factors which give threat to the existence of deer in the park. Up to now there has been no boundary fencing of the park except for the installation of watch towers and boat canals for supervision in the park. Fishing is the main occupation of the surrounding villagers and some people took advantage of gaining entry to the park for fishing and used to also kill the deer. During March 1998, a pregnant sangai was found along with two fawns inside a trapper's net by some forest guards in the park. The young ones were saved but the mother died. The people of the surrounding villages also enter the park to collect vegetables and fodder for feeding the cattle and sometimes take advantage of the opportunity to kill the deer. Sending the livestock into the park to graze in the drier areas of the phoomdi is a common practice by the surrounding villagers. However, the grazing rate of the livestock is much greater than that of the deer. The cattle may also spread epidemic diseases to the deer. Many parts of the park are burned by the villagers, mainly during the dry season of January to March, to improve the growth of the vegetation and this practice often causes uncontrolled fires. Sometimes poaching of the deer is even carried out while the wild fires are burning (Tombi, 1992).

The main long term threat to the ecology and existence of the deer in the park is the

construction of a barrage at the outlet of the lake, commissioned in 1983, which has permanently raised the water level of the park about 768.5 m above mean sea level for the purpose of generating hydro-electricity. Before the hydro-electric project there used to be a seasonal cycle of the phoomdi sinking in the dry season and floating in the rainy season, which plays an important role in the nutrient cycle of the vegetation of the park and also maintains the thickness of the phoomdi. But after commissioning the barrage, the phoomdi has been floating and the nutrient cycle has been affected. The obstruction of the water at Ithai barrage promotes an increase in humic acid and CO₂ in the lake water, which has reduced the pH value. The change in the pH value affects the uptake of the mineral nutrients necessary for the growth of *phumdis* (Anon, 2002). Grasses which are not palatable to sangai have come up in place of the palatable ones. This will restrict the food plants of sangai to only a few. The areas of the park with thick floating phoomdi have decreased with the process of the thinning of the bottom surface of the soil mat. Areas of thinner phoomdi that cannot support the weight of the deer have increased. All of these have led to a decrease in the home range of the deer and the decrease in area signals a threat to the carrying capacity of the park to accommodate the increasing population. Thus, the present Loktak hydro-electric project could lead to the deterioration of the ecosystem of the entire Keibul Lamjao National Park, thereby

endangering the existence and survival of the brow-antlered deer.

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POTENTIALITY OF DURGASAGAR AS BIRD SANCTUARY AND ECO-PARK

by Muhammad Rafiqul Islam, Mohammad Ali and Md. Shafiul Islam

Introduction

Durgasagar is situated only 15 km southwest of Barisal Sadar, by the side of the Barisal-Banaripara Highway under the Babuganj Upazilla (Madhabpasha Mouza). The total area is 45.42 acres (water body 27.38 acres, land area 18.04 acres). Durgasagar is more than 200 years old and surrounded by a variety of vegetation. This dighi (large water body) is a resting place for winter migratory birds, which enhances the natural scenic beauty of Durgasagar.

Durgasagar has been neglected for a long time. The banks of the dighi have eroded year after year and the depth is gradually decreasing. Presently, the natural balance is threatened. The Bangladesh government reformed the dighi's water and land areas in the 1973-74 fiscal year but this project failed to attract visitors to Durgasagar Dighi due to the lack of a proper management program. Some negligence has been seen in tree plantations and in recovering the eroding ghats (staircases). Durgasagar is only a twenty minute drive from Barisal along a scenic road.

A sanctuary could be established for the winter migratory birds and the local avifauna which could serve as a good tourist attraction. To achieve this goal, the government has already erected a boundary wall with two entrance gates. A circular road around the banks of the dighi has also been completed and construction of a rest house in progress. There is a good possibility of transforming Durgasagar into a eco-park.

Recommendations

The following recommendations are made regarding the conservation of wildlife and creating facilities for eco-tourism in the Durgasagar:

- C a massive afforestation program should be undertaken;
- C people should be properly educated about the serious consequences of environmental degradation as well as the benefits of conservation of wildlife;
- C international standard training should be given to a group who have the prerequisite qualifications and are eager to conserve nature for the management of Durgasagar Eco-Park.
- C stringent measures should be taken against poachers.

Conclusion

If Durgasagar Eco-Park can be established it will create a prominent tourist spot along the channel-canal-riverine southern Bengal and may create job opportunities, help support small trades and handicrafts, and uplift the general socio-economic condition of the local people. The eco-park will also enhance the natural beauty of this locality.

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Table 1: Some Avifauna of Durgasagar

Migratory Birds		
Family	Zoological Name	Status
Anatidae	<i>Dendrocygna javanica</i>	LM
	<i>Dendrocygna bicolor</i>	UC
Phalacrocoracidae	<i>Phalacrocorax niger</i>	LM
Ardeidae	<i>Egretta garzetta</i>	LM
Local Birds		
Family	Zoological Name	Status
Picidae	<i>Dinopium benghalense</i>	VC
Dicruridae	<i>Dicrurus adsimilis</i>	VC
Sturnidae	<i>Sturnus contra</i>	VC
	<i>Acridotheres tristis</i>	VC
Pycnonotidae	<i>Pycnonotus cafer</i>	VC
Muscicapidae	<i>Turdodes striatus</i>	VC
	<i>Copsychus saularis</i>	VC
	<i>Orthotomus sutorius</i>	VC
	<i>Pellorneum ruficeps</i>	UC
Accipitridae	<i>Haliastur indus</i>	C
	<i>Milvus migrans</i>	UC
Corvidae	<i>Dendrocitta vagabunda</i>	VC
	<i>Corvus splendens</i>	VC
	<i>Corvus macrorhynchus</i>	VC

Note: VC: very common; UC: uncommon; LM: local migratory

NEW MULTIMEDIA RESOURCE KIT: PARTICIPATORY 3-D MODELLING, GUIDING PRINCIPLES AND APPLICATIONS

By Giacomo Rambaldi and Jasmin Callosa-Tarr

ISBN: 971-8986-47-2

Publisher: ASEAN Regional Centre for Biodiversity Conservation (ARCBC), Los Baños, Laguna, Philippines. July 2002.

This publication (and the accompanying multimedia resource kit) is intended to assist researchers, project managers, Participatory Learning and Action (PLA) and GIS practitioners in enhancing the capacities of marginalised, isolated, and frequently natural resource-dependent, communities to deal with spatial data and to communicate with the “outside world” on a peer-to-peer basis.

Participatory 3-D models (P3DM) integrate people’s knowledge and conventional spatial information like contour lines, to produce stand-alone scale relief models that have proved to be user-friendly and relatively accurate data storage and analysis devices, and excellent media, easing communication between local stakeholders and external agencies.

P3DM is a relatively new facilitation method used in processes related mainly to resource use and tenure and has been conceived to support collaborative initiatives aimed at increasing public participation in problem analysis and decision-making. The method is generally used within projects or initiatives designed to address spatial issues related to the territory. P3DM offers the opportunity to produce relatively precise geo-referenced and scaled qualitative and quantitative data, adding substantial value and communication power to local knowledge.

The resource book provides hands-on guidelines on how to organize and implement a P3DM exercise. In addition, it includes insights on adult learning and spatial cognition, on the history of relief modelling and the analysis of P3DM experiences in the Philippines, Vietnam and Thailand over a period of 15 years.

The Companion CD-ROM contains the following:

- C Resource Book: *Participatory 3-D Modelling: Guiding Principles and Applications*, July 2002; ISBN:971-8986-47-2. [Adobe Portable Document Format (PDF)].
- C Magazine: *GIS and the Fingertips*; ASEAN Biodiversity Vol.2, NO.1, March 2002; ISSN:1655-0471 9 [PDF format].
- C Manual: *Manual on Participatory 3-D Modelling for Natural Resource Management*, September 2000. ISBN:971-8986-21-9 [PDF format].
- C Movie: “*Giving Voice to the Unspoken*”: a 20-minute video production showing the hands-on aspects of 3-D modelling. (MPEG format). The film supports all practical aspects of P3DM described in the book and documents in detail an actual exercise conducted within a protected area in Vietnam.
- C *P3DM Tools*: A selection of ready-to-use scaling and referencing tools. [JPG and PDF formats].
- C *Image Collection*: carefully selected images of coding means (pins and yarns) to simplify the preparation of accurate legends for 3-D models. [JPG format].

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DIVERSITY OF BIRDS IN THE GIANT'S TANK, WANNI REGION, SRI LANKA

by S. Wijeyamohan, T. Baheerathi, S. Luxmy, K. Prabha, T.M. Sajithran, S. Sivagini, V. Sivagnanam,
S. Theeban, Chaminda Wijesundara and Charles Santiapillai

The Giant's Tank is one of the largest irrigation reservoirs in Sri Lanka. It is situated near Murunkan on the northwestern coastal plain at about 60 km west of Medawachchi along the A14 trunk road to Mannar in the Wanni region. A marvel of ancient irrigation works dating back to the 12th century, it lies on one of the driest areas of the island, on the right bank of Aruvi Aru, from which it receives water along an ancient canal via the anicut at Parayanalankulam located about 43 km west of Medawachchi. The embankment or bund was about 90 m broad at the base and originally extended for 24 km (Cave, 1910). Today, however, it extends for only about 8.8 km, and curves at both ends to form the basin for the water it impounds (Brohier, 1965). Despite its name, the Giant's Tank is rather shallow, the maximum depth being only 3.2 m (IUCN, 1990). It has an area of 1,840 ha and a catchment of 9,840 ha. The Giant's Tank irrigates about 12,000 ha of paddy land and its waters feed 122 small tanks. The climate is monsoonal with a mean annual temperature of 27.8°C and a mean annual rainfall of 931 mm.

According to Brohier (1965), Giant's Tank owes its name to local lore, which referred to the work on the right bank of Aruvi Aru as *Sodayan Kattu Kerai*, meaning "the giant-built embankment," which the Dutch named as Reussen-tanke, and the British translated into English as "Giant's tank," thereby perpetuating the legend. When the Dutch Governor Van Imhoff visited the Giant's Tank in 1739, the tank bed was not only dry, but was inhabited by people from four or five villages. It was only in 1879, when the British restored the ancient channel, that the tank began to fill with water from Aruvi Aru (Keble, 1940). According to Phillips (1937), the Giant's Tank itself was declared a sanctuary for the protection of birds as far back as the 1930s,

but the Giant's Tank Sanctuary, which includes the forested areas adjacent to the tank to the north and east and covers an area of 3,944 ha, was declared much later in 1954 under the Fauna and Flora Protection Ordinance, and has been under the management of the Department of Wildlife Conservation (Scott, 1989).

The Giant's Tank is also an important reservoir for freshwater fishery. According to Scott (1989), commercially important fishes such as *Labeo dussumieri*, *Puntius darana*, *Puntius dorsalis* (F. Cyprinidae), *Ompok bimaculatus* (F. Syluridae), *Heteropneustes fossilis* (F. Heteropneustidae), *Oreochromis mossambicus* (F. Cichlidae) and *Ophicephalus striatus* (F. Channidae) are sustainably harvested by the local fishermen. Fish productivity is estimated at about 200 metric tons per year (Scott, 1989). It is the density and diversity of fish that is responsible for the numerical abundance of water birds such as cormorants, herons, egrets and pelicans in the tank. Furthermore, the large open stretch of water and vegetation consisting of reed grasses and water lilies support an incredible number of ducks, grebes and coots, while the floating vegetation provides an ideal habitat for the Pheasant-tailed jacana and the White-breasted waterhen. According to Scott (1989), an estimated 11,000 ducks were recorded from the Giant's Tank in the past, which included 1,000 Cotton Pygmy-Geese (*Nettapus coromandelianus*), which is another resident species. The Comb Duck (*Sarkidiornis melanotos*) has also been recorded from the Giant's Tank (Scott, 1989), but today is thought to be extinct in Sri Lanka (Harrison & Worfolk, 1999).

Despite the richness and diversity of the avifauna in the Giant's Tank, the reservoir has not been subject to any detailed study in the

recent past. This is largely because of the two-decade long ethnic conflict on the island during which many areas, especially in the north and east, were inaccessible to the public. Furthermore, the Government also banned the use of binoculars and cameras in conflict areas, and this virtually prevented any observations being carried out on birds in the field. But as a result of the cessation of hostilities, parts of the country that were hitherto closed to the public have been opened up. It was the return of near normal conditions in the Wanni area that enabled the authors (a joint team of biologists from the Vavuniya Campus of the University of Jaffna and the University of Peradeniya) to make a preliminary assessment of the status of the avifauna in the Giant's Tank in June 2002. This brief study revealed a minimum of 33 resident and one migrant species, the Spot-billed Duck (*Anas poecilorhyncha*), which is a rare

winter visitor that seems to have overstayed. In addition, Phillips (1937) had recorded the Watercock (*Gallicrex cinerea*), Common Moorhen or Indian Waterhen (*Gallinula chloropus*) and the Night Heron (*Nycticorax nycticorax*), while Scott (1989) mentions the Cotton Pygmy-Goose (*Nettapus coromandelianus*), which brings the total number of resident birds recorded to 37. Thus, the Giant's Tank supports about 16% of the 233 species of birds resident in Sri Lanka. Furthermore, given that there are at least some 50 resident species associated with wetlands in Sri Lanka, the Giant's Tank is home to about 74% of them. These observations alone highlight the significance, both locally as well as globally, of the Giant's Tank as an important refuge for wetland birds.

Table 1: Diversity of birds in the Giant's Tank, Sri Lanka

Order	Family	Common Name	Scientific Name	Status
Podicipediformes	Podicipedidae	Little Grebe	<i>Tachybaptus ruficollis</i>	R
Pelecaniformes	Pelecanidae	Spot-billed Pelican	<i>Pelecanus philippensis</i>	R
	Phalacrocoracidae	Little Cormorant	<i>Phalacrocorax niger</i>	R
		Southern Cormorant	<i>P. carbo</i>	R
		Indian Shag	<i>P. fuscicollis</i>	R
	Anhingidae	Indian Darter	<i>Anhinga melanogaster</i>	R
Ciconiiformes	Ardeidae	Eastern Purple Heron	<i>Ardea purpurea</i>	R
		Little Egret	<i>Egretta garzetta</i>	R
		Median Egret	<i>Mesophoyx intermedia</i>	R
		Eastern Large Egret	<i>Casmerodius albus</i>	R
		Pond Heron	<i>Ardeola grayii</i>	R
		Eastern Grey Heron	<i>Ardea cinerea</i>	R
		Black Bittern	<i>Ixobrychus flavicollis</i>	R
	Ciconiidae	Painted Stork	<i>Mycteria leucocephala</i>	R
		Open-bill	<i>Anastomus oscitans</i>	R
	Threskiornithidae	White Ibis	<i>Threskiornis melanocephalus</i>	R
		Spoonbill	<i>Platalea leucorodia</i>	R
Anseriformes	Anatidae	Whistling Teal	<i>Dendrocygna javanica</i>	R
		Spot-billed Duck	<i>Anas poecilorhyncha</i>	M
Falconiformes	Accipitridae	Brahminy Kite	<i>Haliastur indus</i>	R
Gruiformes	Rallidae	White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	R
		Common Coot	<i>Fulica atra</i>	R
		Purple Coot	<i>Porphyrio porphyrio</i>	R
Charadriiformes	Jacanidae	Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	R
	Recurvirostridae	Black-winged Stilt	<i>Himantopus himantopus</i>	R
	Charadriidae	Red-wattled Lapwing	<i>Vanellus indicus</i>	R
	Laridae	Indian Whiskered Tern	<i>Chlidonias hybridus</i>	R
		Gull-billed Tern	<i>Gelochelidon nilotica</i>	R

Coraciiformes	Alcedinidae	Common Kingfisher	<i>Alcedo atthis</i>	R
		White-breasted Kingfisher	<i>Halcyon smyrnensis</i>	R
		Indian Pied Kingfisher	<i>Ceryle rudis</i>	R
Passeriformes	Corvidae	House Crow	<i>Corvus splendens</i>	R
	Sylviidae	Ceylon Fantail Warbler	<i>Cisticola juncidis</i>	R
	Dicruridae	Black Drongo	<i>Dicrurus macrocercus</i>	R

Common names based on Henry (1971); scientific names after Harrison & Worfolk (1999)
(R=resident species; M=migrant species)

The most numerically abundant species numbering more than 1,000 individuals are the Common Coot, Lesser Whistling Teal, Little Egret and Intermediate Egret. The next in abundance, numbering between 500 to 1,000 individuals are the Little Cormorant, Purple Coot, Pond Heron and Pheasant-tailed Jacana. Species such as the Eastern Large Egret, Eastern Grey Heron, Black-winged Stilt and the Spot-billed Pelican are estimated to number between 100-500 each. The most interesting find was the Spot-billed Duck, a rare winter visitor. There were at least 4 individuals that could be identified easily by their yellow-tipped black bills. Phillips (1937) pointed out that it was in Murunkan, near the Giant's Tank, that the first Common Coot (*Fulica atra*) was shot in 1924, and a mere thirteen years later the species had established itself in some numbers near Giant's Tank. Today the Common Coot is one of the most abundant species, numbering in the thousands in the Giant's Tank. This species appears to have spread gradually eastwards up to Vavuniya, where it has been observed in one of the large tanks in the city. Another curious feature is the absence of the Yellow-wattled Lapwing (*Vanellus malabaricus*) in the vicinity of the Giant's Tank, although it is common both to the north and south of the Sanctuary. A group of seven birds was observed feeding in a paddy field near the Parambukadanthan Kulam just north of Uyilankulam on the way to Madhu. The species has also been recorded along the road stretching from Murunkan and Silavathurai.

The European Union Wild Birds Directive (79/409/EEC) dictates that areas regularly supporting at least 1% of the global or biogeographic population of a species or subspecies of waterfowl, or areas that regularly support concentrations of greater than 20,000 birds, are internationally important. Sites that support 1% of the national population of a

species are deemed nationally important (Bibby *et al.*, 2000). Giant's Tank, by the sheer variety and abundance of its birds, qualifies to be one of the most important sites for the conservation of birds in Sri Lanka. Although over-exploitation of natural resources is often linked to armed conflict (Shambaugh *et al.*, 2001), Giant's Tank appears to have survived intact largely because of its isolation and the virtual absence of tourists, both local and foreign. The Giant's Tank deserves special protection by the highest authority in the country to ensure that this incredible diversity is not destroyed through pollution, drainage, siltation and uncontrolled eco-tourism development.

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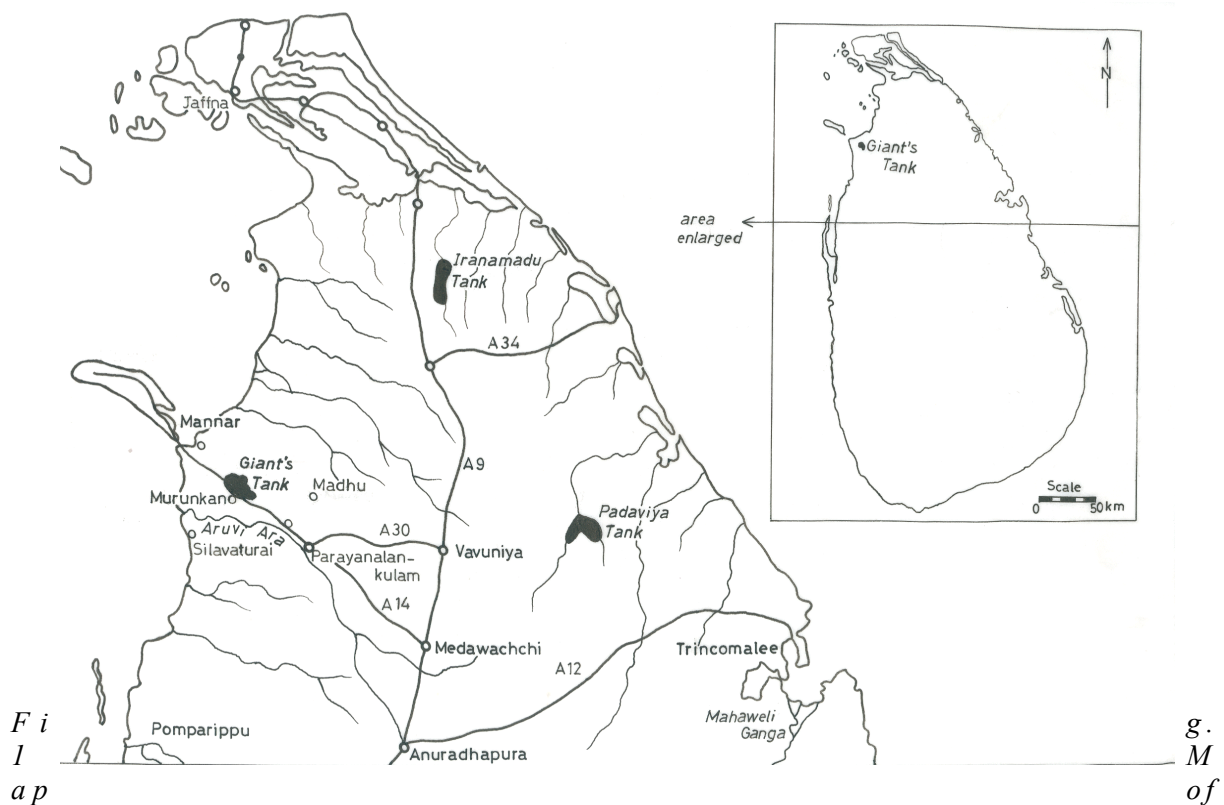
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of the northern part of Sri Lanka showing the location of the Giant's Tank along the A14 highway from Medawachchi to Mannar. In Sri Lanka, any man-made reservoir constructed to catch the water during the rainy season is referred to as a tank. (Map drawn by T.S.B. Alagoda, Department of Zoology, University of Peradeniya, Sri Lanka).

LESSER CATS OF NAMDAPHA NATIONAL PARK (TR), ARUNACHAL PRADESH, INDIA

by S.S. Chandiramani, A.K. Das and N. Singh

Introduction

Man's fascination with cats is born of a mixture of fear and admiration. All of the lesser cats are members of the same family Felidae. Cats are the foremost of all carnivores or beasts of prey as they stand supreme in their equipment of teeth and claws and also in their combination of grace, strength and agility. These characteristics apply not only to the large cats like the Royal Bengal tiger (*Panthera tigris tigris*) and common leopard (*Panthera pardus*), but also to the lesser cats such as leopard cat (*Felis bengalensis*), fishing cat (*Felis viverrina*), marbled cat (*Felis marmorata*), golden cat (*Felis temmincki*) and jungle cat (*Felis chaus*) which are found in Namdapha Tiger Reserve.

The smaller cats have proved to be far more elusive than the legendary movements of the tiger, and thus the group of small wild cats has not received as much attention as tigers or lions. Information about their status is very scanty, lacking even basic information about their existence (Gogate, 1997).

Literature on lesser cats

Although literature about lesser cats has been published in many journals, few references refer to the northeast and none specifically deal with Namdapha.

Namdapha National Park

The Namdapha Reserve Forest area was declared as Namdapha Wildlife Sanctuary in 1972. When Project Tiger came into operation in 1993, the area was declared a national park. An additional area of 177.425 km² was added to the park in 1986.

The park falls within the Indo-Malayan sub-region as per Dasman's classification of natural regions. The geological formation includes tertiary and quaternary sequences. The area is earthquake prone and the rivers and rivulets change their courses often. The altitude variation in the park ranges from 200 msl to 4,571 msl and is unique to this tiger reserve. Peninsular and alpine flora and fauna are found side by side. Only in Namdapha National Park are all four large cat species (i.e. Bengal tiger, leopard, clouded leopard and snow leopard) found. In addition, the only ape found in the northeast, i.e. hoolock gibbon, and the rare and endangered white-winged wood duck are also found in the park.

The remoteness and lack of human settlements keeps even the buffer zone of the park virgin. Grazing, fires and poaching activities are almost nil.

The vegetation can be broadly divided into the following types: tropical forest, sub-tropical forest, temperate forest, sub-alpine forest and alpine forest. Tropical and sub-tropical forest types are predominant.

The floral diversity is so high in Namdapha that no particular species of tree, herb or shrub can be said to dominate. Some of the common tree species are *Dipterocarpus macrocarpus*, *Terminalia myriocarpus*, *Toona ciliata*, *Altingia exelsa*, *Pinus merkusi*, etc. Many species of ferns, bamboos and medicinal plants are also found in Namdapha.

The faunal richness is evidenced by a large and diverse species complex. There are 96 mammal species, 400 avian species, 50 reptile species and 59 mollusc species recorded in the park. Besides 4 species of land molluscs new to India, there

are 5 species of fishes new to science, the only Indian salamander (*Tylototriton verrucosa*), a rare turtle (*Cyclemys mouhati*), a new species of flying squirrel named the Namdapha flying squirrel (*Biswamoyopterus biswasi*), and 14 species of beetles new to science.

Lesser cats of Namdapha National Park

Leopard cat (*Felis bengalensis*)



The leopard cat is about the size of a domestic cat but longer in the leg. Its color and markings give it the aspect of a miniature panther. The prevailing color of the body is yellowish above and white below, ornamented throughout with black or brownish spots. These animals are commonly seen in the lower region of the park. The distribution records of this cat records its occurrence from Kashmir and the Himalayas to Cape Comorine in Southeast Asia, and generally northwards to Manchuria and Korea (S.H. Prater). It is nocturnal in habit and seldom seen in the daytime. The diet includes small birds and animals. The favorite shelter is tree hollows. The animal is frequently sighted on the motor road between Miao and Deban and beyond.

Fishing Cat (*Felis viverrina*)



The present status of fishing cat in Arunachal Pradesh can be considered as rare (A.K. Chatterjee & A.K. Sen, 1983). The fishing cat is distinguished from the leopard cat by its much larger size and shorter tail, which is less than half the length of its head and body. This cat has short limbs and is rather stout in build. The body is covered with short, coarse earthy-grey fur, infused with brown. The body markings consist of a series of elongate spots arranged in more or less longitudinal rows. The lower parts of the body are spotted and the tail is distinctly ringed

with black.

The animal inhabits forests up to 5,000 ft. However, in Arunachal Pradesh this animal is reported from 250 msl to 1,500 msl. It is mostly found near streams, rivers and swampy areas. The best habitat in Namdapha is at Firmbase and Enbeong, but it has also been sighted along the Noa-Dehing river side. The main food item is fish, but it also preys on any small animals and birds.

Golden Cat (*Felis temmincki*)



The coat of this cat ranges from golden brown to dark brown, bright red or grey. There may be a more or less distinct pattern of grayish lines on the flanks and shoulders. Most conspicuous is a horizontal white or buff cheek stripe, sometimes edged with black. Running from below the eye to behind the gap on the inner side of the eye is a white stripe which bifurcates above and is continuous with a greyish stripe passing on to the crown. Its distribution is recorded from Nepal, Sikkim, Assam, China, Myanmar, etc. In Arunachal Pradesh it is recorded from 400 msl to 2,000 msl (A.K. Chatterjee & A.K. Sen, 1983). In Namdapha, the first author has seen this cat in the lower belt. Because of shifting cultivation and deforestation this cat is confined to protected areas only. The main prey animals are poultry, sheep, goats and small mammals and birds (S.H. Prater).

Marbled Cat (*Felis marmorata*)

The general pattern on the coat of this cat consists of strips on the crown, neck and back of

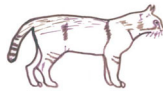


large and small blotches, making a so-called marbling on the flanks, and of spots on the underside of the limbs and on the tail. The marbled pattern on the flank is variable, even

among individuals inhabiting the same region. The tail is darker in tone and its pattern is obscurely defined. Though much smaller in size, the marbled cat resembles the clouded leopard in color and pattern so young clouded leopards are easily confused with the marbled cat. Its distribution is recorded from Nepal, Sikkim and Assam, extending to Myanmar and Malaysia. In Arunachal Pradesh it is recorded from between 250 to 2,000 msl (A.K. Chatterjee & A.K. Sen, 1983). This cat is arboreal in habitat. Local information and sightings of this cat are very rare; however, the first author saw one in Namdapha at the 34th mile and some forest officials have also seen it in the park. The main food items are rats, squirrels, birds, etc. (S.H. Prater).

Jungle Cat (*Felis chaus*)

With its long legs and comparatively short tail, the jungle cat has a very distinctive appearance. Its pale green eyes give it a coldly cruel



expression. The color of the fur varies from sandy grey to yellowish grey. The tail is ringed with black towards the end and has a black tip. The paws are a pale yellow with black or sooty brown underneath. The ears are reddish, ending in a small pencil of black hairs. The underside of the body is paler. The distribution of this cat ranges from North Africa to Asia, Ceylon, Myanmar and Indo-China. In Namdapha it is common. It preys on small mammals, birds and poultry (S.H. Prater, 1980).

Discussion

The wild lesser cats are magnificent members of the family Felidae which are now on the verge of extinction due to deforestation and hunting. The present numbers in Namdapha National Park are safe only inside small pockets of protected areas where the staff carries out vigorous patrolling. The habitat is in urgent need of preservation.

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TIGER PREDATION OF RHINO CALVES AT KAZIRANGA NATIONAL PARK, ASSAM

by Bibhab Kumar Talukdar

Kaziranga National Park in Assam, covering an area of 473.71 km², lies between latitudes 26°30' and 26°45' N and longitudes 93°40' and 93°50' E. Kaziranga was notified first as a reserved forest in 1908, with an area of 228.83 km², and later declared a game reserve in 1916, with an area of 277.65 km². In 1950, Kaziranga was declared a wildlife sanctuary and in 1974 it was finally upgraded to a national park with a total area of 429.93 km². Kaziranga National Park is one of the key areas for the conservation of the endangered Great Indian one-horned rhino (*Rhinoceros unicornis*), along with other threatened species such as the Royal Bengal tiger (*Panthera tigris*) and the Asian elephant (*Elephas maximus*). The current status of the

rhino in Kaziranga National Park and other rhino-bearing areas, along with the threats from poachers, has been described by Talukdar (2000).

There has been a series of discussions throughout the rhino's distribution range about threats to rhinos from poachers and habitat alterations, but information or literature related to carnivore predation on rhino is not available. Commonly, tigers are known for their predation on herbivores other than rhinos, but in Kaziranga National Park, the Royal Bengal tiger preyed upon 203 rhino calves between 1985-2000.

Table 1: Tiger predation of rhino in Kaziranga National Park

Year	Number of rhinos killed by tigers
1985	11
1986	14
1987	10
1988	18
1989	11
1990	12
1991	18
1992	14
1993	17
1994	12
1995	12
1996	11
1997	9
1998	11
1999	14
2000	9
Total	203

Kaziranga has four ranges, namely the western range known as Baguri, the central range known as Kohora, the eastern range known as Agaratoli and the Burapahar range. Rhino concentration has been found to be higher in Baguri, followed by Kohora, Agaratoli and Burapahar. Tiger predation on rhinos is more frequent in Baguri compared to Kohora, comparatively less in

Agaratoli and negligible in Burapahar. This is probably because there are less rhinos present in Agaratoli and Burapahar compared to Kohora and Baguri. The rhino census conducted in Kaziranga National Park in 1999 recorded 1,551 rhinos: 738 (47.55%) in the Baguri range, 687 (44.26%) in Kohora, 112 (7.22%) in Agaratoli and 14 (0.90%) in Burapahar.

Table 2: Range-wise tiger predation on rhinos in Kaziranga National Park

Range	Number of rhinos killed by tigers										
	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Baguri	5	8	7	12	7	9	10	8	7	3	6
Kohora	5	6	3	5	4	2	6	2	6	9	5
Agaratoli	1	0	0	1	0	0	2	4	3	0	1
Burapahar	0	0	0	0	0	1	0	0	1	0	0

Tiger is one of the dominant carnivores in Kaziranga National Park and its population is stated to be 80 as per the tiger census carried out

in 1997. The tiger population in the park estimated in previous years along with its possible prey species is given in Table 3.

Table 3: Estimates of tiger and its possible prey population in Kaziranga National Park

Year	Tiger	Swamp deer	Hog deer	Sambar	Rhino	Wild buffalo	Wild boar
1966	20	213	1,311	120	366	471	155
1972	30	516	4,551	105	658	555	522
1978	40	697	6,855	215	939	610	733
1984	52	756	9,872	158	946	677	1,645
1991	50	635	2,911	55	1,129	1,090	555
1993	72	427	2,048	35	1,164	1,034	140
1999	80	398	5,045	58	1,552	1,192	431

The data revealed that the population of tiger is on the increase in Kaziranga, while the populations of its prey species, mainly three species of deer, are on the decrease, although marginal recovery of hog deer and sambar could

be observed in 1999. The deer population in Kaziranga received a severe blow during the high floods in 1988, especially the hog deer and sambar. The population of swamp deer has also followed the declining trend (Talukdar, 1999).

The same is the case with the wild boar, whose population was reduced by almost 60% between 1984 and 1991, mainly due to the floods in 1988. However, the population of wild boar decreased further in 1993, which recorded only 140 animals. It may be assumed that after the flood of 1988, tigers might have preyed more upon wild boar as the deer population had yet to recover and stabilize. Similarly, the floods of 1998 also resulted in the drowning of 39 rhinos, 7 elephants, 1 bear, over 600 hog deer, 23 wild buffalos, 15 sambar, 22 wild boar, 9 porcupines and other smaller mammals and reptiles. The flood havoc in Kaziranga National Park during 1998 was described earlier by Choudhury (1998).

The reason behind the predation of rhino calves by tiger is not yet fully known. But it is obvious that with the rhino being a herbivore the tiger has no problem preying upon it, especially the calves which may be easier to kill if separated from the mother rhino. Most of the rhino calves killed by tigers are below the age of 12 months. Many conservation workers are of the opinion that the rhino calf meat is a delicacy and that may be one of the reasons why the tiger targets it. The loss of 203 rhino calves to tiger predation over the past 16 years is a cause for concern, especially for an endangered species like *Rhinoceros unicornis*. However, there is little that park authorities can do in this matter. What they can do, however, is ensure that there are less casualties to herbivores in future floods in Kaziranga by creating more high lands within the national park and also allowing the smooth migration of herbivores from the low-lying areas to the hills of Karbi-Anglong, crossing the

national highway in the southern part of the

park.

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SOME BREEDING BIRDS OF THE KARNAPHULI RIVER MOUTH AND ITS ADJACENT AREAS IN CHITTAGONG, BANGLADESH

by Mohammed Abdul Hanna and M. Farid Ahsan

Introduction

Knowing the life history of a bird species and its various activities during breeding is very important because it helps us to protect the species from adverse conditions and to take necessary steps against its extinction from nature. For instance, the pink-headed duck (*Rhodonessa caryophyllacea*) has become extinct globally (once it was present in Bangladesh territory) from nature and common peafowl (*Pavo cristatus*) has recently been lost from nature in Bangladesh territory, although it is still well preserved in captivity in this country. Therefore, each country should have a list of its own breeding birds. That the breeding activities of many birds species help in controlling pest populations because of their requirements of extra energy for themselves and food for rearing their young is an added benefit.

Several researchers in different parts of Bangladesh have compiled breeding records along with the taxonomy of birds such as Sarker and Sarker (1987), Huda (1996), and Khan (2000) among others.

Other researchers have also recorded the breeding ecology of a single species of bird, e.g., Khan (1980): house sparrow, *Passer domesticus*; Bhuiyan and Khan (1981): population and breeding activities of pariah kite, *Milvus migrans*; Anon. (1995): ecology and breeding biology of the blue rock pigeon, *Columba livia intermedia*; Jaman *et al.* (1997): breeding biology of the black drongo, *Dicrurus adsimilis albirictus*; Anon. (1998): breeding biology of gray-headed myna, *Sturnus malabaricus*; Anon. (2000b): breeding biology and behavior of the pied myna, *Sturnus contra*; and Yesmin *et al.* (2001): breeding biology of pond heron, *Ardeola grayii*, in captivity. The present list will be able to add some information

on some birds of Bangladesh regarding breeding, and this in turn may help future workers.

Study Area

The study area comprised about 48.88 km² around the Karnaphuli river mouth in Chittagong, Bangladesh (22/12'30" and 22/20' N and 91/45' and 91/53' E). The area is one of the most scenic parts of the country with tangled hills and valleys, plain lands, agricultural fields, homestead vegetation, sand dunes, sea beach, mangrove forest patches and tidal flats under Chittagong district of Bangladesh. The north side of the study area is bounded by Bandar thana and Char Lakshya union of Karnaphuli thana. The south side is surrounded by the Bay of Bengal and Barasat union of Anwara thana. The eastern side is bounded by Jiri and Kasiais unions of Patiya thana and Chaturi union of Anwara thana; the western-side is covered by the Bay of Bengal. A detailed description of the study area may be found elsewhere (e.g. Ahsan and Hanna, in press). The Karnaphuli river flows through the middle of the study area and falls into the Bay of Bengal, executing a large S-shaped band along the Chittagong harbor.

Materials and Methods

While conducting a survey on the birds of the Karnaphuli river mouth and its adjacent areas in Chittagong, Bangladesh during July 1999 to June 2000, breeding records of some of the birds were noted. Birds were observed either with the aid of a pair of binoculars (Vixen 8-24X50 with multi-coated lens) or with the naked eye, depending on the distance of the objects. Breeding birds were identified by observing nests, the collection of nesting materials, while feeding their young or by identifying the fledglings. Some nests were collected and

materials were identified. Some eggs were measured using a divider and a single pan balance. For species identification, external morphology and other modes i.e., color, size, shape, flight, walk, habitat, call and sitting postures were considered; Ali (1996) and Ali and Ripley (1983) were referred to for confirmation. Photographs were taken using a Yashica SLR (FX-D) Camera with 42-75mm zoom and a 300-mm tele-zoom lens. The breeding birds have been listed following Ali (1996) and the comparisons of breeding records have been made with only the previously available published and unpublished works conducted in Bangladesh territory.

Results and Discussion

1. **Common Kingfisher**, *Alcedo atthis* (Linnaeus 1758) (Alcedinidae: Coraciiformes)
Breeding: Five nests observed in April (present study); breeding takes place from March to July (Sarker and Sarker, 1987); pre-monsoon (Khan, 1996). Nest shape: cup-like long hole, about 14cm long. Nesting place: bank slopes of ponds, canals and rivers. Khan (2000) mentioned that they build nests on the banks of ditches, canals, rivers and suitable even hills.

2. **White-breasted Kingfisher/White-throated Kingfisher**, *Halcyon smyrensis* (Linnaeus, 1758) (Dacelonidae: Coraciiformes)
Breeding: Breeding activities were observed from April to July. Anon. (1999) found one nest in March and another two in April. Nest shape: long, cup-like hole about 12-14cm long. Nesting place: on the banks of ponds, canals, rivers and on denuded hills. Khan (2000) mentioned that they build nests on the banks of ditches, canals, rivers and suitable even hills.

3. **Chestnut-headed Bee-eater**, *Merops leschenaulti* (Vieillot, 1817) (Meropidae: Coraciiformes)
Breeding: Present study confirmed that it breeds from February to June (cf. Sarker and Sarker, 1987; Harvey, 1990); April to July (Khan, 1996); and January to March (Huda, 1996). Nest shape: cup-like long hole (about 10-12 cm). Nesting place: open and denuded hill slopes and earthen banks.

4. **Blue-tailed Bee eater**, *Merops philippinus* (Linnaeus, 1766) (Meropidae: Coraciiformes)
Breeding: Present study confirms it breeds from March to June (cf. Sarker and Sarker, 1987 and Harvey 1990); April to July (Khan, 1996); January to March (Huda, 1996). Nest shape: cup-like long hole (about 10-12cm). Nesting place: open and denuded hill slopes.

5. **Rose-ringed Parakeet**, *Psittacula krameri* (Scopoli, 1769) (Psittacidae: Psittaciformes)
Breeding: Nesting recorded in February 2000 in the trunk holes of *Bombax ceiba*, *Albizia* sp. and *Delonix regia* trees at heights of about 40, 32 and 12 m respectively. Nests have also been found on *Albizia* sp., *Ficus benghalensis* and *Eucalyptus* sp. (Anon, 1992a). One nest was found in a natural hole in the wall of a residential building (Anon, 1999). Sarker and Sarker (1987) and Harvey (1990) recorded its breeding season as being from January to April. Another report indicated February to May, with the peak during March to April (Anon, 1992a). Both parents take part in guarding the eggs and nestlings alternately. Immature individuals were observed in the flock.

6. **Blue Rock Pigeon/Rock Pigeon**, *Columba livia* (Gmelin, 1789) (Columbidae: Columbiformes)
Breeding: During the present study nests were spotted in April and July, but they have also been recorded in March, April, August and November (Anon, 1999). Some reports say this species breeds from October to May (Anon, 1995); others say all the year round (Sarker and Sarker, 1987; Harvey, 1990; Anon, 1992a). Nest shape: plate-like structure. Nesting materials: dry straws, leaves, twigs, feathers, etc. (also small twigs, midribs of leaves, grasses, dry grasses, wires, etc. (Anon, 1999). Nesting place: ventilators of houses and buildings; chimneys of mills and factories, etc.; buildings; godowns; markets; temples; mosques; churches; tombs; railway stations and office buildings (Anon, 1995). This species never builds nests on trees (Anon, 1999).

7. **Spotted Dove**, *Streptopelia chinensis* (Scopoli, 1844) (Columbidae: Columbiformes)
Breeding: Two nests were observed, one in May and the other in July. Its breeding season has

been recorded by some as February to August (Anon, 2000a), but others have observed 15 nests during March to November, of which the maximum (6) nests were found in April (Anon, 1999). It is said to build its nest in the rainy season (Khan, 1996); November to December (Sarker and Sarker, 1987); July to March (Harvey, 1990); April to July (Anon, 1992b). Nesting materials: straws, leaves, coir, twigs, grasses, etc. (Anon, 1999; 2000a). Nesting place: *Phoenix sylvestris* and *Artocarpus heterophyllus* trees; *Tectona grandis*, *Delonix regia*, *Casurina equisetifolia* and *Acacia auriculariformes* (Anon, 1992b).

8. Ruddy Crake/Ruddy-breasted Crake, *Porzana fusca* (Linnaeus, 1766) (Rallidae: Gruiformes)

Breeding: Two chicks were seen along with parents during March and April under the bushes on the bank of a canal and a nest was possibly built there.

9. White-breasted Water Hen, *Amaurornis phoenicurus* (Pennant, 1769) (Rallidae: Gruiformes)

Breeding: Two nests were observed in May. It breeds in the rainy season (Khan, 1996); July and August (Harvey, 1990). Nesting place: under the reeds near the banks of ponds. Nesting materials: they build nests by water hyacinths out of small twigs, grasses, creepers, etc. (Khan, op. cit.).

10. Red-wattled Lapwing, *Vanellus indicus* (Boddaert, 1783)(Charadriidae: Ciconiiformes)

Breeding: Parent birds were observed guarding their young and chasing away a pariah dog during April 2000 in the sand dunes near the mangrove forest patch of Pitanga. They would sit near the nest and keep watch; the neck and head became enlarged. A nest was found in March and two in April on the roofs of buildings (Anon, 1999). Breeding season: between April and August (Anon, 2000a); from March to August (Sarker and Sarker, 1987; Harvey, 1990); rainy season (Khan, 1996).

11. Black Kite/Pariah Kite, *Milvus migrans govinda* (Sykes, 1832) (Accipitridae: Ciconiiformes)

Breeding: one nest found in March, another was

recorded in February (Anon, 1999). Breeding season: November to April (Sarker and Sarker, 1987); from the end of September to April (Bhuiyan and Khan, 1981). Nest shape: untidy plate-like structure. Observed nesting places: chimney of steel mill and *Bombax ceiba* tree; Bhuiyan and Khan (op. cit.) mentioned *Albizia* sp., *Samania saman*, *Mangifera indica*, *Syzygium* sp., *Ficus benghalensis*, and *Polyalthia longifolia* trees, water tanks, chimneys and mills. Also reported as nesting trees were *Caesalpinia pulcherrima*, *Anthocephalus chinensis*, *Albizia lebbbeck* and *Albizia procera* (Anon 1992a).

12. Pond Heron/India Pond Heron, *Ardeola grayii* (Sykes, 1832) (Ardeidae: Ciconiiformes)

Breeding: one nest found in March. Another reportedly found in April (Anon, 1999). Breeding season: from February to November (Yesmin *et al.*, 2001); spreading through the rainy season (Khan, 1996); from March to September (Harvey, 1990; Sarker and Sarker, 1987). Nesting materials: twigs, sticks, leaves, feathers, grasses, etc. (present study); small petioles of leaves, small branches of trees, etc. (Yesmin *et al.*, 2001). Nesting places: *Tamarindus indicus* and bamboo brakes.

13. Little Egret, *Egretta garzetta* (Linnaeus, 1758) (Ardeidae: Ciconiiformes)

Breeding: breeding activities were recorded from July to September. Nesting materials included twigs, sticks, leaves, feathers, grasses, etc. Nesting place: bamboo bush.

14. Night Heron/Black-crowned Night Heron, *Nycticorax nycticorax* (Linnaeus, 1758) (Ardeidae: Ciconiiformes)

Breeding: Observed young with adults in a colony on *Albizia* sp. trees during March to August. Harvey (1990) and Sarker and Sarker (1987) mentioned its breeding season as being from April to September, whereas Khan (1996) reported it as during the rainy season.

15. Black Drongo/King crow, *Dicrurus macrocercus* (Bechstein) (Corvidae: Passeriformes)

Breeding: Breeding activities: April to August (cf. Harvey, 1990); March and April (Anon,

2000s); March to June (Jaman *et al.*, 1997; Anon, 1992a); April to July (Anon, 1992b). Twenty-three nests were found from March to July, of which 13 were found in April (Anon, 1999). Nesting places: roadside *Casurina equisetifolia* trees above 6-7 m high (present study); *Albizia lebbeck*, *Casurina* sp., *Artocarpus chaplasha*, *Artocarpus heterophyllus* and *Acacia auriculariformes* (Anon, 1992b); *Albizia* sp., *Terminalia arjuna* and *Tectona grandis* (Anon, 1992a). Nest shape: small and cup-like. Nesting materials: needle leaf of *C. equisetifolia*, petioles of some legumes, dry leaves and grasses, etc.

16. House Crow, *Corvus splendens* (Vieillot, 1817) (Corvidae: Passeriformes)

Breeding: Breeding activities were recorded during December to July. Anon (1999) recorded four nests: two in December and one each in February and March. Khan (1996) also mentioned that they build nests mainly in the rainy season but also during December and January; January to July (Harvey, 1990); December to July (Anon, 1992a). Nest shape: plate-like, untidy structure. Nesting materials: dry twigs, pieces of rope, bits of dry grass, small pieces of brick, wires, etc. (present study); small sticks and twigs and large iron wire with a cup-like depression in center, lined with fibers (Anon, 1999); branches of trees, petioles of leaves, wires, cotton, fibers, coconut fibers, small pieces of paper, clothing, bamboo, hair, feathers, etc. (Anon, 1992a). Nesting places: *Cocos nucifera*, *Mesua ferra*, *Ficus benghalensis*, *Mangifera indica*, *Caesalpinia pulcherrima*, *Swietenia mahagoni*, *Pinus* sp., *Lagerstroemia* sp., *Barringtonia acutangula*, *Casurina equisetifolia*, *Acacia arabica*, etc. (Anon, 1992a) Nest height: 7.35 m (range 4-8 m, n=10 trees). Eggs: 3 to 4 (n=36 eggs), pale blue-green color, speckled and streaked with brown; Weight: 9.92 gm (range 8.5-10.75, n= 14 eggs); Length: 4.13 cm (range 3.5-3.7cm, n= 14 eggs); and Width: 3.46 cm (range 2.6-2.7cm, n=14 eggs). Incubation period: 18 to 24 days (present study); 16 days, range 10 to 20 days (Anon, 1992a).

17. Magpie Robin/Oriental Magpie, *Copsychus saularis* (Linnaeus, 1758) (Muscicapidae: Passeriformes) (National bird of

Bangladesh)

Breeding: one nest found in March. Anon. (1999) recorded 27 nests between March and July, maximum (11 nests) in March and minimum (3 nests) in May and July. Breeding season: summer (Khan, 1996); March to July (Harvey, 1990; Anon, 1992a); April to July (Anon, 1992b). Nesting materials: tiny twigs, leaves, leaves of Jhau tree, straws, feathers, nylon threads, coir, etc. (present study); grasses, leaves, twigs (Anon, 1999); dry long fibers of palm leaf, coir, feather, hairs, small pieces of paper and clothing, dry grass, small dry leaves, small pieces of bamboo, petioles of different leaves, etc. (Anon, 1992b). Nesting places: *Cocos nucifera* and holes of bamboo brake (present study); holes of trees, cracks of the buildings, pipes of goal posts or electricity pillars, etc. (Khan, 1996).

18. Grey-headed Myna/Chestnut-tailed Starling, *Sturnus malabaricus* (Gmelin 1789) (Sturnidae: Passeriformes)

Breeding: March to July. Also recorded from July to August (Anon, 2000a); February to July (Anon, 1998) and rainy season (Khan, 1996); March to June (Harvey, 1990). Anon. (1999) recorded two nests in April and two in May. Nesting places: roadside light posts, cracks of buildings, etc. Nesting materials: fine twigs, dry grasses, stems, roots, fibers, cobwebs, etc. Anon (1998) recorded dry leaves, polythene, chalk, cigarette buds, dry flowers, straw, small pieces of brick, sand, the outer surface of peanuts, small pieces of wood, coal, etc. Anon (1992a) noted petioles of leaves, small pieces of paper and clothing, pieces of polythene, cotton, feathers, etc.

NOTES: Possibly cobwebs were made by spiders in the nests, sand may have been carried in along with polythene and peanuts may have been brought to feed young, with shells left uneaten.

19. Pied Myna/Asian Pied Starling, *Sturnus contra* (Linnaeus, 1758) (Sturnidae: Passeriformes)

Breeding: Six nests were observed during April to June and on average 3-4 eggs were found in 5 nests in April. Anon (1999) found 65 nests from March to June, of which the maximum

number (37 nests) were noted in April. The breeding season has been mentioned by several workers (e.g. March to October: Sarker and Sarker, 1987, Harvey, 1990 and Anon, 2000a; March to August: Anon, 2000b; March to July: Anon, 1992a; April to July: Anon, 1992b; rainy season: Khan, 1996). Nest shape: roughly circular with lateral entrance. Nesting materials: untidy nest of twigs, grasses, stem fibers, polythene, paper, plastic, etc. (present study); fine twigs, fallen leaves, petioles, straws, feathers, polythene, ropes and rubbish (Anon, 2000a); twigs, fine dry grasses, leaves, cotton, cloth, feathers, polythene, paper, rope, mammal hair, cast-off snake skins, photographic negatives, etc. (Anon, 2000b). Nesting places: *Casuarina equisetifolia*, *Albizia* sp., *Mangifera indica*, electricity posts, etc. Anon (2000b) observed nests on *A. procera*, *C. equisetifolia*, *M. indica*, *Azadirachta indica*, *Artocarpus heterophyllus* and *Anthocephalus chinensis* trees. Anon (1992a) noted nests on *Ficus benghalensis*, *Albizia* sp., *M. indica*, *Sweitenia mahagoni*, *Cocos nucifera*, *Delonix regia*, *Barringtonia racemosa*, *Tectona grandis*, *Artocarpus heterophyllus*, *Anthocephalus chinensis*, *Havea brasiliensis*, *Acacia arabica*, *Syzygium cumini* and electricity posts.

20. Common Myna, *Acridotheres tristis* (Linnaeus, 1766) (Sturnidae: Passeriformes)
Breeding: Breeding activities were observed from April to August. Breeding has also been recorded from April to July (Anon, 1992b); the rainy season (Khan, 1996); February to July (Harvey, 1990) and March to June (Anon, 1992a). Anon (1999) found 24 nests during March to July, with the maximum number (10 nests) seen in April and the minimum (1) in July. Nesting materials: tiny twigs, coir, leaves, straw, feathers, etc. Nesting places: *Cocos nucifera* and roadside lamp posts (present study); *Albizia lebbeck*, *Casuarina* sp., *Borassus flabillifer*, *Artocarpus heterophyllus*, *Anthocephalus chinensis*, *Tectona grandis*, cornices of buildings and tin shades (Anon, 1992b).

21. Jungle Myna, *Acridotheres fuscus* (Wagler, 1827) (Sturnidae: Passeriformes)
Breeding: One nest observed in the hollow trunk of a Narikel palm (*Cocos nucifera*) in April.

Sarker and Sarker (1987) reported its breeding season as from February to July; Khan (1996) mentioned the rainy season; Harvey (1990) cited March to July and Anon (1992a) reported February to August.

22. Red-vented Bulbul, *Pycnonotus cafer* (Linnaeus, 1766) (Pycnonotidae: Passeriformes)
Breeding: one nest observed in March. Anon (1999) found 33 nests from March to July, with maximum number (15 nests) in April and minimum (2 nests) in July. Its breeding season reportedly ranges from March to August (Anon, 2000a; Sarker and Sarker, 1987); March to May (Anon, 1992a); April to July (Anon, 1992b) and January to August (Harvey, 1990). Nest shape: a cup-like structure made with dry rachis, leaves, feathers, etc. (present study); dry long fibers of palm leaf, coir, cotton, small pieces of paper and clothing, small petioles of dry leaves, etc. (Anon, 1992a). Nesting places: *Polyalthia longifolia* about 4m high from the ground (present study); *Casuarina* sp., *Areca catechu*, *Borassus flabillifer*, *Tectona grandis*, *Delonix regia* and shrubs (Anon, 1992b). Eggs: 3 (present study). Khan (1996) reported 2-4; Color: pinkish white, with profuse purplish-brown or claret colored blotches. Weight: 9.75 gm (9.6-10gm, n=3 eggs).

23. Tailor Bird/Common Tailor Bird, *Orthotomus sutorius* (Pennant, 1769) (Silvidae: Passeriformes)
Breeding: One nest observed in April. Anon. (1999) observed eight nests during March to July - with the maximum number (4 nests) in March, two in April and one each in May and July. Breeding: June to August (Anon, 1992a); April to August (Harvey, 1990); April to September (Sarker and Sarker, 1987). Nest shape is cup-like; Nesting materials: gathered threads, coir, dry fine grasses, fine fibers of coir/cobwebs. Khan (2000) reported jute fibers, hairs, cobwebs, fine creepers, threads, fine dry grasses, cotton, small pieces of cloth, wool, feathers, etc. Anon (1992a) noted coir, cotton, wool, etc.

24. House Sparrow, *Passer domesticus* (Linnaeus, 1758) (Passeridae: Passeriformes)
Breeding: breeding activities observed from mid-January to July. Anon. (1999) recorded 15

nests during March to May with maximum number (9 nests) in March and minimum (1) in May. Breeding season: February to October (Harvey, 1990; Sarker and Sarker, 1987). Khan (1980) reported two distinct breeding seasons- one from February to June and another from September to October, with peak breeding activities between March and May. Rahman and Husain (1981) also mentioned two breeding periods: one from January to June and the other from August to October. Nesting materials: straws, leaves, feathers, pieces of rope, twigs, etc. Nesting places: houses, buildings, electricity posts, etc.

25. **Baya weaver/Baya.** *Ploceus philippinus* (Linnaeus, 1766) (Passeridae: Passeriformes) Breeding: mid-February to November (present study); March to October (Sarker and Sarker, 1987); summer and winter (Khan, 1996). Nest shape: long, with two holes beneath. Nesting places: *Borassus flabillifer* and *Cocos nucifera* trees. Khan (1996) noted that they build nests mainly on *C. nucifera*, *Phoenix sylvestris* and *B. flabillifer* trees, but when these plants are not available they build nests on *Ficus benghalensis*, *Ficus religiosa*, *Mangifera indica*, *Syzygium cumini*, *Artocarpus heterophyllus*, *Albizia* sp., *Tamarindus indicus*, *Areca catechu* and *Casurina equisetifolia* trees.

Conclusion

The breeding season of birds mostly depends on the availability of mates, proper food and shelter. Ecological differences of habitats also influence the breeding season, which differs from area to area, as has been seen from the discussion. The breeding season of most of the reported bird species of the area is closely related to the flowering and fruiting season (i.e. March to August). Knowing preferred nesting places of birds may be a useful tool in formulating conservation strategies for the bird species of an area.

One migratory species, the Pacific Golden Plover (*Pulialis dominica*) was seen with its breeding plumage in December, but we could not confirm whether it breeds here or not. We intend to investigate whether any migratory birds use this area as their breeding grounds or

not.

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Common roosting site at Mahrangarh Fort (Photo: Chhangani)

ECOLOGY OF VULTURES OF DIFFERENT SPECIES IN AND AROUND JODHPUR (RAJASTHAN) INDIA

by Anil Kumar Chhangani

Introduction

The Indian region is incredibly rich in bird life. Over 1,200 of the world's 8,650 species of birds are found in this region (Grewal, 1995). In India, there are eight species of the Old World vultures found in different geographical regions (Ali and Ripley, 1987; Grewal, 1995; Kazmierozak, 2000), including: King vulture (*Sarcogyps calvus*), Cinereous vulture (*Aegypius monachus*), Egyptian vulture (*Neophron percnopterus*), Lammergeier (*Gypaetus barbatus*), Eurasian griffon (*Gyps fulvus*), and Himalayan griffon (*Gyps bengalensis*). Of these eight species, two species viz. Lammergeier and Himalayan griffon have not been observed in and around Jodhpur, while the remaining six species have been observed there.

Most vultures feed on carcasses. They do not attack men or livestock. Usually vultures obtain

food from carnivore kills in the forests, meat at slaughterhouses and carcass dumping grounds of municipal corporations. Vultures are the most eco-friendly birds. They help us save our planet from infectious diseases by feeding upon dead animals even during natural disasters like floods, droughts, famines and epidemics. It is now claimed that they have become endemic to some parts of India but their ecology, population dynamics, seasonal migration, causes of population decline, etc. are not known.

The author has been observing, recording and documenting vultures in and around Jodhpur over an area of about 150 km² since 1995 while studying Hanuman langurs in the wild. Incidentally, langurs share the same hillocks and cliffs where vultures nest, rest and breed. The author has recorded a large number of vulture-juvenile langur play episodes in the wild. Interestingly, vultures never attack langurs and

conversely langur infants and juveniles never disturb the vulture nests, eggs and hatchlings. These efforts have generated preliminary data on breeding, nesting, feeding, roosting, inter-species behavior, seasonal migration, etc. of vultures in and around Jodhpur.

Materials and Methods

Information about nesting sites, demographic data, predation, interaction among vultures and seasonal migration data in and around Jodhpur (altitude 240 m MCL, latitude 26°18' N and longitude 73°08' E) was collected by the author

since 1997. Observations were recorded by scan and Ad libitum sampling (Altmann, 1974). Equipment included binoculars, cameras and video cameras.

Information on vulture ecology, feeding sites, the total number of carcasses that are left at dumping sites, drinking, bathing and community feeding by birds and other animals on carcasses along with vultures were collected (Chhangani and Mohnot, 2001). Information was also collected on the history of carcasses and a detailed inventory made of the dead animal species available to vultures.

Common feeding site of vultures at dumping ground (Photo: Chhangani)



Results

Feeding

In the vulture census of 2000, a total number of 690 vultures of six species (*Sarcogyps calvus*, *Aegypius monachus*, *Neophron percnopterus*, *Gyps fulvus*, *Gyps indicus* and *Gyps bengalensis*) were counted in and around Jodhpur. All six species of vultures along with other birds and

mammals were seen feeding at the same site (Municipal Corporation's dead animal dumping ground). This is the only feeding site for the vulture population of Jodhpur. On an average, 8-10 carcasses are dumped every day at the dumping site. Eighty percent of the carcasses

were of cows, 10% buffalos, 4% goats, 2% donkeys, 2% dogs and the remaining 2% were of camels, horses, etc. More than 70% of the carcasses contain 10-20 kg of different grades of plastic and parchment paper in the stomachs, particularly of cows. Birds observed commonly feeding at the dumping site along with vultures were the Common raven (*Corvus corax*), House crow (*Corvus splendens*), Cattle egret (*Bubulcus ibis*), White ibis (*Threskiornis aethiopica*), Drongo (*Dicurus adsimilis*), Green bee-eaters (*Merops orientalis orientalis*), Rosy pastor (*Sturnus roseus*), etc. along with mammals such as feral dogs (*Canis familiaris*) and jackals (*Canis aureus*).

Nesting

Out of the six vulture species present, four species, i.e. Long-billed vulture, White-backed vulture, King vulture and Scavenger vulture, breed in and around Jodhpur. The Long-billed vulture nests in the clefts of rocks in and around Jodhpur city, while the other three species nested in trees. A total of 92 nest of Long-billed vultures (all with a single egg) were recorded during the period October 1999-April 2000 at 10 different nesting sites.



Vulture chick (Photo: Chhangani)

Table 1: Feeding, nesting and roosting sites of Long-billed vulture

No.	Location	Feeding Site	Nesting Site (no. of nests)	Roosting Site
1.	Bariganga	No	Yes (2)	No
2.	Nimba-Nimbri	No	Yes (2)	No
3.	Shiphouse Hills	No	Yes (9)	No
4.	Fort	No	Yes (18)	Yes
5.	Masuria Hills	No	Yes (13)	Yes
6.	Bhembharak	No	Yes (4)	No
7.	Sidhnath Hills	No	Yes (5)	No
8.	Golasni Hills	No	Yes (6)	No
9.	Chopasni Hills	No	Yes (11)	No
10.	Arna	Yes	Yes (22)	Yes
Total		1	10 (92)	3

Out of the above 10 nesting sites, Fort, Shiphouse Hills and Masuria Hills are well within the city area with human settlements, whereas the remaining seven nesting sites are in the outskirts of the city.

Roosting

Aside from nesting pairs, all other vultures of all species use two main common roosting sites. Of these, Fort is within the city wall and is at an average height of 60-80 m from the ground. The other site, Arna, is 20 km southwest of Jodhpur city, with the roosting site about 45-55 m from the ground. These are on very steep rocky slopes which give protection from predators. Sixty percent of the total Jodhpur vulture population roosts at Fort and the remaining 40% roosts at Arna, Masuria Hills and a few other nesting sites. Fort is better protected from predators than Arna.

Predation

Predators that prey on vulture eggs, chicks, juveniles and adults were observed at the nesting and feeding sites. Out of a total 92 eggs, one was eaten by a jackal and one was probably broken by a crow. Five chicks were killed, one by a jackal, one by a jungle cat, one by an unknown animal and two that were thrown from nests by other vultures of the same species during intra-species competition to occupy the nests. All four juveniles were observed to be killed by dogs. Two had fallen on the road while taking their first flights and were caught by street dogs, and the other two, along with three adults, were killed by dogs at the feeding site.

Threats to the Vulture Population

Out of the six species of vultures found around Jodhpur, four are listed in the IUCN Red List (2000). Results and observations of the present study suggest that the vulture population around Jodhpur faces the following threats:

1. Habitat loss: The intensive sandstone mining in and around Jodhpur has led to the loss of nesting sites. This leads to intra-species competition to occupy the limited number of nesting places available in the

cliffs.

The lack of proper, safe nesting sites has forced vultures to lay eggs at unsafe nesting sites where predators such as jackals and jungle cats can easily approach.

2. Food competition with other species, in particular with dogs.
3. The increasing number of dogs at the municipal corporation dumping ground has become a major threat to juvenile and adult vultures at the site.

Conservation Suggestions

1. Mining activities around the vulture nesting, feeding and roosting sites should be stopped immediately.
2. Feeding, nesting and roosting areas should be declared protected areas so that activities like tree cutting, grazing and human disturbance can be controlled.
3. An 8-10 ft high wall should be erected around the feeding site so that aggressive encounters between dogs and vultures can be avoided.
4. The excess population of dogs around nesting, roosting and feeding areas should be trapped and removed.

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Nesting site of vulture in rock cleft(Photo:Chhangani)

FOREST NEWS

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ASIA-PACIFIC FORESTRY COMMISSION CONSIDERS PRESSING REGIONAL FORESTRY ISSUES

Representatives from 27 Asia-Pacific countries and 11 international organizations met in Ulaanbaatar, Mongolia, 26-30 August 2002, to consider a range of possible actions to deal with critical issues facing the forestry sector in the region. The nineteenth session of the Asia-Pacific Forestry Commission (APFC) was organized jointly by FAO and the Mongolian Ministry of Nature and Environment. The 27 countries participating was the most ever for an APFC session, surpassing the previous high of 25 set two years ago in Australia.

His Excellency, Ulambayar Barsbold, Minister of Nature and Environment, Government of Mongolia, presided over the meeting as Chairperson. Bashir Ahmed Wani, Romeo T. Acosta and Livo Mele, heads of forestry agencies in Pakistan, Philippines and Vanuatu, respectively, served as Vice Chairpersons for the session.

The Ulaanbaatar meeting paralleled the World Summit on Sustainable Development (WSSD), held simultaneously in Johannesburg, South Africa, where the forest-related problems of biodiversity loss, deforestation and illegal logging were given prominent attention by world leaders. But while WSSD was oriented toward global action, forestry specialists in Mongolia focused on regional initiatives and cooperation among Asia-Pacific countries.

Discussion on agenda topics was active and

several useful decisions and recommendations were developed, particularly focusing on collaborative actions that APFC members – working together with FAO and other international organizations – could take to address pressing concerns. The following paragraphs summarize the conclusions and recommendations related to specific agenda topics discussed in the Ulaanbaatar meeting. Copies of the full report of the APFC session are available from the FAO Regional Office for Asia and the Pacific.

State of forestry in the region

Delegates cited several common threats to the region's forests, including continued deforestation and degradation of natural forests, competition from alternative land uses, poor timber harvesting practices, pests and diseases, forest fires and illegal logging. It was recognized that countries were tackling these problems through a variety of measures, but were sometimes constrained by the lack of skilled staff, budgetary resources, appropriate technology and political will.

The Commission noted the trend toward greater appreciation of the environmental, social and cultural benefits of forests in influencing forest management decisions. This is reflected in policy shifts in several countries away from timber production and toward greater protection of natural forests, increased attention to the conservation of biodiversity, a focus on the

linkages between forests and water, institutional restructuring of government natural resources agencies, enhanced public participation in conservation efforts, and a continued expansion in the number and area of protected areas.

Delegates emphasized the roles of forest plantations and trees outside forests in partially satisfying the growing demands for wood and fiber, and shifting pressure from natural forests. While appreciating that Asia and the Pacific already leads the world in plantation development, the Commission noted opportunities for more efficient use of incentives and reforestation funds, improved practices and technologies, and greater investment by the private sector in plantation establishment.

The rapid growth of forest-based ecotourism was highlighted by delegates from several countries. Ecotourism was recognized as offering potential new livelihood opportunities for rural communities, but new skills and reorientation of forest development staff are required to develop these opportunities successfully. Careful management is also needed to avoid damage to fragile ecosystems.

Many countries reported on initiatives to accelerate decentralization and devolution of forest management and increase participation of stakeholders in forest management decision making.

Several countries described recent efforts to update and revise forest policies and legislation in line with efforts to enhance sustainable management of forests, accommodate new modalities in participatory forest management, enhance the multiple benefits of forests, increase linkages with related sectors, encourage private-sector investment in forest plantation development, and improve overall efficiency in the sector. Progress was also reported in implementing priority initiatives under national forest programmes and similar integrated programmes.

Delegates stressed that important challenges remain. The Commission recommended greater

support for: (i) developing and implementing criteria and indicators for sustainable forest management; (ii) forest fire management; (iii) reforming forestry institutions; (iv) balancing timber supply and demand; (v) promoting forest law enforcement and good governance; (vi) sustainable use of non-wood forest products; (vii) developing viable livelihoods for forest-dependent people; and (viii) improving access to markets.

APFC and FAO-supported activities in the region

APFC and FAO-supported activities in Asia and the Pacific have generally concentrated on four areas in the past two years: (a) ensuring sustainable supplies of wood and fiber; (b) continuous improvement in forest management; (c) devolution of forest management responsibilities; and (d) cross-cutting initiatives. The Commission generally approved of recent APFC and FAO-supported activities.

The Commission acknowledged the close links between poverty, food insecurity and land degradation. It requested FAO to assist in building capacities for monitoring forest degradation and desertification trends, and to help countries in their afforestation and reforestation efforts. In this regard, participants welcomed information about the international conference on forest rehabilitation being organized jointly by FAO, FORSPA, APAFRI, FRIM and IUFRO in October 2002.

Delegates were informed of ongoing efforts by FAO to improve the availability of information and data related to trees outside forests. The Commission urged FAO to work with member countries to develop appropriate techniques for assessing, monitoring and managing tree resources outside forests.

There was strong support for FAO to continue assisting countries in implementing the regional and national codes of practice for forest harvesting. FAO was asked to expand its support for the development and implementation of national codes of practice, including capacity

building for effective implementation. The Commission also requested FAO to continue providing timely and appropriate information on sustainable forest management, particularly on reduced impact logging and improved forest management practices.

Delegates recalled the initial progress made under the Regional Initiative for the Development and Implementation of National-Level Criteria and Indicators for Sustainable Management of Dry Forests in Asia, launched in 1999, and related efforts through other international and national initiatives. Appreciating the value of sharing expertise and experiences in implementing criteria and indicators under diverse conditions, the Commission recommended that FAO strengthen international cooperation on this issue.

Recognizing the intense interest in forest certification and the growing number of certification systems and approaches, the Commission requested FAO to raise awareness and increase understanding related to forest certification, identify commonalities among the various approaches, and encourage the development of minimum standards for certification systems. FAO was urged to organize an expert meeting to discuss these issues.

Delegates highlighted the important functions of forests in conserving the rich biodiversity of the region, but acknowledged difficulties in monitoring biodiversity and effectively managing protected forest areas. The Commission was informed that FAO was currently developing a strategy for increasing its support for forest conservation in the region in collaboration with other partner organizations.

The availability of reliable supplies of fresh water and the relationship between forests and water were underscored as important emerging concerns. The Commission urged FAO to promote greater understanding and awareness of the linkages between forests and water, and to provide continuing support for effective watershed management. It also encouraged member countries to improve intra-regional cooperation in managing

watersheds and water resources.

The Commission applauded the progress that many countries had made in devolving forest management responsibilities and benefits to local people. It recognized, however, the significant difficulties in restructuring and reorienting forestry institutions to effectively deal with decentralized and devolved forest management. Member countries were encouraged to share information on different approaches and their impacts and FAO was requested to give increased attention to decentralization and devolution issues.

Delegates stressed that strong political commitment from the highest levels of leadership was required to effectively address forestry issues. The Commission urged FAO and other international organizations to continue efforts to develop and strengthen the political will needed to achieve sustainable forest management.

Invasive species: regional cooperation in combating threats

During a special in-session seminar, the Commission focused on the threats posed by alien invasive species (plants, pests and diseases) and potential regional cooperation for dealing with these problems. The seminar was supported in part by the USDA Forest Service and the FAO-Netherlands Partnership Programme. Six resource speakers from selected countries in the region provided information on invasive species threats in their countries and efforts to prevent, monitor and manage specific problem species.

The seminar emphasized that problems associated with invasive species are escalating in frequency and impact as a result of increasing international trade, travel and transport. Unfortunately, most forest managers are not adequately aware of the problems related to invasive species or of appropriate safeguards. As a result, work in dealing with invasive species is at an embryonic stage in many member countries.

Delegates took note of the alarming economic, environmental and social impacts caused by

invasive species. Significant economic costs are suffered from the loss of forest productivity and disruption of trade, and expenditures for monitoring, control, quarantine, prevention and research. The aggressive and disruptive nature of invasive species also causes the loss of native species and habitats. Social costs include the loss of aesthetic benefits and cultural values, disruption of employment and livelihoods, and human health impacts.

The Commission recommended that FAO support activities, including technical meetings, to increase awareness and understanding of the issues and threats associated with invasive species, develop appropriate measures for dealing with these threats, and identify additional information and research needs.

The seminar identified several goals in addressing the problems of invasive species, namely prevention, early detection, eradication (where possible) or control, and restoration. It was recognized that successful management of invasive species threats requires comprehensive strategies employing a wide array of measures. Countries were encouraged to develop sound strategies for addressing threats from invasive species, including guidelines and regimes for deliberate introductions.

The Commission also urged the development of regional invasive species strategies. It suggested that member countries, FAO and other international organizations should collaborate in developing a regional invasive species information network with possible Internet linkages and a website for information dissemination and sharing. FAO and other international partners were urged to strengthen capacities for risk assessment, diagnostics, monitoring and surveillance, interdiction, incursion planning, eradication and pest management.

Illegal logging and trade: what can be done?

Delegates recognized the highly sensitive nature of the issues related to illegal logging and trade, and the differing definitions and perception of

various stakeholders. They regarded the mere fact that the subject could be discussed in the Commission meeting as a positive step toward defining the problem and identifying specific remedial measures.

It was acknowledged that illegal logging and trade are significant in Asia and the Pacific, resulting in widespread negative economic, social and environmental impacts. Delegates noted that the largest markets for illegally harvested timber are within the Asia-Pacific region, with Europe and North America also being significant markets. The Commission emphasized that producers, traders, importing and exporting countries, and consumers all share responsibility for the expansion of illegal logging and should work together to address it.

The Commission requested FAO to facilitate the sharing of information and experiences of countries related to the complex issues surrounding illegal logging and illegal trade of forest products. It further urged FAO to consider assisting member countries in the following areas:

- C encouraging regional cooperation in combating illegal logging and trade, recognizing that action on illegal logging must be focused at the national level;
- C raising awareness of the economic, social and environmental costs of illegal logging and illegal trade in forest products;
- C reviewing and disseminating information on successful approaches and cases of curtailing illegal logging and trade;
- C simplifying and rationalizing forest laws and increasing the transparency of forest regulations, where necessary;
- C reviewing log pricing policies and strengthening capacities in assessing illegal domestic and international timber trade;
- C applying criteria and indicators for sustainable forest management, forest certification and audit and monitoring systems;
- C formulating and implementing codes of practice for effective forest harvesting; and
- C promoting increased participation of local people in forest management and enhancing the activities of local organizations, including building their capacity to monitor forest

management.

The Commission recognized the Ministerial Declaration of the Forest Law Enforcement and Governance East Asia Ministerial Conference, held in Bali, Indonesia, in September 2001, as a positive step in gaining commitment and support for actions in combating illegal logging and associated illegal trade. It encouraged member countries and organizations involved to establish without delay a regional task force on forest law enforcement and governance as called for in the Ministerial Declaration.

Impact of incentives on the development of forest plantation resources

A second in-session seminar reviewed the preliminary results of the APFC regional study on the impact of incentives on forest plantation development. Seven presenters, who have been involved with the regional study, summarized the varied experiences of countries in the region in providing direct and indirect incentives to encourage forest plantation development.

Incentives can be broadly defined. Common direct incentives include subsidized seedlings, tax concessions, cost-sharing arrangements, or the provision of local infrastructure. Important indirect and enabling incentives include a competitive economic environment, good governance, clear land tenure and recognized property rights, national and local security, accurate and up-to-date information on plantation resources, relevant research and development, favorable market conditions, and effective mechanisms for addressing potential opposition to forest plantations.

Delegates drew attention to the differing requirements and management objectives of small-scale farmers and landowners, which could call for incentives different from those needed to encourage plantation development by large-scale corporate investors. Similarly, it was recognized that different incentives may be required to support plantations for environmental and social

benefits as compared with those established for production purposes.

The Commission recognized that clear, consistent and stable policies are essential for creating a favorable investment climate for promoting the development of private sector forest plantations by large- and small-scale producers, regardless of other incentives provided.

Delegates noted that the effectiveness of incentives depends on their relevance to the social and economic conditions in each country, although many issues are similar in all countries. Given the dynamic nature of these factors, incentive systems should be flexible, carefully targeted, and adjusted or removed when no longer required to encourage further investment.

The Commission was informed that the findings of the regional study would be published as an APFC document in the near future. It was recommended that the full report be complemented by a short, easy-to-read executive summary, and that it be widely disseminated to planners and policy makers in the region, preferably in major languages of member countries. FAO was also requested to consider developing basic guidelines for designing effective incentive systems.

“The splintering of forestry”: coping with conflicting international forestry agendas

The Commission recognized that widespread concerns about forests and the environment have resulted in a multiplicity of international agreements, fora, processes and conventions that have various relationships to forests. Along with these agreements and fora have come escalating burdens of reporting and participation, creating particular difficulties for countries with less capacity and financial resources. Delegates deliberated on whether this multiplicity represents new sources of support for sustainable forest management or dilutes the commitment.

While recognizing that the diverse array of conventions, agreements and fora offer opportunities for engendering additional support

for sustainable forest management, delegates reiterated their belief that holistic, comprehensive, balanced and integrated approaches were required to effectively address forestry issues. They agreed that current considerations of international fora dealing with issues of sustainable forestry often lead to duplication of efforts and ineffective use of limited resources. Moreover, they frequently do not provide adequate opportunity for forestry experts to effectively contribute to the development of policies and their implementation.

Delegates stressed that increased coordination was needed at national, regional and international levels to ensure more effective involvement of member countries and organizations in the various international fora, processes and conventions. The Commission urged FAO to strengthen the role of the Asia-Pacific Forestry Commission in coordinating regional inputs to international fora and efforts to effectively implement actions agreed upon by those fora. The Commission also urged FAO to support member countries in building understanding of various international agreements and capacities for effective participation.

Delegates further highlighted the central role of the Collaborative Partnership on Forests (CPF) in coordinating activities at the global level, particularly implementation of the IFP/IFF Proposals for Action. FAO was urged to continue providing strong support for the coordinating functions of the CPF.

National forest programmes were seen as an effective mechanism for forest planning and for mobilizing and coordinating necessary support for sustainable forest management at the national

level. FAO was requested to increase its support for the effective implementation of national forest programmes in member countries.

To ease the reporting burdens placed on member countries, the Commission requested FAO to work with other international organizations, countries and processes to streamline, simplify and coordinate reporting requirements.

Information items

Delegates were updated on recent activities of the United Nations Forum on Forests (UNFF), the Collaborative Partnership on Forests (CPF) and the International Year of Mountains, as well as plans for the XII World Forestry Congress.

A wide array of activities organized in Asia and the Pacific in connection with the International Year of Mountains was elaborated, culminating with the Global Mountain Summit 2002, in Bishkek, Kyrgyzstan. The Commission urged FAO to continue support for sustainable mountain development beyond the immediate year of observance dedicated to mountains.

Delegates were informed of preparations being made for the XII World Forestry Congress, to be convened 21-28 September 2003, in Quebec City, Canada, under the central theme of "Forests, source of life."

Date and place of the next session

An offer to host the twentieth session of the APFC (to be convened in 2004) was made by the delegation from Nepal.

CAN WE BRING BACK THE FORESTS?

Contributed by S. Appannah, Senior Adviser, FORSPA

Background

It could be argued that the problems of forestry, or for that matter with the management of all natural resources, is one of containing human greed and self-centeredness. Or it could also be that we still lack the technical know-how to manage the resources. But in actual fact, the answer generally lies somewhere in between.

Against a background of massive forest destruction and land degradation in the tropics, there have been numerous calls for their rehabilitation. Rehabilitation of degraded forest land offers many benefits for societies. However, despite the importance of the matter and its urgency, we have seen few major initiatives to address it. What is the reason for the lack of action? Is it due to limitations in knowledge and experience, or perhaps inadequate policy, planning and financial incentives? These were the key questions that a recent conference addressed.

Bringing Back the Forests

Some 70 participants from over 20 countries attended the international conference "Bringing Back the Forests: Policies and Practices for Degraded Lands and Forests." The conference was jointly organized by the Asia Pacific Association of Forestry Research Institutions (APAFRI), the Food and Agriculture Organization (FAO), the Forestry Research Support Programme for Asia and the Pacific (FORSPA), the Forest Research Institute Malaysia (FRIM) and the International Union of Forest Research Organizations (IUFRO).

Twenty-eight papers were presented during the six sessions, viz. Introduction, Rehabilitation in Practice, Different Planting Approaches, Integrating Rural Livelihood Needs,

Rehabilitation of Ecosystems and Landscapes, and Policy, Planning and Partnership.

The organizers started the conference off by posing a set of questions that were to be addressed, which included issues related to: terminology, causes of forest and land degradation, rehabilitation techniques, research and development needs, benefits and beneficiaries of rehabilitation, kinds of incentives and financial arrangements needed, using forest rehabilitation to alleviate rural poverty, and future directions.

The introductory papers touched on the following subjects: the massive decline of tropical forests; the simplification of the landscape, and the resulting decline in resources; and the potential impacts on climate, all of which are leading to further impoverishment of forest-dependent people. Rehabilitation of degraded forests and lands is accepted as an appropriate solution, and a variety of technical solutions are being explored. The means include bringing back the original ecosystem and services (restoration), recovering biodiversity (rehabilitation), and concentrating on the commercial production of the land (sustainability).

The presentations also explored the question of whether all the basic techniques in fact already exist and whether implementation was the major issue. Although there were strong arguments that in-depth studies on rehabilitation techniques are still needed, other presentations asserted that the major constraints are policy, finance, and socio-economic issues. Some scientists argued that their duty is to develop the techniques as finely as possible without regard to the economic feasibility and let society decide on implementation. In general, most presentations gave additional insights into new developments resulting from

research.

The papers can be grouped into the following categories:

Local to landscape-level rehabilitation approaches – The discussions centered around rehabilitation techniques such as forest succession systems, assisted natural regeneration, establishment of production forests with protective functions, and species and genetic diversity in the context of rehabilitation. Researchers also indicated a marked preference for using native trees over exotics for rehabilitation. One paper looked at forest degradation and rehabilitation from a historical perspective, while another touched on the important issue of learning from past experiences of rehabilitation so as to avoid failures.

Technology bases – The discussions on techniques developed for completely rehabilitating degraded mining lands were introduced, along with remote sensing and GIS systems which can be used for identifying the forest sites that need rehabilitation. Another presentation looked at techniques for assessing the wealth of forests with a focus on directing benefits to the rural poor.

Community involvement – Several presentations reviewed case studies for bringing about forest recovery using the help of villagers, and the linkages between community forestry, welfare and the benefits of local governance. Attempts to harness local knowledge for expanding farm forestry are also being made. The discussions further explored the benefits of forging private sector and community partnerships in forest rehabilitation.

Finances – Several presentations discussed the issues relating to incentives for growing trees, and how institutional financing can bring about afforestation. A few papers also extended the discussions beyond the mere financing of tree plantings and touched on

how communities can be rewarded or compensated for protecting watersheds.

Policies and practices – A few papers touched on the subject of policy, particularly in relation to leaseholds, tenure and other issues of community forestry.

The conference concluded with a plenary session on “Plotting a future course of action.” The panelists were asked to comment on several areas, including: issues of policies, institutional arrangements and financial mechanisms; who should pay for rehabilitation; tradeoffs between production and biodiversity; the linkages between rural poverty, production and biodiversity, and how forest rehabilitation can alleviate rural poverty and enhance the natural environment; and the need for more research and development to implement forest rehabilitation.

The panelists discussed these topics and made further observations. They pointed out that more efforts will need to be given to resolving policy and financial issues before progress can be achieved. Among them, the issue of securing investment was reiterated. In general, there is still a lack of political commitment, and so rehabilitation needs are not well recognized. While the need for additional research and development for specific technical problems could not be dismissed, it was further recognized that all research is based on small trials, and that there was an urgent need to scale up the trials. There was general agreement that forests will play a critical role in alleviating rural poverty, and that rehabilitation offers many opportunities. An additional area that was emphasized was the need for networking and sharing of information. Education and awareness building will also be needed, particularly the need to bring forests closer to urban areas. The plenary session also looked further into what future activities are needed, and several suggestions were offered.

ASIAN FORESTERS FOCUS ON POTENTIAL OF ASSISTED NATURAL REGENERATION

Practical, low-cost methods for restoring forest cover and rehabilitating degraded lands were the focus of an international workshop and study tour, organized in the Philippines by FAO, the Philippines Department of Environment and Natural Resources (DENR) and the Bagong Pagasa Foundation (a non-governmental organization active in environmental conservation, reforestation, and rural development in Philippines). Support for the workshop was also provided by the International Plant Genetic Resources Institute (IPGRI), the Center for International Forestry Research (CIFOR), and the International Center for Research in Agroforestry (ICRAF). More than 30 forestry experts and officials, from 11 Asian countries (Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Vietnam), participated in the workshop and study tour, 22-26 April 2002, which included discussions in Manila and field visits to Palawan island.

The workshop and study tour highlighted knowledge and experiences related to “assisted natural regeneration” (ANR), which encompasses a range of techniques to accelerate natural succession toward more diverse and productive forests. The synergistic aspects of ANR, especially the complementary interactions of technological factors, socio-cultural elements and ecological processes, were emphasized throughout the workshop and study tour.

Some of the most successful ANR methods have been pilot-tested in the Philippines, beginning in the 1980s. Experience has indicated that ANR can provide the following benefits and advantages:

- C many areas can be reforested faster and less expensively (often 60 to 70 percent cheaper) than conventional reforestation techniques if seedlings of tree species are naturally

- abundant and if the climate is favorable;
- C regenerated forests are much more diverse biologically than conventional plantations;
- C original vegetation and corresponding ecosystem functions are restored or maintained;
- C there is minimal soil disturbance, thus soil structure is maintained and soil erosion is virtually nil;
- C employment is provided for local communities due to the labor-intensive nature of ANR;
- C use of indigenous knowledge is promoted; and
- C hydrological integrity and biological functions are enhanced.

Although designed for field implementers, the workshop and study tour also featured presentations by respected environmental experts. Among others, Dr. Percy Sajise, IPGRI Regional Director, detailed the fundamental scientific principles that underpin the strength and relevance of ANR. He urged foresters to “work with nature” via ANR, and thereby expand rehabilitation accomplishments while concurrently enhancing performance and sound ecosystem management. Messages from Dr. Sang Mu Lee, FAO Representative in the Philippines, and Mr. Patrick Durst, FAO Senior Forestry Officer, pointed out the challenges posed by millions of hectares of *Imperata* grasslands in the Asia-Pacific region, and the opportunities to restore forests to these vast areas by applying ANR.

Other technical presentations during the workshop included discussions of the theoretical and scientific basis for ANR, technical and social dimensions of ANR, and bio-economic modeling studies of *Imperata* grassland conversion.

Brief country presentations were also made, highlighting a wide range of ANR activities and

strategies throughout the region. It was obvious from the country presentations that no consensus exists on the definition and scope of ANR in the region, and it was suggested that more work might be done to clarify definitions related to ANR. Nonetheless, the workshop agreed on the value of sharing experiences despite differing conditions and approaches, and urged that much more could be done without allowing programs to become paralyzed for lack of clear definitions.

Discussion groups focused on the prospects for arriving at a common understanding of ANR, state-of-the-art in ANR implementation, identification of constraints and impediments to wider adoption of ANR, key issues for working

with communities, and additional research needs. Recommendations were also formulated for broader promotion and application of ANR, including possible establishment of ANR demonstration-cum-training centers in selected locations.

Field visits in Palawan gave participants opportunities for “hands-on” application of ANR and the chance to observe practical ANR implementation activities as practiced in the Philippines. Participants also held discussions with local farmers and villagers, village leaders, and NGO field staff, to gain their perspectives on ANR implementation.

GETTING A BETTER GRIP ON THE COSTS OF RIL

FAO/RAP recently collaborated with the Center for International Forestry Research (CIFOR), USDA Forest Service, Blue Ox Forestry (a private consulting firm based in Portland, Oregon, USA), and the Indonesian Ministry of Forestry in organizing a small workshop to advance the development of a computer model to assess the financial aspects of reduced impact logging (RIL). The workshop, which was attended by 15 invited experts familiar with logging costs and activities, was convened 6-8 May 2002, in Bogor, Indonesia. The initiative is part of the ongoing activities of the Asia-Pacific Forestry Commission (APFC) to promote reduced impact logging and effective implementation of codes of practice for forest harvesting.

The workshop focused on the testing and further development of the RILSIM\$ computer model, designed to evaluate the financial aspects of RIL. The goal in developing this software is to help loggers, government forestry officials, policy makers, university staff and students, members of non-governmental organizations, and the general public to better understand the financial costs and benefits of reduced impact logging practices vis-à-vis conventional logging practices. The RILSIM\$ model software is being developed using Microsoft's Visual C++ programming environment.

The development of the model and associated software is motivated by the persistent frustration of most experts and proponents of RIL over the lack of reliable data and tools for analyzing the costs and benefits of alternative logging practices. This frustration was expressed repeatedly and vociferously at the International Conference on Reduced Impact Logging to Advance Sustainable

Forest Management, held in Kuching, Malaysia in early 2001.

The objectives of the Bogor RILSIM workshop were to:

- C provide an in-depth introduction to the software and its documentation for a range of potential users;
- C assemble realistic data on conditions relevant to local logging operations from the workshop participants;
- C obtain detailed feedback on the capabilities and limitations of the software and its documentation in order to guide revisions prior to the formal release of the software package; and
- C provide an overview of the software, its objectives, and its capabilities in an open presentation at the Indonesian Ministry of Forestry.

The workshop was generally successful in promoting better understanding of the RILSIM\$ model and in advancing development of the model software. However, the participants (who represented a mix of potential users from government agencies, research institutes and the private sector) underscored the difficulties and challenges faced in developing the RILSIM\$ model. The wide range of knowledge (of logging activities and costs) and variable skill levels in using computer models of potential users, and the complexity of logging operations and associated expenditures, make development of the model particularly challenging. Important trade-offs will be required to develop the model in a manner that accurately reflects the complexities of logging costs while keeping the model simple enough that it can be used widely.

MONITORING THE IMPACTS OF FOREST HARVESTING ON SOIL AND WATER

The FAO-supported Forestry Research Support Program for Asia and the Pacific (FORSPA) and the Commonwealth Scientific and Industrial Research Organization (CSIRO) Land and Water Division held a 10-day field-training course and a workshop on “Monitoring the Impacts of Forest Harvesting on Soil and Water,” in Madang, Papua New Guinea, 12-20 August 2002. The workshop was part of the ongoing work of the Tree Nutrition Network. Researchers from Papua New Guinea, Solomon Islands, Vanuatu and Australia participated in the course. The objective of the workshop was to provide hands-on training in the methods for monitoring impacts of forest harvesting on soil and water parameters, and on how the results can be employed to improve forest management.

Participants were first introduced to the theoretical basis of nutrient flows in the forest ecosystem, and the sampling techniques available for measuring these inputs and outputs. Participants then directly engaged in practical sampling and measuring of a number of parameters like biomass, soil, water and nutrients.

The likely impacts of different harvesting practices on soil and nutrient resources, water quality, and water yield were evaluated by the

workshop participants. The data were used to explore possible management practices to mitigate or minimize the negative effects of harvesting.

Additional issues explored during the workshop included the following questions: (i) what are the key impacts of forest management activities on soil and water resources in the region? (ii) how do these impacts relate to the sustainability of forest resource use? (iii) how important and widely recognized are these impacts – by policy makers, management agencies, forest companies and local communities? (iv) how effectively are these impacts dealt with in current forest planning, management and implementation of codes of logging practices? and (v) what opportunities exist for collaboration and regional initiatives in research and training to underpin better management of forest soil and water resources? In addition, participants were introduced to the role of research and how it can make a difference to forest management, and how the newly emerging criteria and indicators (C&I) audit systems can be used for evaluating aspects of nutrient losses during forest harvesting. CSIRO agreed to follow up on several of the issues that require additional training before these practices can be implemented.

REVIEW OF THE THAI FORESTRY SECTOR MASTER PLAN

The National Forest Programme Facility (NFPF), supported by Finland, France, Norway and the Netherlands, has recently provided catalytic support to several countries in the Asia-Pacific region, including: China (to organize a strategic training workshop in Nanning and review the Simao Forestry Action Programme); DPR Korea (to organize a workshop to launch an NFP framework); Mongolia (to support the NFP process); and Thailand (to review the Forestry Sector Master Plan).

The Thai Forestry Sector Master Plan (FSMP) was launched in 1991 with support from FINNIDA and ADB. The FSMP framework has three major elements, i.e. people and forestry (socio-ecological), production and utilization (technological), and institutional development. Several activities have been initiated to support FSMP implementation, including Five-Year National Development Plans, Government-funded projects, development programs assisted by international donors, and several regional initiatives executed by FAO, such as the Regional Wood Energy Development Programme (RWEDP), Forestry Research Support Programme for Asia and the Pacific (FORSPA), and the Regional Model Forest Project.

Since the launching of the FSMP, the Royal Thai Government has ratified several international conventions, such as the International Tropical Timber Agreement, CITES, RAMSAR, and the World Heritage Convention, and is partner to several international initiatives for sustainable forest management.

Monitoring of FSMP programs has been conducted in an *ad hoc* manner, with rather weak linkages to recent international initiatives on sustainable forest management, government policy reforms in forestry and other sectors. It also has

inadequately dealt with forestry's contribution to poverty alleviation and food security.

There have been reviews of various FSMP programs and activities, including the community forestry, reforestation, watershed and conservation programs. However, it is now appropriate, 10 years after the launching of the FSMP, to review the overall extent of implementation. The review is intended to identify issues and problems and lessons learnt from FSMP implementation. It will also recommend new paradigms, concepts, modalities, policy strategies and program reforms, and will strengthen the existing institutions to bring them in line with the Government's socio-economic development policy and international initiatives for sustainable forestry management.

A national team, headed by a coordinator, is conducting the review. Four workshops were held, the first two to discuss the FSMP paradigms, concepts and modalities and international initiatives on forest and forestry, including CSD-IPF/IFF/UNFF, and the second two targeting the issues, status and progress of FSMP implementation and recommended follow-up actions. It was recommended that priority should be given to forest policy reform. The revision exercise should be carried out after the policy reformulation. Partners involved in the review include NGOs, the private sector and international organizations such as IUCN, CARE and ICRAF.

Parallel with the FSMP review, Thailand has conducted a major Government reorganization and restructuring which includes the formation of the new Ministry of Environment and Natural Resources.

It is expected that the report of the FSMP review exercise will be available in mid-November.

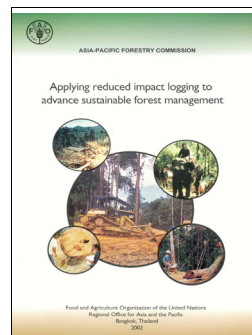
NEW RAP FORESTRY PUBLICATIONS

APPLYING REDUCED IMPACT LOGGING TO ADVANCE SUSTAINABLE FOREST MANAGEMENT

RAP Publication 2002/14

There is a broad consensus that timber harvesting must be improved to achieve sustainable forest management. Reduced impact logging (RIL) is a key component of better forest management. Its implementation is largely contingent on satisfying economic and institutional concerns. In tropical forests, RIL has been tested and applied on a small scale for more than a decade. Various timber-producing countries in Asia and the Pacific have recognized its potential for advancing sustainable forest management. Yet, many questions remain and the lack of sound and appropriate information continues to impede the widespread application of RIL.

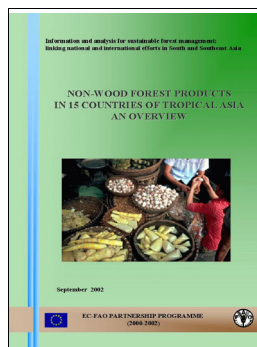
This publication helps fill that critical information gap. It includes a wealth of information that was presented during the International Conference on the application of reduced impact logging to advance sustainable forest management, held from 26 February to 1 March 2001, in Kuching, Malaysia. The conference assessed past and



ongoing efforts to implement RIL and considered options for future application.

This publication reflects an important milestone in the efforts to improve forest management in the region. While acknowledging that considerable challenges lie ahead, it provides reason for cautious optimism concerning the wider application of RIL in the future.

NON-WOOD FOREST PRODUCTS IN 15 COUNTRIES OF TROPICAL ASIA – AN OVERVIEW



In most tropical countries, non-wood forest

products (NWFP) play an important role in the daily lives and well being of local populations. In particular, rural and poor people depend on NWFP as sources of food, fodder, medicines, gums, resins and construction material. In addition to local consumption, NWFP are also important traded commodities on local, national and international markets. Traded NWFP provide employment and income.

Data on the exploitation, management, consumption and trade of NWFP remain limited. Unlike timber and agricultural products, no regular monitoring and evaluation of the resources

and socio-economic contribution of NWFP at the national level are being carried out. Information is limited to selected NWFP of national importance. But even for several of these major NWFP, data are often incomplete and cannot be extrapolated to the national level or compared among countries.

The preparation of this publication was carried out

IN SUPPORT OF FORESTRY STATISTICS

Since UNCED and the work of the Intergovernmental Forum on Forests (IFF) in particular, the demand for more and reliable information on forest use and conservation has increased rapidly at global, regional, national and local levels. The Forestry Department of FAO publishes the FAO Yearbook of Forest Products and updates its database on an annual basis. The publication of the yearbook, the only global statistical overview of forest products and trade, is made possible through the cooperation with governments, which supply most data in the form of replies to standardized questionnaires. Since 1999, data has been gathered using a joint forest products questionnaire, the Joint Forest Sector Questionnaire (JFSQ), supported by the Forestry Department of FAO, the Economic Commission of Europe (ECE), the Statistical Office of the European Communities (EUROSTAT) and the International Tropical Timber Organization (ITTO).

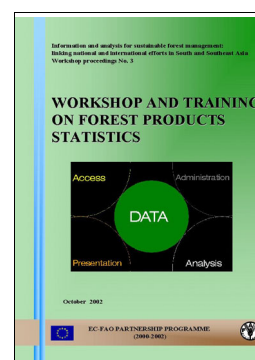
The approach to generating the global statistics appears to be straightforward. Yet, many countries face a number of problems in providing the requested data in a timely manner. To overcome the shortcomings the EC-FAO Partnership Programme established a network of statistical correspondents and organized as a first step a workshop and training course for the correspondents. The meeting was held from 20 to 24 May 2002 in Bangkok and its objectives were to:

1. establish the network/working group of statistical correspondents in the 13 member

under the EC-FAO Partnership Programme on *Information and analysis for sustainable forest management: linking national and international efforts in South Asia and Southeast Asia*. This report contains NWFP country profiles for 15 Asian countries and a regional overview. The country profiles include text on qualitative and quantitative NWFP data and standardized tables showing quantitative information.

- countries of the EC-FAO Partnership Programme;
2. provide training on standardized international definitions and tabular formats for completing the JFSQ;
3. review current forest product statistics at national and regional levels;
4. identify the main weaknesses and constraints concerning forest statistics and to develop a set of alternative frameworks for improving national statistical processes; and
5. encourage information sharing among countries and with international organizations.

The proceedings of the workshop and training course are now available.

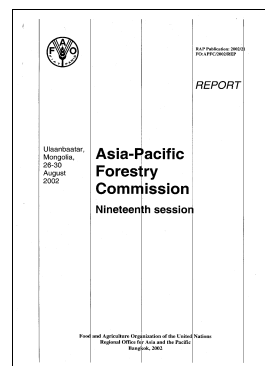


REPORT OF THE ASIA-PACIFIC FORESTRY COMMISSION NINETEENTH SESSION

RAP Publication: 2002/21

FO:APFC/2002/REP

At the invitation of the Government of Mongolia, the nineteenth session of the Asia-Pacific Forestry Commission (APFC) was held from 26-30 August 2002 in Ulaanbaatar, Mongolia. The session was attended by representatives from 27 of the 29 member countries and 11 international, intergovernmental and non-governmental organizations. Discussions focused on regional initiatives and cooperation among Asia-Pacific countries. The summary of the session and copies of the full report are available online from the APFC website (www.apfc.or.th), or in hard copy from the FAO Regional Office for Asia and the Pacific.



REGIONAL STUDY ON PACIFIC ISLANDS FORESTRY LEGISLATION

Forestry is, by its very nature, a complex subject, and therefore forestry legislation tends to be rather complex. In the Pacific Islands, this complexity is increased by factors like the remoteness of the forest resource, the fragile nature of tropical rainforests and the diversity of the stakeholders. The forestry law must suit the needs and circumstances of villagers in remote forests, and at the same time stand up to challenges by expert litigation lawyers engaged by foreign logging companies to protect their interests.

FAO has had a long involvement in forestry law reform and has provided assistance to many countries in reviewing their forestry and related legislation. A recently published FAO study reviews the forestry legislation in six Pacific Island countries: Tonga, Samoa, Fiji, Papua New Guinea, Solomon Islands and Vanuatu. It was produced in preparation for a proposed regional

workshop to discuss the issues and challenges for forestry legislation in the Southwest Pacific, and to identify possible options for governments interested in improving legislation.

Forestry legislation currently in force ranges from the early Forest Act 1961 of Tonga to the very recent Forestry Act 2001 of Vanuatu. While Tonga and Samoa are still operating under old-fashioned forestry legislation, Fiji, Papua New Guinea, Solomon Islands and Vanuatu have all revised their main forestry laws in the last decade.

This paper can be downloaded from the following website: <http://www.fao.org/Legal/pub-e.htm> . Hard copies can be requested from Mr. Aru Mathias, Forest Resources Management Officer, FAO Sub-Regional Office for Pacific Islands, Private Mail Bag, Apia, Samoa; E-mail: Aru.Mathias@fao.org .

FAO ASIA-PACIFIC FORESTRY CALENDAR

18-22 November 2002. Rome, Italy. ***NFP Week: 1) (18-19) Sharing NFP Experiences; 2) (20-21) Enhancing Stakeholder Participation in National Forest Programmes.*** Contact: Manuel Paveri, Chief, Forestry Policy and Institutions Branch, FAO Forestry Department, Via delle Terme di Caracalla, 00100 Rome, Italy; Tel: (3906) 57052196; Fax: (3906) 57053152; E-mail: Manuel.Paveri@fao.org

25-29 November 2002. Tacloban City, Philippines. ***4th Regional Model Forest Workshop & 4th Project Steering Committee Meeting.*** Contact: Tang Hon Tat, Chief Technical Adviser, Regional Project on Model Forest Approach for Sustainable Forest Management, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, 39 Phra Atit Road, Bangkok 10200, Thailand; Tel: (662) 697-4220; Fax: (662) 697-4432; E-mail: hontat.tang@fao.org

2-4 December 2002. Colombo, Sri Lanka. ***Getting Effective Research Results with Scarce Resources.*** Contact: S. Appanah, Senior Programme Adviser, Forestry Research Support Programme for Asia and the Pacific, FAO Regional Office for Asia and the Pacific, Maliwan Mansion, Bangkok 10200, Thailand; Tel: (66-2) 697-4136; Fax: (66-2) 697-4411; E-mail: Simmathiri.Appanah@fao.org

4-6 December 2002. Rome, Italy. ***Expert Consultation on Developing an Action Programme Towards Improved Bamboo and Rattan Trade Statistics.*** Contact: P. Vantomme, FOPW, FAO Forestry Department, Via delle Terme di Caracalla, 00100 Rome, Italy; Tel: (3906) 57054064; Fax: (3906) 57053152; E-mail: Paul.Vantomme@fao.org

13-14 December 2002. Kathmandu, Nepal. ***Preparing the Next Generation of Watershed Management Programmes.*** Contact: Moujahed Achouri, Forestry Officer, Watershed Management, FAO Forestry Department, Via delle Terme di Caracalla, 00100 Rome, Italy; Tel: (3906) 57056095; Fax: (3906) 57053152; E-mail: Moujahed.Achouri@fao.org

3-7 February 2003. C de Guatemala, Guatemala. ***International Conference on Criteria and Indicators for Sustainable Forest Management.*** Contact: F. Castaneda, FORM, FAO Forestry Department, Via delle Terme di Caracalla, 00100 Rome, Italy; Tel: (3906) 57053834; Fax: (3906) 57053152; E-mail: Froylan.Castaneda@fao.org

10-14 March 2003. ***16th Session of the Committee on Forestry (COFO).*** Rome, Italy. Contact: Michael Martin, Secretary of COFO, FAO Forestry Department, Via delle Terme di Caracalla, 00100 Rome, Italy; Tel: (3906) 57053302; Fax: (3906) 57052151; E-mail: Michael.Martin@fao.org

21-28 September 2003. ***XII World Forestry Congress.*** Québec City, Canada. Contact: Secretariat General, XII World Forestry Congress 2003, P.O. Box 7275, Québec City, Canada G1G 5E5; E-mail: sec-gen@wfc2003.org

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This issue of FOREST NEWS was compiled by Patrick B. Durst, Senior Forestry Officer, FAO/RAP.*

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

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 2. *Asia-Pacific Tropical Forestry: Ecological Disaster or Sustainable Growth?* (RAPA Publication 1994/18)
 3. *Workshop Report: Reform of the Forestry Sector: Towards a Market Orientation in China, Laos, Mongolia, Myanmar, and Vietnam* (RAPA Publication 1995/4)
 4. *Beyond Timber: Social, Economic and Cultural Dimensions of Non-Wood Forest Products in Asia and the Pacific* (RAP Publication 1995/13)
 5. *A Guide to the Identification of Diseases and Pests of Neem (*Azadirachta indica*)* (RAP Publication 1995/41)
 6. *Non-Wood Forest Products in Bhutan* (RAP Publication 1996/6)
 7. *Asia-Pacific Agroforestry Profiles: Second Edition* (APAN Field Doc. No.4/RAP Publication 1996/20)
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 13. *Directory of Selected Tropical Forestry Journals and Newsletters (2nd Edition)* RAP Publication 1997/17 - FORSPA Publication No.19/1997.
 14. *Forest Dependent Survival Strategies of Tribal Women: Implications for Joint Forest Management in Andhra Pradesh, India* (RAP Publication 1997/24)
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 24. *Asia-Pacific Forestry Commission Fifty Years* (RAP Publication 2000/2)
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 27. *Report of the Asia-Pacific Forestry Commission Eighteenth Session* (RAP Publication 2000/11)
 29. *Forests Out of Bounds: Impacts and Effectiveness of Logging Bans in Natural Forests in Asia-Pacific* (RAP Publication 2001/08); *Executive Summary* (RAP Publication 2001/10)
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 31. *Proceedings of the International Conference on Timber Plantation Development*
 32. *Information and Analysis for Trees Outside Forests in India* (Working Paper No.1. EC-FAO Partnership Programme)
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