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

July-September 2011

TIGERPAPER

Regional Quarterly Bulletin on Wildlife and National Parks Management

Vol. XXXVIII : No. 3

Featuring

FOREST NEWS

Vol. XXV: No. 3

TIGERPAPER

REGIONAL OFFICE
FOR ASIA AND THE PACIFIC

TIGERPAPER is a quarterly news bulletin dedicated to the exchange of information relating to wildlife and national parks management for the Asia-Pacific Region.
ISSN 1014 - 2789

Address.

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Contents

TIGERPAPER

FOREST NEWS

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Front cover: *Hemidactylus hunae - Lateral view of right side of the head. (Photo: Courtesy of D.M.S.S. Karunarathna)*

REDISCOVERY OF Hemidactylus hunae Deraniyagala, 1937 (Reptilia: Gekkonidae) FROM TYPE LOCALITY AND SOME ADDITIONAL FIELD OBSERVATIONS FROM SRI LANKA

by D.M.S. Suranjan Karunarathna and Anushka Kumarasinghe

Introduction

There are 42 species of Gekonid lizards in Sri Lanka and 33 species (78.5%) of them are endemic to the island (Bauer *et al.*, 2010a, 2010b; de Silva, 2006; Manamendra-Arachchi *et al.*, 2007; Wickramasinghe and Munundradasa, 2007). The genus *Hemidactylus* is spread throughout South Asia as well as Europe and most of the Indian Archipelago (Deraniyagala, 1953; Pough *et al.*, 2004). The genus *Hemidactylus* comprises eight species/sub species in Sri Lanka (Das and de Silva, 2005), hence, becoming the second largest gecko genus of the island (Wickramasinghe and Somaweera, 2008). *Hemidactylus frenatus* Schlegel, 1836; *H. leschenaultii* Dumeril and Bibron, 1836; *H. scabriceps* (Annandale, 1906); *H. platyurus* Schneider, 1792; *H. parvimaculatus* Deraniyagala, 1953; *H. maculatus hunae* Deraniyagala, 1937; *H. lankae* Deraniyagala, 1953 and *H. depressus* Gray, 1842 (Carranza and Arnold, 2006; de Silva, 2006) are the members of *Hemidactylus* genus found in Sri Lanka. Of these, the latter four are endemic to Sri Lanka (Manamendra-Arachchi, 1997; Wickramasinghe and Somaweera, 2003).

Hemidactylus hunae is a poorly studied gecko species in Sri Lanka (de Silva *et al.*, 2004; Wickramasinghe and Somaweera, 2008). *H. hunae* was first described by Dr. P.E.P. Deraniyagala in 1937 from Okanda and Paanama in the Eastern Province of Sri Lanka based on five specimens (Somaweera and Somaweera, 2009). The holotype is a female (SVL 105mm and TL 115mm) and it has been deposited in the British museum. According to IUCN Sri Lanka and MENR (2007), its conservation status is 'Near Threatened'. There have been no recent records from type localities in Paanama on this species in the past 70 years. During a study of the biodiversity of Eastern province, the authors caught specimens of an unusual large gecko in and around the Paanama forest area. After careful examination it was identified as *H. hunae* Deraniyagala, 1937. This constitutes the second record of the species from a type locality in Paanama and these were not collected. It is essential to gather information on *H. hunae* in different areas of the country as the first step towards conservation of this giant gecko species.

Materials and methods

The specimens examined were deposited at the National Museum of Sri Lanka (NMSL) in Colombo and with the Wildlife Heritage Trust of Sri Lanka (WHT), Agarapatana. This work is mainly based on a search for distribution patterns, habitat, ecology, behavior and our additional field observations on their conditions and threats. Photographs were taken of live specimens, which were then released back where they were originally captured. No specimens were preserved or injured. All the measurements were taken to the nearest 0.1 mm with vernier calipers and measuring tape. Elevation is given in meters and other measurements were given in millimeters. SVL = snout vent length and TL = tail length.

Type locality and habitat

Paanama is located in Ampara District, Eastern Province, and is one of the prime habitats of Sloth bear (*Melursus ursinus*) and Leopard (*Panthera pardus*). Paanama (Fig.1) is approximately 16 km from Potuvil town and its elevation is less than 25m. The area lies between 7° 25' 47" Northern latitudes and 81° 12' 18" Eastern longitudes and encompasses an area of more than 100 km^2. The average annual rainfall is over 1,750 mm, with most of the rainfall occurring from December to March, with occasional rains in the other months. From August to December the weather gradually becomes very dry with the

TIGERPAPER Vol. 38: No. 3 July-September 2011

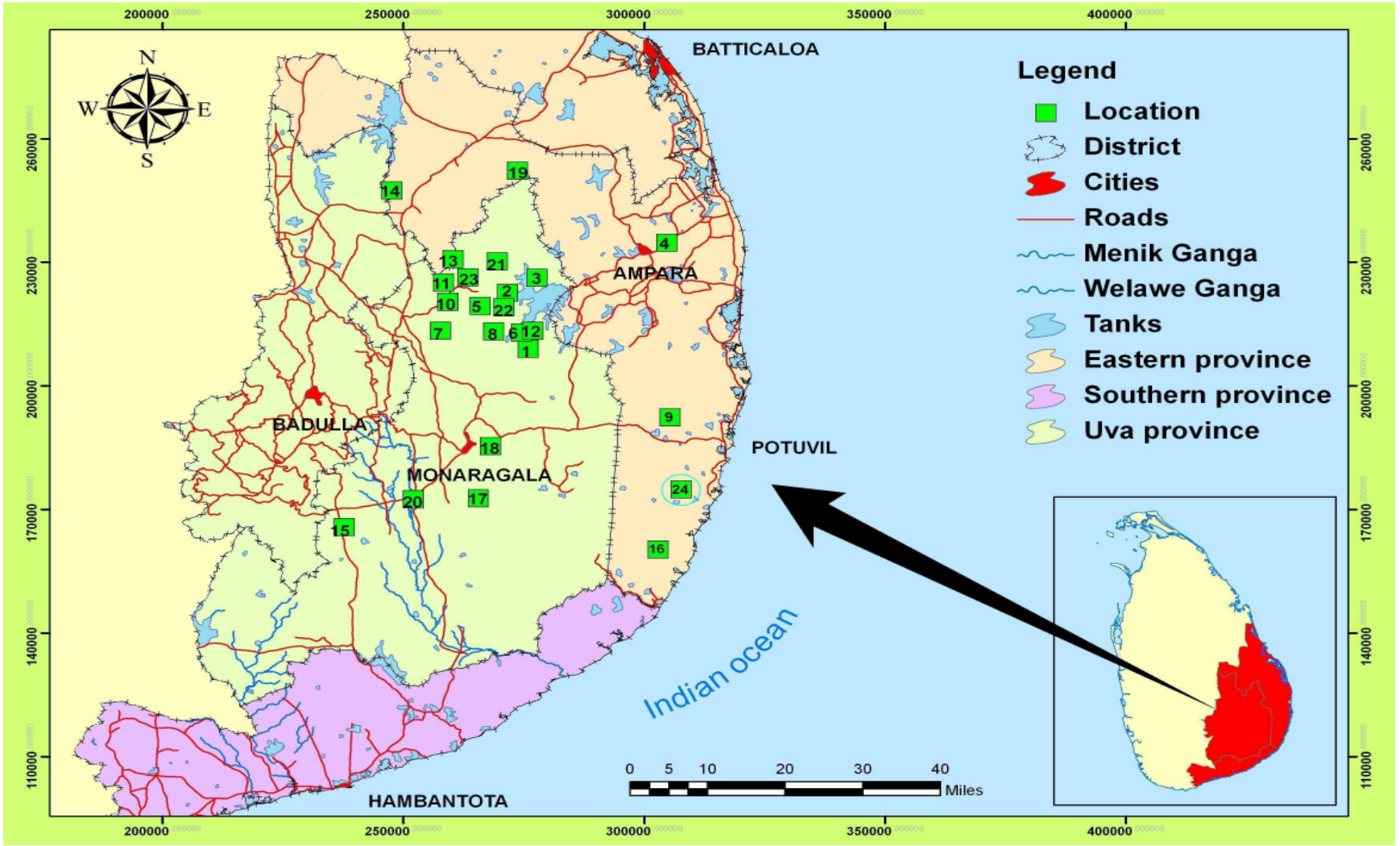

Figure 1: Current distribution pattern of Hemidactylus hunae

1) Baduluwelakanda; 2) Bambarabeddegala; 3) Beddegala; 4) Buddangala; 5) Bulupitiyahela; 6) Dambadeniyahela; 7) Godigamuwahela; 8) Guruhela; 9) Habuthagala; 10) Hamapolakanda; 11) Hangala; 12) Hewamedillahela; 13) Karandugala; 14) Kokagalakanda; 15) Koslanda; 16) Kudumbigala; 1) Maligathenna; 18) Maragalakanda; 19) Nuwaragala; 20) Rahathangala; 21) Rathugala; 22) Ulhela; 23) Yakunhela; 24) Panama "Type locality"

highest temperatures recorded in August (33°C). The mean annual temperature in the Panama area is 29.4°C with a lowest recording of 28.1° C. According to Gunatilleke and Gunatilleke (1990), the area is classified as tropical dry mixed evergreen forest. The dominant tree species in the area are *Manilkara hexandra* (Palu), *Dimorphocalyx sepiaria* (Weera), *Terminalia arjuna* (Kumbuk), *Diospyros ebenum* (Kaluwara), *D. malabarica* (Thimbiri), *D. chaeocarpa* (Kalumediriya), *Schleichera oleosa* (Kon), *Limonia acidissima* (Divul), *Ficus* sp. (Nuga) and the climbing plant *Entada pusaetha* (Puswel). The area is full of large caves (8-12m width and 10m high), large rocks, stone boulders, and is shady due to the high (20m) forest canopy. Recent survey results show that the Paanama area harbours 14 species of amphibians and 43 spe-cies of reptiles (Somaweera *et al.,* 2004).

Observation at type locality

The rediscovery was made on February 21, 2007 at 11.10 hrs on a clear morning with normal weather conditions. Observations were made with the naked eye from a distance of about 2m from the gecko. No disturbances were made to the animal during the time of observation. A fully grown mature male *Hemidactylus hunae* (SVL 128.5mm and TL 136.3mm) was caught. The gecko was lying on a dark cave wall, 2m above ground level. In the same cave, we also observed six other specimens including two juveniles. One of the members of the research group caught other two other adult specimens: SVL 116.3mm and TL 122.7mm male; SVL 112.4mm and TL 117.3mm female from the other side of the same cave. There were numerous suitable microhabitats for *H. hunae*, but the juvenile individual count was very low.

In this location *H. hunae* is sympatric with *Calodactylodes illingworthorum* and *Hemidactylus frenatus*. It was thought that the distribution of *H. hunae* was restricted to between 100m - 400m elevation of the southeastern parts of the country. According to our observations there is a considerable isolated, not stable, population. Hence, this record from Ampara District in the Eastern Province is very significant. Several field trips were made afterwards to gather further data and to locate other individuals, but none of them were successful. Further investigation at the same site to locate this same individual was also a failure. However, this species is the largest endemic member representing the *Hemidactylus* genus in Sri Lanka. Therefore, more research will have to be carried out in this location to gather more data on this species.

Additional observations

According to our field observations *Hemidactylus maculatus hunae* is restricted to the southeastern parts of Sri Lanka in the dry zone and intermediate zone between about 25m to 400m a.s.l.. During our surveys in Ampara, Badulla and Monaragala districts we recorded 24 separate locations, which are shown in the map. We also identified 58 important granite caves and rock boulders in these areas. Out of these, 5 caves were represented as egg-deposition sites. In these egg-deposition sites we counted 11 eggs in total (measurements range from to 8.2mm – 8.7mm wide and 10.8mm – 12.1mm long; mean is 8.4mm x 11.5mm). In total, 92 individuals were recorded during the whole study period. Out of the 92 individuals, 63 were found in dark granite caves; 21 in cement mixed-clay-walls; and 8 in well shaded anthills. Most of the *H. hunae* use these anthills and granite caves to hunt for their prey.

All the eggs were found in dark granite caves enclosed with huge anthills; egg deposition sites were well protected from sunlight and rain. Only one female enters the egg- deposition site at a time and lays 1 to 3 eggs. We have never observed more than one female laying eggs at the same time. But according to Deraniyagala (1953), *H. hunae* is communal oviposition.

These geckos are very active from 16.00 hr to 22.00 hr, but from 23.00 hr to 15.00 hr they are inactive with no movement. During the daytime from 11.00 hr to 14.00 hr they lie motionless on the inside dark surface of granite caves. No individuals were ever sighted on tree trunks. On rare occasions, in the daytime in secluded places, we sighted some individuals on clay-walls. These hermitages are very cool and shady places because of closed forest and many streams flowing nearby them.

Table – 1. Locations, population, biological and elevation range data were recorded during the study period 2003 to 2007. [Abbreviations: Number of Caves Observed (**NCO**); Number of Egg Laying Sites (**NES**); Number of Eggs (**NOE**); Number of Individual (**NOI**) and Elevation (**ELE**)].

Location		NCO	NES	NOE	NOI	ELE
1	Baduluwelakanda	2	0	0	3	280m
2	Bambarabeddegala	2	0	0	4	400m
3	Beddegala	1	0	0	2	350m
4	Buddangala	3	0	0	2	140m
5	Bulupitiyahela	3	0	0	5	390m
6	Dambadeniyahela	1	0	0	3	200m
7	Godigamuwahela	1	0	0	3	230m
8	Guruhela	2	0	0	2	370m
9	Habuthagala	1	0	0	1	200m
10	Hamapolakanda	5	1	2	4	200m
11	Hangala	3	1	1	4	180m
12	Hewamedillahela	2	0	0	2	360m
13	Karandugala	4	0	0	7	250m
14	Kokagalakanda	2	0	0	4	390m
15	Koslanda	1	0	0	1	400m
16	Kudumbigala	2	0	0	2	80m
17	Maligathenna	4	0	0	3	160m
18	Maragalakanda	3	1	3	6	400m
19	Nuwaragala	2	0	0	2	400m
20	Rahathangala	2	0	0	5	180m
21	Rathugala	3	0	0	4	210m
22	Ulhela	2	0	0	2	400m
23	Yakunhela	4	2	5	12	400m
24	Panama	3	0	0	9	25m
	Total	**58**	**5**	**11**	**92**	

Karunarathna and Amarasinghe (2011) reported the first relevant record of this gecko feeding on a rat.

Current distribution

Data on the distribution of *H. hunae* in Sri Lanka were collected during five years of studies (2003 to 2007) recorded from 24 locations. According to available data, the species has been recorded from 33 localities: Ampara, Buddangala, Deegawapi, Galoya, Habuthagala, Kokagala, Kudumbigala, Kumana, Lahugala, Mahaoya, Nuwaragala, Paanama (Ampara District), Koslanda (Badulla District) and Baduluwelakanda, Bambarabeddegala, Beddegala, Bulupitiyahela, Dambadeniyahela, Godigamuwahela, Guruhela, Hamapolakanda, Hangala, Hewamedillahela, Karandugala, Maligathenna, Maragalakanda, Monaragala, Nilgala, Rahathangala, Rathugala, Siyabalanduwa, Ulhela, Yakunhela (Monaragala District) (De Silva *et al.*, 2004; Wickramasinghe and Somaweera, 2008). They are well established in intermediate zone savannah forest at Monaragala District, especially around the Senanayake tank.

Table – 2. Measurements (mm) of the 11 eggs were recorded in 4 locations.

Egg no.	Width	Long	Habitat
1	8.5	11.9	Under red and dry soil
2	8.3	11.4	- do -
3	8.6	10.9	- do -
4	8.4	11.7	- do -
5	8.5	11.5	- do -
6	8.2	11.8	Under granite rock
7	8.7	12.1	- do -
8	8.5	10.8	- do -
9	8.5	11.6	Under ash and dry soil
10	8.4	11.8	- do -
11	8.6	11.8	- do -
Mean	**8.4**	**11.5**	

Conclusions

Human impact on the natural habitats of *H. hunae* is very high and deforestation is increasing rapidly due to the extension of paddy cultivations. In addition to the granite rocks being demolished for building material, the villagers believe mythical stories about this gecko species. In the Nilgala area, the tribal men and villagers are very afraid of these geckos as they believe that if this species touches their body it will cause many diseases. Therefore, tribal men kill this species on sight.

Authorized government establishments should work to minimize the demolishing of granite rocks as well as illegal deforestation, Chena cultivations and manmade forest fires. *H. hunae* is an endemic and near-threatened gecko species. Unless conservation measures are taken, their numbers may go down in the near future. More published literature on their ecological status is needed for the management of this species.

Acknowledgements

The authors would like to thank Mr. Mendis Wickramasinghe, Mr. Prasanna Samarawickrama, Mr. Naalin Perera, Mr. Sarath Ekanayake, Mr. Chandana Asela and Mr. Sampath Goonatilake (IUCN – Sri Lanka) and Mr. Kelum Manamendra-Arachchi (WHT) for their various assistance. They would also like to thank Mr. Thasun Amarasinghe, Mr. Chamila Soysa, Mr. Toshan Peiris, Mr. Tiran Abeywardena, Mr. Panduka Silva, Mr. Asanka Udayakumara and Mr. Niranjan Karunarathna (YZA – Sri Lanka) for field support.

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Adult male Hemidactylus hunae

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Dorsal aspect of head and scales of H. hunae

Large irregular and subconical tubercle presence in flank of H. hunae

Ventral aspect of head and scales of H. hunae

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OCCURRENCE OF WHITE-WINGED WOOD DUCK (Cairina scutulata) IN FOREST ECOLOGY OF NAMERI NATIONAL PARK, ASSAM (INDIA)

by Niranjan Das and Sujata Deori

Introduction

Assam State in northeast India is one of the richest biodiversity zones in the world and consists of tropical rainforests, deciduous forests, riverine grasslands, bamboo orchards and numerous wetland ecosystems. Many are protected as national parks and wildlife sanctuaries. Kaziranga – home of the rare Indian rhinoceros – and Manas are two UNESCO World Heritage Sites in Assam.

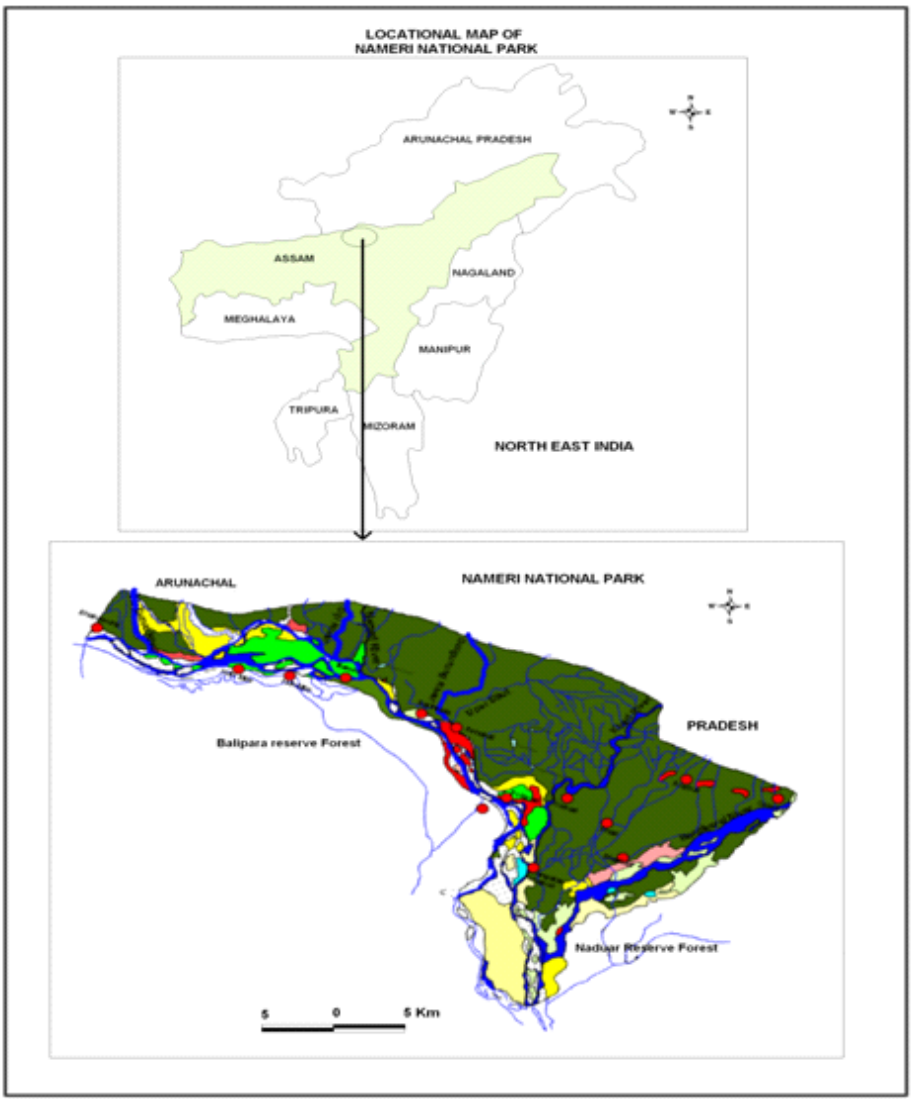
Nameri National Park is part of the north bank landscape of the Brahmaputra River as propagated by WWF and is located near bordering Assam and Arunachal Pradesh; it also is a part of the Eastern Himalayan biodiversity hotspot. A survey was conducted in Nameri National Park during 2008-2009 and 337 avian species was recorded. A detailed checklist of birds was compiled on the basis of fieldwork carried out in the same year. This includes, as reported in the International Union for Conservation of Nature (IUCN) Red List, the White-winged wood duck (*Cairina scutulata*), which is included in the endangered species of 2010 IUCN Red List Category (as evaluated by Bird Life International - the official Red List Authority for birds for IUCN). In the present study the author discusses the ecology and distribution of white winged-wood duck in Nameri National Park, as the park is considered a sheltered habitat for endangered species in the world.

Nameri National Park is located at Latitude 26°50'48" to 27°03'43" North and Longitude 92°39'00" to 92°59'00" East and covers an area of 200 km^2 in the foothills of the eastern Himalayas in Assam. It is contiguous with Pakhui Wildlife Sanctuary in Arunachal Pradesh to the north, and together they exceed 1,000 km^2 with elevations ranging from 79 to over 1,500 m above sea level. The park is bounded by the Bor-Dikorai River and Sijussa forest camp in the east. Its western border is marked by the Jia-Bhorelli River and is adjacent to Balipara Reserve Forest, while its northern border is contiguous with Pakhui Wildlife Sanctuary of Arunachal Pradesh. The southern border is marked by the confluence of the Jia-Bhorelli and Bor-Dikorai rivers. The park is criss-crossed by the tributaries of the Jia-Bhorelli river namely: Diji, Dinai, Doigurung, Nameri, Dikorai, Khari, etc.

The terrain is undulating, with lower areas at elevations between 80–100 m above sea level along the Jia-Bhorelli and its tributaries, and higher areas at 200–225 m above sea level in the central and northern parts of the park. Soils are characterized by sandy or sandy loam alluvial deposits. Numerous small rivers and perennial streams originating in Arunachal Pradesh run through the park and feed into the Jia-Bhorelli River. Many rivers shift their course during the rainy season and form dry riverbeds during the winter. Forest and woodland cover the majority of the park (94% or 188 km^2). Grasslands are found along the banks of the Jia-Bhorelli River and its tributaries and cover an area of 10 km^2 (5%). The remaining 2 km^2 (1%) is formed by various river beds. Nameri is covered by Tropical Evergreen, Semi-Evergreen and Moist Deciduous forests with cane and bamboo brakes and narrow strips of open grassland along rivers. Grasslands comprise less than 10% of the total area of the park, while the Semi-Evergreen and Moist Deciduous species dominate the area. The vegetation of the park is a mosaic of four major forest types (Champion and Seth, 1968): 1) Eastern

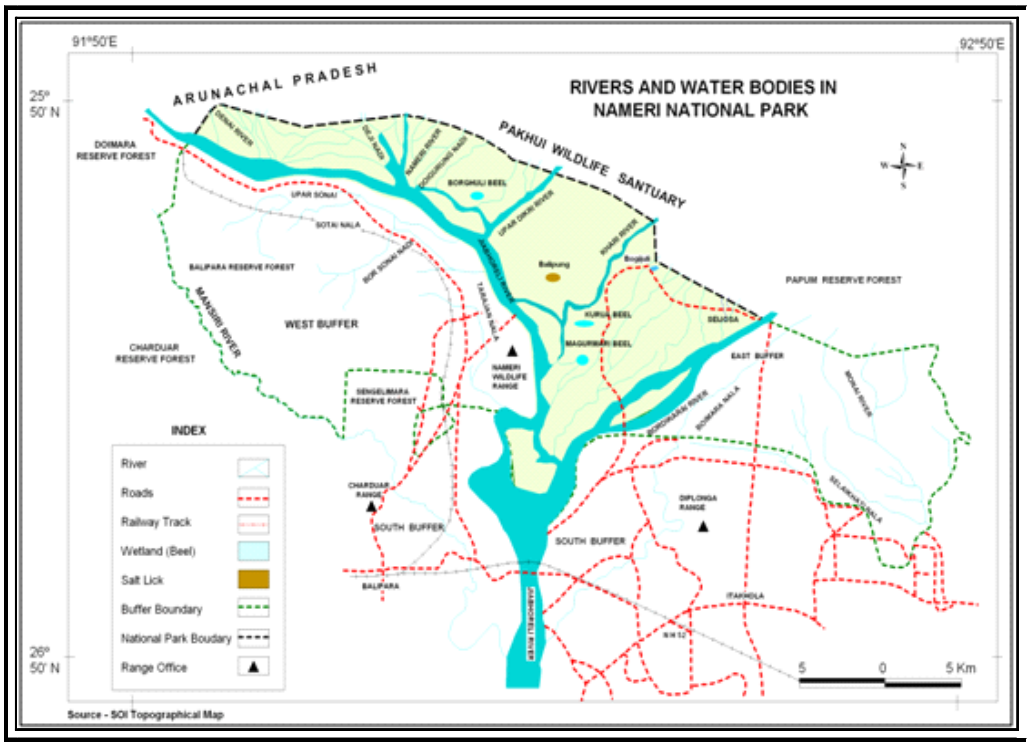
Alluvial Secondary Semi-Evergreen Forest; 2) Low Alluvial Savannah Woodland; 3) Eastern Dillenia Swamp Forest; and 4) Wet Bamboo Forest (usually found along streams or on badly drained hollows), with areas of cane brakes formed by *Calamus tenuis*. Orchids found in the park include Dendrobium, Cymbidium, Ladies Slipper, etc. Tree ferns, lianas and creepers are some of the specialties of this forest.

The subtropical monsoon climate of the region is characterized by heavy rainfall with an annual average of 3,500 mm. The predominance of the southwest monsoon in this region causes precipitation to be highly seasonal (Barthakur, 1986). Most of the rain falls between May and September, which marks the summer (hot) season. Winters (October to April) are usually cool and dry, although rains are not uncommon. The average temperature in the area varies from a low of 5°C in winter to a high of 37°C in summer. The relative humidity is high, and varies between 65% to 90% or more. Parts of the area were declared as Naduar Reserve Forest (present East Buffer) in 1876 and Nameri Wildlife Sanctuary in 1985. The Nameri National Park was formed in 1998.



The Jia-Bhoreli river

The Jia-Bhorelli River forms the western boundary of the national park; its basin covers an area of 11,716 km^2 and lies between 26°37'N to 28°0'N latitudes and 92°0'E to 93°25'E longitudes. It originates in the great Himalayan ranges at an elevation of 4,520 m and traverses a total distance of 247 km through mountains, hills and plains until reaching its confluence with the Brahmaputra. Perennial waters of numerous feeder streams coming from different ranges feed the Jia-Bhorelli River. The basin falls in the state of Assam and Arunachal Pradesh, accounting for 6.7% of the total catchment area of the Brahmaputra river system. Out of its total basin area, 10,239.8 km^2 (87.4%) lies in the hills of Arunachal Pradesh and 1,476.2 km^2 (12.6%) in the plains of Assam. The Jia-Bhorelli basin, with a truncated base, has a maximum length of 157 km and a maximum width of 143 km. In the Nameri National Park, the Jia-Bhorelli River and its flood plain covers an area of 163.4 km^2, which is 1.39% of the entire Jia-Bhoreli basin. The river traverses a distance of 62 km from Bhalukpung, situated near the Assam-Arunachal Pradesh border, to its confluence with the Brahmaputra River just near the Bhomoraguri hill near Tezpur (Bora *et al*., 1988).



List of wetlands with area and locations of White-winged wood duck

Sl. No.	Name of wetlands	Area	Seasonality
1	Borghuli Beel	0.20 sq. km.	Only in winter
2	Kurua Beel	0.30 sq. km.	Throughout the year
3	Magurmari Beel	0.30 sq. km.	Throughout the year
4	Near the confluences of Diji and Khari river	0.60 sq. km.	Only in winter
5	Near the edge of the high forest in Bogijuli area	0.20 sq. km.	Throughout the year

***Source**-Authors Field Observations, 2009*

Table 1: Water Bodies of Nameri National Park

Sl No.	Name of the water course	Nature	Location
Water bodies in Core Area			
1	Jia-Bhoreli River	Perennial	All along the western boundary of the Nameri National Park
2	Dihaipur Nala	Perennial	Tributary of Jia-Bhoreli river
3	Diji Nadi	Perennial	Tributary of Jia-Bhoreli River
4	Nameri Nadi	Perennial	Tributary of Jia-Bhoreli River
5	Doigrung Nadi	Perennial	Tributary of Jia-Bhoreli River
6	Upar-Dikrai Nadi	Perennial	Tributary of Jia-Bhoreli River
7	Khari Nadi	Perennial	Tributary of Jia-Bhoreli River
8	Bogijuli Nala	Perennial	Tributary of Jia-Bhoreli River
9	Koilajuli Nala	Perennial	Tributary of Jia-Bhoreli river running through the area between Bogijuli Nala and Bor-Dikorai river.
10	Bor-Dikorai River	Perennial	Tributary of Jia-Bhoreli River along the eastern boundary of the Park
Water bodies in East Buffer			
11	Boimara Nadi	Perennial	Tributary of Jia-Bhoreli River through Nauduar Reserve Forest
12	Monai Nala	Perennial	Tributary of Ghiladhari River starting from Nauduar Reserve Forest
13	Selaikhati Nadi	Perennial	Tributary of Ghiladhari River
14	Monai and Chota Ghiladhari Nadi	Perennial	Tributary of Ghiladhari River
Water bodies in West Buffer			
15	Ghiladhari River	Perennial	Along the Eastern Boundary of Nauduar Reserve Forest
16	18th mile Nala	Seasonal	Tributary of Jia-Bhoreli River
17	Upar -Sonai Nadi	Perennial	Tributary of Jia-Bhoreli River
18	Chotai Nadi	Perennial	Tributary of Uper -Sonai Nadi
19	Bor-Sonai Nala	Perennial	Tributary of Jia-Bhoreli River
20	Tarajan Nala	Perennial	Tributary of Jia-Bhoreli River

Plant varieties of Nameri National Park

Plants are grouped into flora based on region, period, special environment, or climate. Plant diversity depends on climate, altitude, soils and the presence of other species.

Plants are living organisms belonging to the kingdom Plantae. It includes familiar organisms such as trees, herbs, bushes, grasses, vines, ferns, mosses, green algae, etc. These eco-regions are a part of the Eastern Himalayan Mega Biodiversity Hotspot. It is one of the richest areas in the world

in terms of Plant Functional Type[1] and Plant Functional Complexity. Nameri National Park has relatively rich natural vegetation with numerous medicinal and commercial plant species. Most parts of the park are covered by Moist Mixed Deciduous Forest and it provides shelter to more than 600 species of plants. The Tropical Evergreen and Semi-Evergreen Forests mingle here with the Moist Deciduous Forest. The other forest types like cane and bamboo brakes and narrow strips of open grassland can also be found in this park.

Some of the most common and dominant plant species in the Nameri National Park include: *Albizzia lucida, Albizzia procera, Amoora wallichii, Artocarpus chaplasha, Baccaurea sapida, Bischofia javanica, Bombax ceiba, Canarium strictum, Castanopsis indica, Cordia dichotoma, Cinnamomum cecicodaphnea, Dendrocalamus hamiltonii, Dillenia indica, Duabanga grandiflora, Duabanga sonneratoides, Dysoxylum procerum, Endospermum chinese, Lagerstroemia flos-reginae, Litsea sebifera, Mesua ferrea*, etc.

Apart from these, other species present include: *Morus roxburghii, Premna bengalensis, Pseudostachyum polymorphum, Pterospermum acerifolium, Sapium baccatum, Shorea assamica, Sterculia hamiltonii, Syzygium cumini, Terminalia citrina, Terminalia myriocarpa, Trewia nudiflora, Vatica lanceaefolia*, etc.

The vegetation of the park varies from riverine succession stage of grasslands to climax stage of high forests of various species. Nameri National Park falls under the Brahmaputra Valley Biogeographic Province[2] (9A) of North-East Biogeographic Zone (9), as per the Biogeographic classification of India (2000).

The forest types of Nameri National Park

Areas of the park correspond to the following forest types as classified by Champion and Seth (1968)[3]

(i)	1/1B/C2 (b)	Upper Assam Valley Tropical Evergreen Forest or Mesua Forest
(ii)	1/2B/1S1	Sub-Himalayan Light Alluvial Semi Evergreen Forest
(iii)	1/2B/2S1	Pioneer Euphorbiaceous Scrub
(iv)	1/2B/2S2	Eastern Alluvial Secondary Semi Evergreen Forests
(v)	1/2/E1	Cane Brakes
(vi)	1/3C2d (iii)	Eastern Heavy Alluvium Plains Sal
(vii)	1/3/C3 (b)	East Himalayan Moist Deciduous Forests
(viii)	1/3/1S1	Low Alluvial Savannah Woodland (Salmalia–Albizzia)
(ix)	1/4D/SS5	Eastern Dillenia Swamp Forest

(a)Dillenia Biscofia Composition
(b)Dillenia-MesuaComposition

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1 Plant functional Type and Plant Functional Complexity were first designed by grouping plants a priori based on knowledge of their function or on observed correlations among their morphological, physiological, biochemical, reproductive or demographic characteristics. It was assumed that these classifications would allow predicting changes in the ecosystem processes directly from projected changes in plant species composition in response to global change.

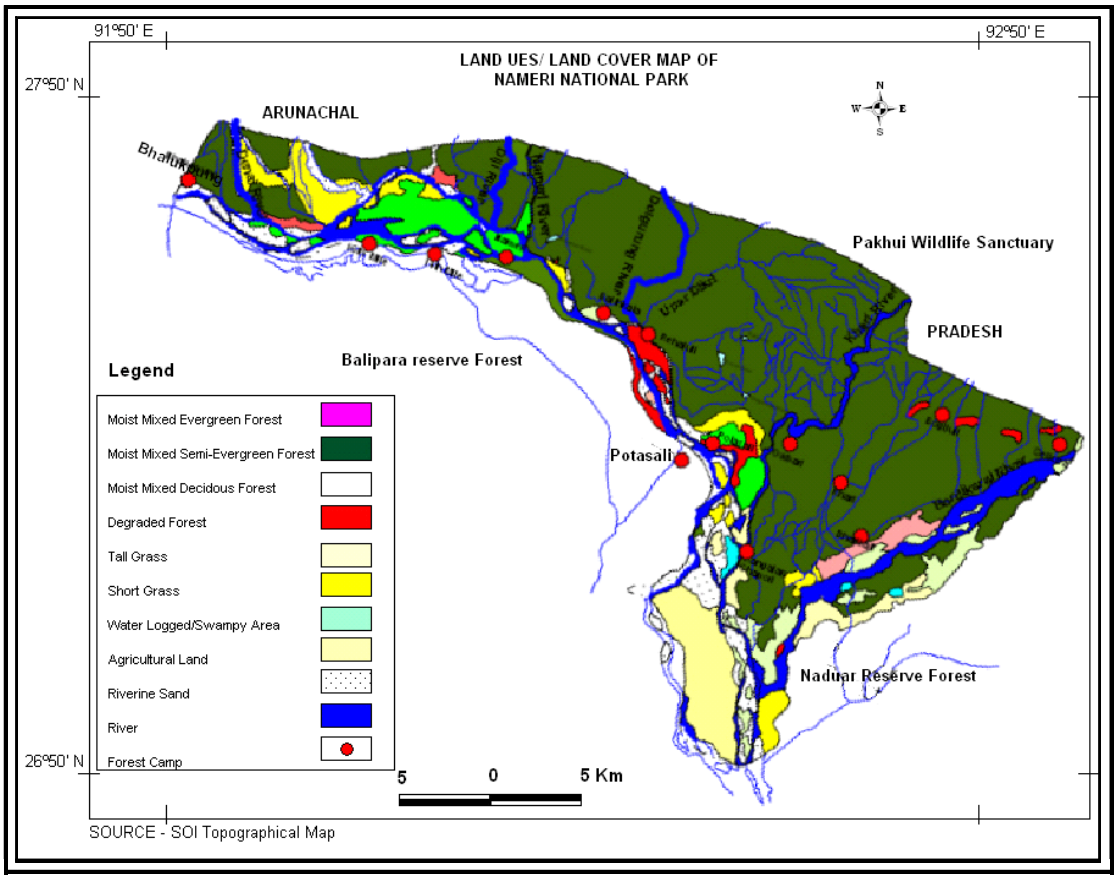
2 Biogeographic Region is an ecologically and geographically defined area smaller than a 'realm' or 'ecozone'. It covers relatively large areas of land or water, and contains characteristic, geographically distinct assemblages of natural communities and species.

3 Champion, H.G. and Seth, S.K. (1968) classified forests into five major groups based on climatic factors. These major groups have been further divided into 16 type groups based on temperature and moisture content. A few of these type groups have been further divided into several subgroups. Ultimately, the type groups have been classified into 221 forest types and subtypes based on location specific climate factors and vegetation formation. Structure, physiognomy, floristics, temperature, edaphic factors, and moisture are all used as characters to define the types.

Table 2: Forest Types of Nameri National Park

Type of Forests	Core area	East buffer	West buffer
1/1B/C2 (b) Upper Assam Valley Tropical Evergreen Forest or Mesua Forest	+	+	-
1/2B/1S1 Sub- Himalayan Light Alluvial Semi Everest Forest	+	-	-
1/2B/2S1 Pioneer Euphorbiaceous Scrub	+	+	-
1/2B/2S2 Eastern Alluvial Secondary Semi Evergreen Forest	+	+	+
1/2/E1 Cane Brakes	+	-	-
1/3C2d (iii) Eastern Heavy Alluvium Plains Sal	-	-	+
1/3C3(b) East Himalayan Moist Deciduous Forest	-	-	+
1/3/1S1 Low Alluvial Savannah Woodland (*Salmalia- Albizzia*)	+	+	-
1/4D/SS5 Eastern Dillenia Swamp Forest (a) Dillenia- Biscofia Composition (b) Dillenia- Mesua Composition	+	+	+

Source: *Champion and Seth 1968, A Revised Survey of the Forest Types of India.*
(+) Available, (-) Unavailable



Forest cover in the park and buffers

The density of forest cover in the park varies from 0.5 to 0.9 (as per NDVI)[4] There are open areas in the east and west buffer zones where encroachment takes place (Das, 1998). Food for herbivores is abundant in the core area. As the foraging area required for Asiatic elephants is quite big, many elephants come out of the forests and cause depredations in the paddy lands of nearby villages during October to December. Fruiting trees are available for avian species.

The water bodies in the form of wetlands such as Borghuli Beel, Kurua Beel and Magurmari Beel are formed in the dry courses of the Jia-Bhorelli River. They are the habitat for aquatic birds during the dry season. The *Ficus, Bischofia, Prema, Amoora, Terminalia, Castanopsis*, etc. seed-bearing trees are available for the avian species. Grasslands are available for deer and other herbivores. Natural food for animals in both the eastern and western buffer areas is almost non-existent.

Altingia excelsa and *Morus laveagata* were abundant in this locality, but due to exploitation prior to formation of the wildlife sanctuary, these species have become rare. The grasslands along the riverbanks and river islands should be protected and maintained for forage by the herbivores. *Mesua ferrea*, which was once abundant in both the east and west buffers, has also died out due to excessive opening of the forest cover.

Results

Like most areas in North-East India, Nameri has been inadequately surveyed for avian species. No published checklist of the birds of the park exists, although there is some literature relating to birds in the neighboring Pakhui Wildlife Sanctuary of Arunachal Pradesh (Datta *et al*.; 1998; Singh, 1991, 1994). Fieldwork was mostly done in Nameri during all seasons from 2008 to September 2009. Before then, records were kept from ecotourism excursions in the park. Bird species from Nameri are recorded in Talukdar (1997), Talukdar and Das (1997), Dymond (1998), Hendriks (1998), and Barua and Sharma (1999) (see also the IUCN Red List (Bird Life International 2004).

Observations of white-winged wood duck found in Nameri National Park (including IUCN-2010 status)

Description

The white-winged wood duck (*Cairina scutulata*) is large, with a black body and a white head thickly spotted with black, conspicuous white patches on the wings and red or orange eyes. Its average length is about 81 cm. The males have more gloss on the plumage and are much larger and heavier than the females. Its voice is distinctive and ghostly, and accounts for the Assamese name 'Deo Hans' or Spirit Duck. In Burma, it is called 'Mandali', and in Indonesia 'Itik Hutan', or Forest Duck. The white-winged wood duck is one of the most endangered birds in the world. It was once distributed widely across northeast India and South-East Asia, but now only about 800 survive in the wild, of which about 450 are present in northeast India. In India, the duck is limited to Assam and Arunachal Pradesh.

The white-winged wood duck is essentially a resident of the dense tropical evergreen forest. It prefers to live in inaccessible swampy areas formed by numerous rivers, streams, crocks, etc. This duck is generally found in pairs or in small parties of four to six, although parties of more than 10 have also been recorded. It is a shade-loving bird, spending most of the day in secluded jungle pools, occasionally perching on the trees during the day.

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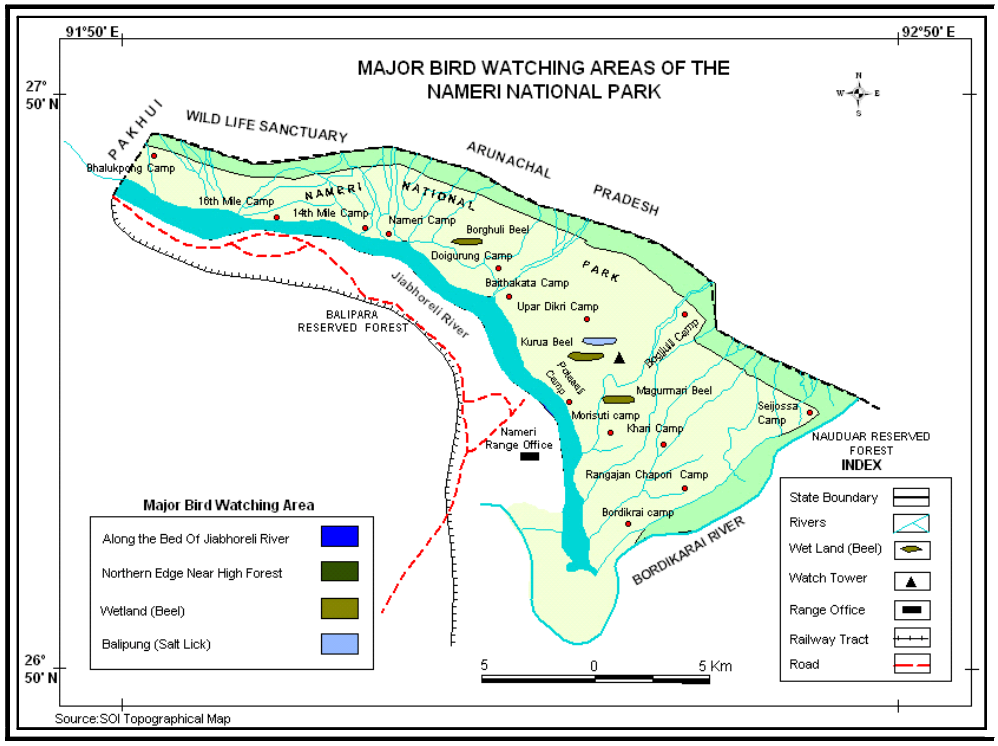
[4] Nearly all satellite Vegetation Indices employ a difference formula to quantify the density of plant growth on Earth - near-infrared radiation minus visible radiation divided by near-infrared radiation plus visible radiation. The result of this formula is called the ***Normalized Difference Vegetation Index*** *(NDVI). Written mathematically, the formula is:* ***NDVI*** *= (NIR — VIS)/(NIR + VIS)*

Calculations of NDVI for a given pixel always result in a number that ranges from minus one (-1) to plus one (+1); however, no green leaves give a value close to zero. A zero means no vegetation and close to +1 (0.8 - 0.9) indicates the highest possible density of green leaves.



It moves to its feeding grounds in open waters after dusk and remains active throughout the night until early morning. The adults are largely omnivorous. The food consists of plant and animal material, aquatic plants, seeds of wild and cultivated plants, aquatic insects, crustaceans, molluscs, frogs, snakes and fishes. The ducklings seem to start feeding entirely on small animals, progressively expanding their diet to include insects, worms, small snails and fish. The usual call of the male is a trumpet-like cronk, while the call of the female in flight is a whistle. It breeds in the hollows of trees during summer months.

Nameri is one of the few areas where this species has been recorded in Assam outside its main stronghold in the Dibru-Saikhowa Biosphere Reserve in Dibrugarh and Tinsukia districts, where a population of 200 individuals is estimated (out of a total Indian population of 300-350 individuals (Islam *et al.*, 2002). This resident species inhabits pools and secluded marshes in dense forest. There are three wetlands in addition to perennial rivers and streams – Borghuli Beel, Kurua Beel and Magurmari Beel, which are formed in the dry courses of the Jia-Bhorelli River, and are the habitat of white-winged wood duck in the park. Sightings are fairly regular and breeding occurs in the park. Eleven ducklings were seen on 17th November 2006 with two adults, along with a small group of Oriental Darters (*Anhinga melanogaster*) in Borghuli Beel (secluded wetland) in the early morning.

In the beginning of the 20th century, this species was reported to be very common in South-East Asia. However, during the latter half of the century the population of this duck dropped alarmingly. In 1951, the bird was declared to be one of the most threatened species of the ducks of northeastern India by the Indian Wild Life Board and was placed on the special protected list.

The primary factor affecting the population of wood ducks is the disturbance and destruction of the forest habitat. In nearly all instances this has been due to the activities of man. The survival of the species appears to depend on the continued existence of dense, undisturbed primary rain forest in South-East Asia.

In 1997, it was estimated that there were only 450 birds left in the wild, spread between Laos, Thailand, Vietnam, Cambodia, Indonesia

(Sumatra), India (northeastern part) and Myanmar. It is thought to now be extinct in Malaysia and Java.

The severe decline in the duck's population is largely attributed to the destruction, degradation and disturbance of riverine habitats, including loss of riparian forest corridors. The resultant small, fragmented populations are vulnerable to extinction due to loss of genetic variability, disturbance, hunting and collection of eggs and chicks for food or pets. More local threats to the bird include inappropriate forest management, and pollution.

WWF-India is working to conserve the habitats of white-winged wood duck though its Western Arunachal Pradesh and North Bank Landscapes programmes in Arunachal Pradesh and Assam respectively.

Conservation status

Deforestation is the main threat that white-winged wood ducks face. Other contributing factors are pollution and hunting. White-winged wood ducks live in heavily forested areas and hide during the day; it is difficult to get an accurate count of the species in the wild. They are currently on IUCN's Red List as an endangered species with an estimated 800 left in the wild as of the year 2002.

Conservation efforts in the bird's native lands include protection of habitats and enforcement of hunting regulations. Surveys of current populations are being conducted to try and determine an accurate number of the white-winged wood ducks left and to identify their habitats. Preventing deforestation in their habitats is extremely important. Each pair of white-winged wood ducks needs approximately 250 acres of habitat in order to breed.

Captive breeding programs for white-winged wood ducks have been successful in increasing the captive population, but of little success in benefiting the wild population. A few of the captive-bred ducks were able to be released into the wild, but it is a rare occasion that a release in the wild is possible.

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(continued from p.16)

HABITAT SELECTION PATTERNS OF BLACKBUCK (Antelope cervicapra) AND CHINKARA (Gazella bennetti) IN THAR DESERT OF RAJASTHAN (INDIA)

by H.S. Gehlot and G.R. Jakher

Introduction

The Thar Desert is rich in many varieties and populations of wildlife fauna. There are several types of physical environments with their specific fauna (e.g., Blackbuck and Chinkara) and the local people (*Bishnoies*) have been very protective of the wildlife, providing full protection to them. Despite its harsh environmental conditions, the Rajasthan Desert supports a large number of wild animals. Among the wild ungulates of this desert, the Indian gazelle (*Gazella bennetti*) and the Indian antelope (*Antelope cervicapra*) are the predominant species. As a result of almost continuous hunting and poaching and also due to the gradual degradation of its preferred natural habitats, the present population of Indian antelope may not be more than 4.6 percent of its earlier strength (Mukherjee, 1976). Due to habitat destruction these species are listed as endangered under Schedule II, Part II of the Wildlife Protection Act of India, 1972 and in Appendix II of CITES.

Materials and methods

Study area

The two sites selected for intensive study are situated in Guda Bishnoi Wildlife Closed Area, located 20 km southeast of Jodhpur city. The closed area is a preferred habitat of Chinkara and Blackbuck and is situated at 26°07.426 N latitude and 73°05.495 E longitude at 629 ft altitude above MSL near national highway No. 65. The Guda Bishnoian village complex area has been divided into two distinct habitat types on the basis of different topographical features, soil type and salinity levels. The northern part selected for the intensive study, named Guda Bishnoi-I, lies at 26°11.906' N latitude and 73°06.875' E longitude and is inhabited by Indian gazelle. The area close the Luni river and south of Guda village was selected for the Blackbuck intensive study site and named GB-II. The preferred habitat of the blackbuck is situated at 26°06.909' N latitude and 73°05.038' E longitude. The intensive study sites had three widely separated pockets of scrub vegetation. The scrub is dominated by shrubs such as *Prosopis juliflora*, *Capparis decidua*, *Ziziphus nummularia*, and some other species including *Maytenus emarginata*, *Prosopis cineraria*, *Lycium barbarum* and occasionally *Acacia senegal*. A similar type of *Prosopis-Capparis-Maytenus* type of vegetation grows on the edges of crop fields. *Crotolaria burhia* was comparatively less abundant in Guda Bishnoi II. During the monsoon, a large area is put under cultivation for crops such as Bajra (*Pennisetum typhoides*), Moth (*Phaseolus aconitifolia*), Gaur (*Cyamopsis tetragonoloba*), Mung (*Vigna radiata*) and Til (*Sesamum indicum*). Apart from ungulates like the Indian gazelle (*Gazella bennetti*), Blackbuck (*Antelope cervicapra*) and Nilgai or Bluebull (*Boselaphaus tragocamelus*), the closed area and agricultural landscapes still support Wolf (*Canis lupus*), Indian fox (*Vulpes bengalensis*), Desert fox (*Vulpes vulpes*) and Indian porcupine (*Hystirx indica*).

Quadrate method for study of habitats

Three transects, each one km long, were randomly marked off within the intensive study areas for quantifying the habitat to study vegetation parameters. At each 100 m point on each transect a quadrate measuring 100 m^2 was placed to measure the quantitative and qualitative abundance of different flora. This process was repeated each season. Further, for a more detailed study of small grasses, two sub quadrates measuring 0.5 m x 0.5 m were laid down in 10 m radius plots and the

percentage of ground and grass cover, the number of plant species, the type of species and the number of individuals were recorded. These basic quantitative vegetation ecology parameters were used to measure the relative importance of species and to determine the dominant species using the Important Value Index for the vegetation of the study site. The relative importance of each species in the community was computed in terms of relative frequency (RF), relative density (RD) and relative abundance (RA). The relative values were computed by using the general functions:

$$Rv = Xv / ? Xv .100$$

The sum of three relative values was considered as Important Value Index

IVI= RF+RD+RA

Statistical analysis of the habitat

The behavioural data were recorded in the ratio scale and the vegetation data were expressed in percentages. Since the sampling technique was random and each study area being more or less homogeneous, the percentages expressed were translated to the whole habitat. Windows-based SPSS and Excel programmes were used for statistical analyses and for carrying out the rigorous statistical analysis used in preparing a graphical representation at the study area.

The relation between the habitat and forages consumed by the animals indicates the utilization of niche by the animals in relation to availability of forages. It is expressed in terms of the Relative Preference Index (PRI) and was calculated following Putman (1986):

$$PRI = \frac{\% \text{ utilization}}{\% \text{ availability}}$$

Results and discussion

The study site was divided into different habitat categories on the basis of land use pattern. In all, a 16 km^2 area was under intensive study in two sites. Each intensive site was divided into six habitats on the basis of land use pattern: 1) Recently harvested crop field (RHCF); 2) harvested crop field (HCF); 3) fallow land 3 (FL 3); 4) fallow land 4 (FL 4); 5) scrub land (SL); and 6) hedge row (HR).

During the present study the basic quantitative parameters of vegetation, namely, frequency, abundance and density, were observed to determine the animals' relationship with the food plants. In Guda Bishnoian-I, *Z. nummularia* was found to be denser with a 16.87% relative density and was the most dominant vegetation species with an Importance Value Index of 36.86. During the rainy season, agricultural crops were more abundant. The other important preferred plant – *M. emarginata* – had a 16.30% relative density (Table 2). The Relative Preference Index during summer, winter and monsoon indicated a differential preference of habitats in GB-I by Chinkara (Table 4). The PRI for different habitats used indicates that during summer and winter, RHCF were highly preferred over other habitats with a PRI of 1.61 and 2.10 respectively. During the monsoon season FL 3 was highly preferred against other habitats with a PRI of 1.60 (Tables 3, 4), whereas the PRI for habitats used indicates that during winter and summer scrubland was mostly preferred by Blackbuck over other habitats.

An animal's utilization of the habitat is defined by its need for food and the constraints involved, both extrinsic and intrinsic (Krebs and Davis, 1984) and according to Scenft (1987) foraging behavior is governed at two levels: 1) at the landscape level where the animal selects the feeding area or habitat types; and 2) at the level of the plant communities where plant species are selected in order to meet basic needs of food, cover, water and micro-nutrients. During the present study, Blackbuck spent less time in RHCF and HCF in proportion to FL4, FL3 and scrubland. During summer, the

habitats were utilized by Blackbuck in the following order: SL > HCF > RHCF > FL3-4 > HR. A maximum 29.41% of the time was spent in scrubland. During winter the habitats were used by Blackbuck in the order of: SL > RHCF> HCF > FL3 > FL4 > HA. But the Chinkara spent the maximum time in RHCF during winter and the habitats were used in the order of: RHCF > HCF > SL > FL3 > FL4 > HA (Table-8), whereas during summer the habitats were used in the order of: SL > HCF > RHCF > HR > FL3 > FL4.

The same observation has already been noted by other researchers (Goyal *et al.*, 1986, 1988; Ghosh *et al.*, 1984, 1987) that there is a basic difference between the habitat utilization of Blackbuck and Chinkara. Selection of feeding areas could be a function of spatial and temporal distribution by the nutritive quality, secondary compounds and plant architecture. The preferred habitats of Chinkara are wastelands broken up by dry streams, scattered bushes and jungles (Roberts, 1977); they even inhabit sandy areas. Their altitudinal range is from sea-level up to 1,200 m (in Baluchistan). They are not found in wet areas. In Gujarat, Madhya Pradesh, Maharashtra and Andhra Pradesh Chinkara are seen in forests having a rainfall range of 500-1500 mm, but with a low density (Rahmani, 1990). Various studies have been conducted on habitat selection and food preference on different gazelle species (Goyal *et al.*, 1986; Bharav, 1981; Grettenberger and Newby, 1986; Mohamed *et al*., 1991; Loggers, 1991.)

Acknowledgements

The authors are grateful to Dr. H.C.Bohra, Sr. Scientist CAZRI, Jodhpur, Dr. S. P. Goyal, Mr. Qamar Qureshi, Dr. Y.V. Jhala, Scientist WII Dehradun and A.R. Rahmani, Director, B.N.H.S, Bombay, for providing the relevant literature and giving suggestions and their constant help in carrying out the field work.

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Table 1: Area of different habitat categories of both selected study sites for Chinkara and Blackbuck

S.NO.	Habitat Categories	Site wise area (km^2)		Total area
		GB-I	GB-II	
01	RHCF	1.34	2.10	3.44
02	HCF	1.84	0.95	2.79
03	FL 3	0.54	1.10	1.64
04	FL 4	1.13	1.38	2.51
05	SL	0.23	4.62	4.85
06	HR	0.42	0.35	0.77
	Total	**5.50**	**10.5**	**16.00**

Table 2: Relative importance of floral species in Guda Bishnoi-I Study Site

S.N.	Floral Species	Basic Quantitative Parameters			Relative Values (%)			IVI
		Frequency (%)	Abundance	Density	RF	RA	RD	
1	*P. cineraria*	57.14	1.75	1.0	5.47	2.20	2.03	9.7
2	*C. burhia*	71.42	2.17	2.71	6.84	3.40	5.52	15.76
3	*C. decidua*	57.14	2.0	1.14	5.47	2.51	2.32	10.3
4	*M. emarginata*	100	8.0	8.0	9.58	10.06	16.3	35.94
5	*Z. nummularia*	100	8.28	8.28	6.58	10.41	16.8	36.86
6	*A. nilotica*	57.14	1.5	0.85	5.47	1.88	1.73	9.08
7	*B. aegyptiaca*	71.42	1.8	1.28	6.84	2.26	2.60	11.7
8	*C. procera*	28.57	1.5	0.42	2.73	1.88	0.85	5.46
9	*T. undulata*	42.85	1.0	0.42	4.10	1.25	0.85	6.2
10	*P. juliflora*	28.57	1.0	0.28	2.73	1.25	0.57	4.55
11	*L. pyrotechnica*	42.85	2.66	1.66	4.10	3.34	2.32	9.76
12	*L. barbarium*	85.71	5.33	4.57	8.21	6.70	9.31	24.22
13	*C. pendulus*	28.57	1.0	0.28	2.73	1.25	0.57	4.55
14	*Aerva* spp.	28.57	3.5	1.0	2.73	4.40	2.03	9.16
15	*Cenchrus* spp.	42.85	1.66	0.71	4.10	2.08	1.44	7.62
16	*T. purpurea*	85.71	9.16	7.85	8.21	11.52	16.0	35.73
17	*F. cretica*	42.85	7.66	3.28	4.10	9.63	6.68	20.41
18	Unidentified plant spp	42.85	3.0	1.28	4.10	3.77	2.60	10.47
19	Agricultural crops	28.57	16.0	4.57	2.73	20.12	9.31	32.16
		1042.78	79.51	49.06				

Table 3: Different habitats used by Chinkara (season-wise) at Guda Bishnoi-I Study Site

Habitat Categories	Area (km^2)	Area %	Habitat used (%) by Indian gazelle		
			Winter	Monsoon	Summer
RHCF	1.34	24.36	51.16	13.64	39.23
HCF	1.84	33.45	26.75	30.11	33.03
FL 3	0.54	9.81	5.10	15.70	6.28
FL 4	1.13	20.54	8.62	28.79	11.91
SL	0.23	4.18	3.72	8.56	3.76
HR	0.42	7.63	4.65	3.20	5.79

Table 4: PRI in relation to habitats used by Chinkara in Guda Bishnoi-I Study Site

Habitat Categories	Relative preference index (PRI)		
	Winter	Monsoon	Summer
RHCF	2.10	0.56	1.61
HCF	0.80	0.90	0.99
FL3	0.52	1.6	0.69
FL4	0.42	1.40	0.58
SL	0.89	2.05	0.90
HR	0.61	0.42	0.76

Table 5: Different habitats used by Blackbuck (season-wise) at Guda Bishnoi-II Study Site

S.NO.	Habitat categories	Area (km^2)	Area %	Habitat used by Indian antelope (%)		
				Winter	Monsoon	Summer
01	RHCF	2.10	29.04	20.13	5.27	9.86
02	HCF	0.95		6.09	28.79	11.02
03	FL 3	1.10	23.61	5.24	8.44	9.28
04	FL 4	1.38		4.79	3.39	6.64
05	SL	4.62	44	59.73	48.44	59.32
06	HR	0.35	3.33	4.02	5.67	3.88

Table 6: Relative importance of floral species in Guda Bishnoi-II Study Site

S.N.	Plant Species	Basic Quantitative Parameters			Relative Values (%)			IVI
		Frequency	Abundance	Density	RF	RA	RD	
1	*P. cineraria*	42.85	1.66	0.71	4.05	2.06	2.34	8.45
2	*C. burhia*	28.57	4.5	1.28	2.70	5.60	4.22	12.52
3	*C. decidua*	42.85	1.66	0.71	4.05	2.06	2.34	8.45
4	*M. emarginata*	42.85	1.0	0.42	4.05	1.24	1.38	6.67
5	*Z. nummularia*	85.71	2.6	1.85	8.11	3.23	7.06	18.4
6	*A. juliflora*	57.14	3.25	1.85	5.40	4.04	6.10	15.54
7	*B. aegyptiaca*	28.57	1.0	0.28	2.70	1.24	0.92	4.88
8	*C. procera*	71.42	1.4	1.0	6.75	1.74	3.30	11.79
9	*T. undulata*	28.57	1.5	0.42	2.70	1.86	1.38	5.94
10	*S. persica*	42.85	1.0	0.42	4.05	1.24	1.38	6.67
11	*L. pyrotechnica*	42.85	1.0	0.42	4.05	2.49	2.80	9.34
2	*L. barbarium*	42.85	2.0	0.85	5.40	3.42	5.18	14.0
13	*A. senegal*	28.57	2.5	0.71	2.70	3.11	2.34	8.15
14	*C. pendulus*	28.57	1.0	0.28	2.70	1.24	0.92	4.86
15	*Aerva* spp.	28.57	4.0	1.14	2.70	4.98	3.76	11.44
16	*Cenchrus* spp .	28.57	3.0	0.85	2.70	3.73	2.80	9.23
17	*T. purpurea*	57.14	6.75	3.85	5.40	8.40	12.71	26.51
18	*F. cretica*	57.14	4.25	2.42	5.40	5.29	7.98	18.67
19	*D. bipinnata*	71.42	3.8	2.7	6.75	4.73	8.94	20.42
20	*D. stramonium*	57.14	2.5	1.42	5.40	3.11	4.68	13.19
21	*C. melo*	14.28	2.0	0.28	1.35	2.49	0.92	4.76
22	*C. lanatus*	14.28	3.0	0.42	1.35	3.73	1.38	6.46
23	*C. colocynthis*	14.28	2.0	0.28	1.35	2.49	0.92	4.76
24	*T. terrestris*	28.27	3.5	1.0	2.70	4.35	3.30	10.35
25	Agricultural crops	14.28	15.0	2.14	1.35	18.68	7.06	27.09
26	Not identified plants	42.85	2.66	1.14	4.05	3.31	3.76	11.12
	Total	1056.73	80.28					

Table 7: PRI in relation to habitats used by Blackbuck in Guda Bishnoi–II Study Site

Habitat Categories	Relative preference index (PRI)		
	Winter	Monsoon	Summer
RHCF	1.0	0.26	0.49
HCF	0.67	3.18	1.21
FL3	0.50	0.80	0.88
FL4	0.36	0.25	0.50
SL	1.35	1.60	1.34
HR	1.30	1.70	1.16

Table 8: Differential habitat utilization (%) by Blackbuck and Chinkara during summer and winter seasons at both study sites

A. For Blackbuck

Season/habitat	RHCF	HCF	FL3	FL4	SL ?	HR	Time Spent (min.)
Summer	18.48	25.0	9.45	9.24	29.41	8.40	4760
Winter	22.95	14.80	12.03	8.85	33.36	8.0	1412

B. For Chinkara

Season/habitat	RHCF	HCF	FL3	FL4	SL	HR	Time spent (min.)
Summer	22.35	24.5	9.15	7.25	28.5	9.35	4760
Winter	36.36	20.95	11.75	6.85	17.24	6.80	1412

DOCUMENTING THE RELIANCE ON FOREST AND ITS PRODUCTS BY NISHIS IN AND AROUND ITANAGAR WILDLIFE SANCTUARY, ARUNACHAL PRADESH, NORTHEAST INDIA

by Ambika Ayiyadurai and Surendra Varma

Introduction

The Nishi are one of the major tribes inhabiting Arunachal Pradesh. Arunachal Pradesh is located in the northeast of India and is known for its rich biological and cultural diversity and is recognized as one of the 25 "biodiversity hotspots" of the world (Myers, 1988). The State has a forest cover of about 68,045 km^2 (Anon, 2001a; Singh, 1995) and is also home to about 26 ethnic human communities with distinctive cultures and rich traditions (Anon, 2002). Among them, the Nishis are considered to be one of the dominant communities and practice slash-and-burn cultivation, which is popularly called jhum, or shifting cultivation. Due to the mountainous terrain and lack of sufficient suitable land for irrigation-based cultivation, this community is almost entirely dependent on slash-and-burn cultivation. Shifting cultivation usually involves cutting of secondary bamboo forests (Ramakrishnan, 1992; Raman *et al*., 1998). Since old growth or primary forest is less extensively available and is more difficult to clear, they are not cultivated frequently. The tribe as a whole is fond of hunting and fishing. Nishis practice polygamy and the length of the hut gives an indication of the number of wives a Nishi man has. The village is a cluster of huts made of bamboo, built on stilts and habitually situated in the valley. Examples of their hunting skills are proudly displayed at the entrance of each hut. The skull of a boar is generally kept among the trophies. At some houses, monkey skulls are usually hung near the door to keep evil spirits away (Shukla, 1965). Women are involved in farming and do not go into the forest as much as men. Nishis speak their own language, which has no script; English is understood. It is believed that God wrote the script of the language of Nishis on the back of a mithun, which was eaten up by the people, so there is no written form of the Nishi language. Overall, the food, shelter and other needs of this community are met from the forest. One can notice the social, economic, cultural and even linguistic association of the forest and its products in the lives of Nishis that evolved over a period of time. The conservation of forest or wildlife or mitigating measures for Nishi-wildlife conflicts have to take these aspects into consideration. It was what motivated us to undertake a survey of the dependency on the forest and its products by Nishis in villages near Itanagar Wildlife Sanctuary in Arunachal Pradesh in northeast India.

Survey sites

The study site and the villages fall in Papum Pare district of Arunachal Pradesh. It is located between latitude 26°55' and 28°40' N and between longitude 92°40' and 94°21' E. The district headquarters is in Yupia, which is about 20 km from Itanagar. The district is approximately 3,462 km^2 in area with 274 villages and 2 towns. The district is divided into two administrative subdivisions – Sagalee and Itanagar Capital Complex. There are nine administrative circles- Sagalee, Mengio, Toru, Laiporiang, Kimin, Balijan, Doimukh, Itanagar and Naharlagun.

Itanagar Wildlife Sanctuary

Itanagar Wildlife Sanctuary is located in the vicinity of Itanagar, the capital city of Arunachal Pradesh, in Papum-pare district (Fig. 1) and covers an area of 140.30 km^2. It was established in 1978 (Anon, 2000) and is a notable biodiversity area. The region

Fig 1: Map of Itanagar Wildlife Sanctuary, Arunachal Pradesh

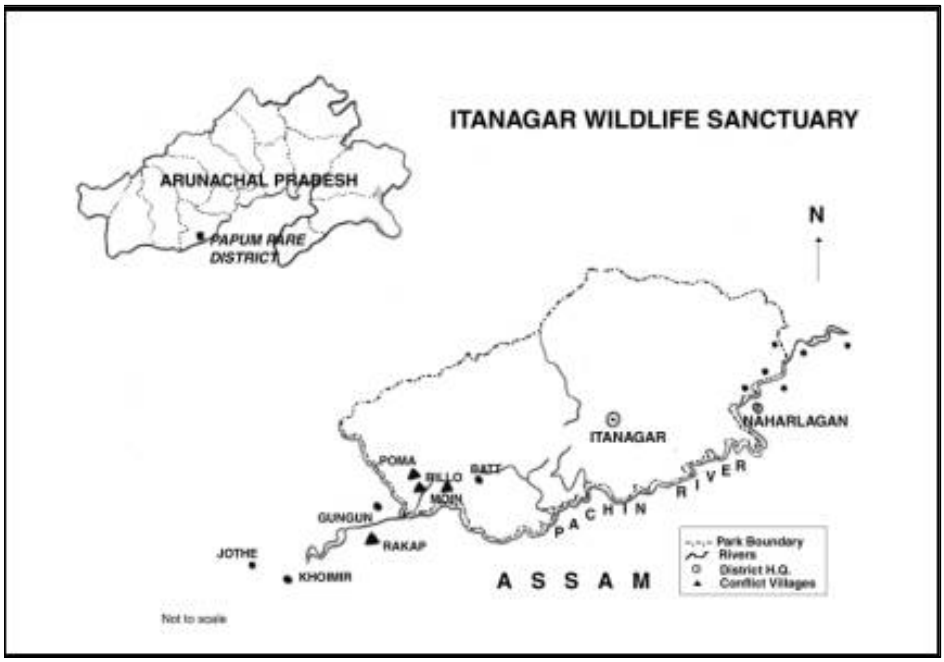

Table 1: Scientific names of species reported

S.no	Taxa	Local name	Scientific name
1	Mammals:	Assamese macaque	*Macaca assemensis*
2		Barking deer	*Muntiacus muntjak*
3		Capped langur	*Trachypithecus pileatus*
4		Clouded leopard	*Neofelis nebulosa*
5		Dhole	*Cuon alpinus*
6		Elephant	*Elephas maximus*
7		Gaur	*Bos gaurus gaurus*
8		Himalayan black bear	*Selenarctos thibetanus*
9		Indian Porcupine	*Hystrix indica*
10		Jackal	*Canis aureus*
11		Jungle cat	*Felis chaus*
12		Leopard	*Panthera pardus*
13		Mongoose	*Herpestes spp.*
14		Mithun	*Bos gaurus frontalis*
15		Rhesus macaque	*Macaca mulatta),*
16		Stump tailed macaque	*Macaca arctoides*
17		Sambar	*Cervus unicolor*
18		Tiger	*Panthera tigris*
19		Wild boar	*Sus scrofa*
1	Birds	Indian hornbill	*Buceros bicornis*
2		Racket-tailed drongo	*Dicrurus paradiseus*
3		Wreathed hornbill	*Aceros undulates*

is mostly hilly (precipitous hillsides are the common feature of this area) and the average altitude of the terrain is 1,000 m above sea level. The terrain occupied by the forest gently slopes southwards and is highly rugged with mountainous ranges. Geologically, the forest area is prone to landslides during the summer months and is quite unstable. The soil on the hills is moderately deep, moist, fertile and loamy, the upper layer of which is stained with humus. The soil is very loose and heavily eroded.

The major forest types in this region are North Bank Tropical Evergreen (Nahor- Jutuli), Tropical Semi Evergreen and secondary forests. At places, the evergreen and semi evergreen forests merge with one another and cannot be described separately (Kaul & Hariharan, 1987). The region has a number of mammalian fauna. Notable among them are sambar, barking deer, wild boar, elephant, tiger, leopard, clouded leopard, jackal, dhole, Assamese macaque, rhesus macaque, capped langur and stump-tailed macaque.

Survey villages

Six villages located within and around Itanagar WLS, viz. Poma, Rillo, Jothe, Rakap, Moin and Khoimir, were the focus villages for the survey. The villages are around 10-15 km from Itanagar and can be approached by road. Most of the villages are small, with an average of 30-35 families, each with about 11 members, including children. Poma village has a Forest Range Office, a check post, an inspection bungalow, a middle school and a primary health center. Jothe and Moin have a primary and a residential school respectively. All the villages have water and electricity supply.

Methods

The surveys were carried out by visiting villages and obtaining information through questionnaires and direct observations.

Survey through village visit

The initial procedure of this approach was to establish the degree of dependency on the forest and its resources by different age and sex classes of village people. Information on their dependency on forest products was collected from the villagers based on their visits to the forest per day, time spent and the status of human-animal conflict there. It was established that men spend more time in the forest and the survey was planned to interview two individuals of each age class (old and experienced persons, middle aged and individuals from the age class in which they start going to the forest) from each village.

Results

Reasons for visiting forests

A number of reasons were identified for a Nishi to visit the forest: i) in search of mithun; ii) to collect bamboo; iii) for jhumming; iv) for collection of vegetables; and v) to hunt animals. Sixty-three percent of the villagers visited the forest to look for mithun, 37% for collection of wood and bamboo, to jhum and to collect other forest products. With reference to specific reasons for visiting the forest, a majority (78%) went to the forest for hunting. Only a few (11%) did not go to the forest, the reason being that there were no animals in the forest. About 11% of the interviewed persons went to the forest to observe animals. Time spent in the forest varied and depended on the purpose of the visit. It ranged anywhere from a few hours (39%) to one whole day (11%) to a few days (50%); sometimes they spent many days in the forest until they found their mithun. Men usually visited the forests more often than women, to collect forest products. That the majority of the villagers, being hunters, spent a reasonable amount of time in the forest reflects the fact of heavy exploitation of forest and wildlife.

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Status of human-animal conflict

Jackals represented 26% of the replies from people regarding the animals visiting their settlement. Other animals such as dhole, leopard, tiger and Himalayan black bear attacked mithun and other domestic animals. Elephant visits occurred once in a year, mainly for paddy. Jackals visited looking for chicken (57%), lambs and piglets. Villagers also reported that jackals raided their maize fields. Elephants caused more damage and the economic loss was about Rs. 5000-6000 (approx. US$ 100-170). No human casualties due to wildlife have

occurred so far. With reference to the animal visits near human habitations during a particular season, 52% of the villagers who were interviewed felt that there was no seasonal difference in sighting animals. But 26% felt that more animals were sighted during the winter season, whereas the rest of the villagers did not have any opinion. Sightings of more animals during the winter season were attributed to the flowering and fruiting of some of the wild and cultivated species around the settlement. The conflict status does create pressure on the economy and food supply and the villagers retaliate by killing the animals.

Hunting

Hunting is a tradition among the Nishis and almost all men hunt regularly. Most of them possess guns. Traditional animal trapping/capturing methods are also used. Most of them have a set of bows and arrows in their houses. Hunting is both an individual as well as a group undertaking. The forest in its entirety belongs to the village as a whole. Thus, any person is free to hunt in any part of the forest that he likes; but he is forbidden to disturb the traps already laid by others (Shukla, 1965). Nishis, after jhum, enjoy a great deal of relaxation by hunting, tracking and stalking wild game. They wait near salt licks and near crop fields for animals. Bows, arrows, spears, self-designed mechanical traps and guns are used for trapping and killing animals. The young boys from Nishi villages frequently carried catapults, which seemed to be their favorite toy. The foundation to become skillful hunters is laid right from childhood. The entire tradition appears to focus on hunting and herbivore mammals, particularly the prey species, appeared to be on the losing end.

Forest products used

Nishis use a number of products derived from wildlife for different purposes including ornamental, medicinal, consumable and commercial. Skulls, horns and jaws of various wildlife species were displayed on the entrance of most of the Nishi houses. Nishi men carry a long flat knife called a "dao" hung around their shoulder. The knife is covered with flat bamboo strips and sometimes with the skin of wild animals, specifically of capped langur and Himalayan black bear, used as the shoulder belt. The village headmen are called Gaon bhurrahs and they wear special headgear decorated with the beak of a hornbill and a feather is attached to the unique cane cap. There are also a few semi-precious stones embedded in their headgear.

The headgear also has other animal parts like the tail of a small mammal with light and dark orange stripes (a squirrel species). One headgear also had part of a racket-tailed drongo at the back of the cane cap. Mithun horns are generally kept in the houses, although some are displayed at the entrance of the huts. Mithun horns were used as containers to keep small things (coins, tooth brush and tablets) and were hung on the walls. Deer and mithun hides were used as mats on the floor during winters. Animals are hunted for supplementary food and for curing different ailments. Primates are killed more often, followed by deer. Monkeys (both macaques and langurs) are hunted for their skin and meat. Deer are killed for the skin, horns and meat; bears for the gall bladder, skin, claws, fur and meat; and tigers and leopards for their skin, claws, teeth and meat. Wild boar is mainly hunted for meat. Solanki *et al.* (in press) found that Nishis from 20 villages hunted 11 species of mammals.

There are some medicines derived from the animals. Tiger and leopard bones are used to treat rheumatism. Animal hides are used for ritual purposes and jaws with teeth are used to decorate the huts. Bear gall bladder is believed to cure dysentery, jaundice and intestinal troubles. Barking deer antler is believed to cure impotence, hypertension and arthritis. Primate meat is used for the treatment of malaria.

Nishis also take part in other forms of resource gathering: some men work for the forest department as casual workers, some for the Public Works Department in road construction near their villages. Women from the villages sell bamboo, wood and vegetables in the nearby markets.

Table 2: List of animal products and their usage by Nishi

S. No	Species	Body part	Ornamental	Medicinal	Edible	Commercial
1	Barking deer	Skin, horn	Mat, display		Meat	
2	Wild goat	Skin, horn	Bag, display		Meat	
3.	Hornbill	Beak, feather	Head Gear			
4.	Capped Langur	Skull	Display		Meat	
5.	Himalayan Black Bear	Skin	Shoulder belt	Bile		Sale
6.	Greater racket tailed Drango		Head gear			
7.	Mithun	Horns, skin	Display, mat		Meat	Sale

Methods of hunting and trapping wildlife

Some of the indigenous methods of trapping animals are still in use (Figures 2 & 3). During the survey two traps (noose traps) set up on a tree branch to catch canopy-dwelling animals were encountered. The trapping method is to tie the bait to the branch with a string (reed) and a loop is made around the bait. The bait, in this case a nut, is positioned within the loop in such a way that the animal is forced to walk through the loop to get the nut. The end of the string is tied to a heavy stone (around 3 kg weight). As the animal tries to feed on the nut, the loop tightens and locks the animal in the loop. The animal gets trapped and the heavy stone connected to the loop does not allow the animal to escape. The trapped animal is strangled and dies.

A trap (locally called pan) to capture/kill tigers was demonstrated during the survey by the villagers. The trap works on the principle of lever release. The trap is made up of a cane string tied on the trail at a height 6 inches above the ground. The string is then tied to a sharp bamboo spear, which is hidden in the bushes on one side of the trail. The string is held tight so that a slight disturbance in the string will immediately release the bamboo stick. Any movement of the animal over this trail dislodges and releases the bamboo spear hidden in the bushes and kills the animal. The bamboo used in this trap is a special one and is usually grown in higher regions. This particular bamboo species is also believed to cause an itching sensation and infection in the wound, so that it will not heal quickly. There have been instances when this trap has killed even humans. In one such accident, the person who laid the trap had to give 15 mithuns as compensation to the victim's family. Now a decision has been made by the gaon burrahs not to use this type of trap any more and since then they are no longer used. Earlier, when these traps were still being used, the chance of humans getting injured/ killed was high. According to the villagers, dholes can also be killed using this trap. Currently, villagers carry guns (SBBL) when they go to the forests to protect themselves from wild animals and also for shooting animals and birds.

Conclusion

The dependency of Nishis on the forest and its products is well known (Solanki *et al.*, in press), but it has not been well documented. Nishis have been hunting animals for many years. This is a major activity for them which they enjoy and are proud of their hunting skills. There is an urgent need for assessing their dependency on the forest products and the effects of their hunting and trapping of wildlife species. This information will help to determine the status of the forest and wildlife found in the region and also help to develop conservation strategies. Other than shifting cultivation and irrigation-based agriculture, people in the area do not have any other source of income. During the survey many people expressed the need

Figure 2: Trap for capturing small canopy dwelling animals

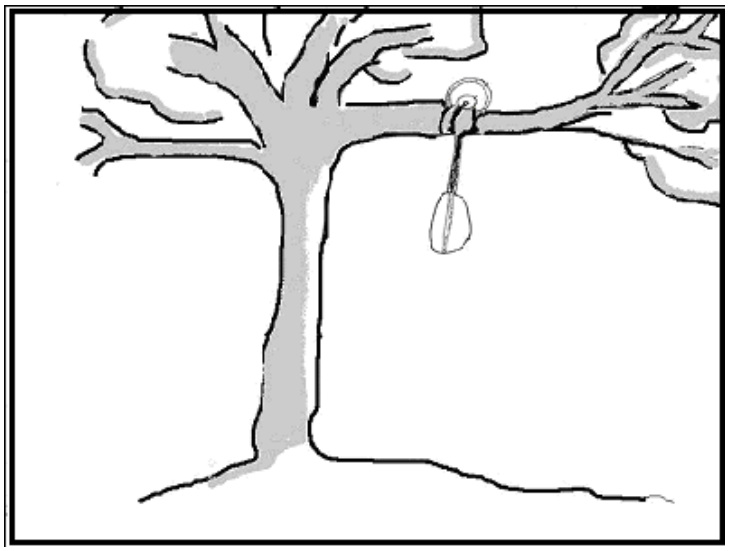
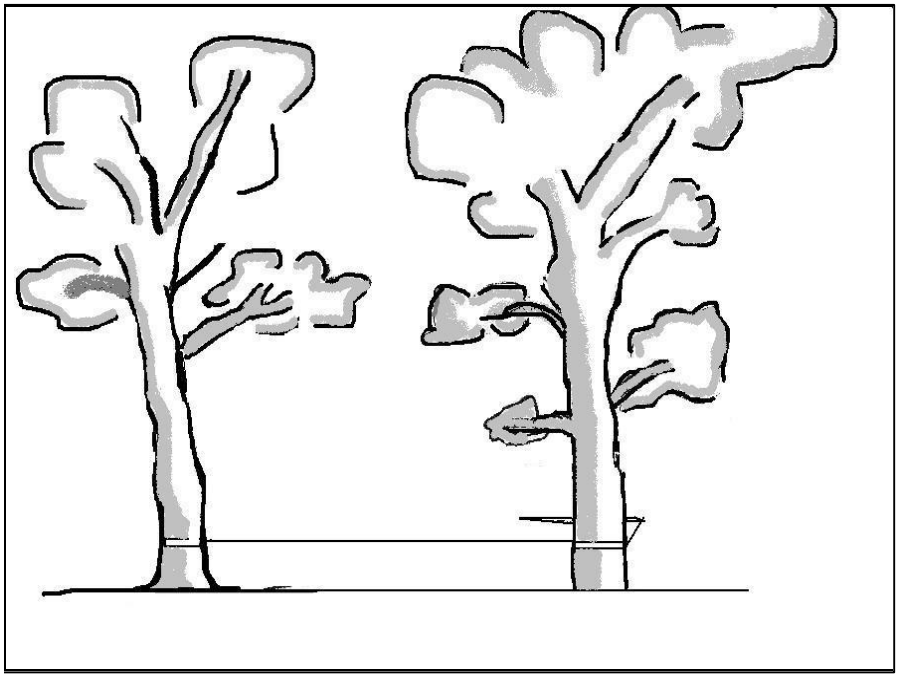


Figure 3: Trap used to capture/kill tigers and other trespassers (as demonstrated to the Field Investigator)



for alternative livelihoods. Some of the suggestions they offered were pig farms, poultry farms and fisheries, which will decrease the hunting and trapping of wildlife. Such alternative livelihoods have never been tried in the area and it would be worth attempting in at least one village on an experimental basis. The problems encountered can be rectified immediately as these villages are very close to the capital town. A handicraft cooperative society could be set up as an income-generating scheme, through which their dependency on forest and forest products would be reduced. Galle (skirt of woven fibre with designs typical to Nishis) weaving can be taken up as an activity for supplementary income. Products made of bamboo (grown sustainably) can be sold through co-operative societies run by the villagers.

Acknowledgments

We appreciate the knowledge and field skills of our Nishi trackers Mr. Nabum Tagam, Mr. Tok Pradhan, Mr. Tabum Jirgo and Mr Tam Gos. They helped us a lot in the field, at times even to escape from live traps that we came across in the forests. Mr. Sunil Subba, Field Officer, Wildlife Trust of India, based in Arunachal Pradesh, arranged all logistics. Mr Riya and Mr Shambhu in the Inspection Bungalow cooked some of the Nishi food made out of some kind of ferns and mushrooms for us to sample. The Nishi families welcomed us kindness and offered valuable information during the household visits.

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RECORDS OF SOME TERMITE SPECIES FROM FORESTS OF NORTH GUJARAT REGION, INDIA

by Manojkumar Paardeshi, Justus Joshua and S.F. Wesley Sundarraj

Introduction

Termites are ecological engineers as their activities, such as mound-building, subterranean tunneling and soil-feeding, improves soil structure and quality (Lee & Wood, 1971; Holt & Lepage, 2000). All these ecological functions assist forests to survive, by helping in the recycling of dead materials. So, a species-level inventory is helpful for further ecological research on termites in the forest ecosystem.

India has a very rich and unique biodiversity and is one of the twelve mega biodiversity countries in the world. Gujarat is situated within latitudes 20°1' to 24°7'N and longitudes 68°4' to 74°4'E, covering a total geographical area of 1, 95,984 km^2 and accounting for 6% of the country's total geographical area. The study area, North Gujarat Region (NGR), is located in the northern part of Gujarat state with its northern boundary bordering Rajasthan state. The study area extends between 23°35'13.0" to 24°30'57.0" N and 72°10'28.0" to 73°24'47.0" E. It covers a large extent of forest area spreading over c.2550 km^2, though not contiguous, and includes two Protected Areas and adjoining Reserved Forests, interspersed with patches of agriculture ecosystems. The entire study area falls in Banaskantha, Mehsana and Sabarkantha districts of Gujarat State.

Methodology

Termites were surveyed at different locations in the forests of NGR during 2006. From the general survey it was clear that the termites were generally more active during mornings and late evenings. Therefore, studies were mainly carried out during the morning. To study the diversity of the termites, all possible habitats (e.g., logs, fallen twigs, leaf litter and tree stumps) were thoroughly checked and termites were collected, if present. Since a soldier termite is more important for species-level classification, greater efforts were made to collect samples of the soldier caste. However, all individuals ware collected from infested objects and kept on big, white hard paper sheets. Termites were collected with the help of brushes and preserved in 70% alcohol. For identification of termites the key used by Roonwal and Chhotani (1989) and Chhotani (1997) was employed, which is more acceptable and seems to be more practical and satisfactory in the Indian context (Rathore and Bhattacharya, 2004).

Results and discussion

A total of 87 different locations were sampled to study the termite diversity. Overall, 11 species of termites belonging to six genera and two families were recorded from the entire study area (Table 1). Family Termitidae was abundant in the region and nine species of termites were recorded from this individual family, while only two species were recorded from family Rhinitermitidae. However, the species *Coptotermes heimi* from family Rhinotermitidae was found to be very common and recorded from 18 locations of the study area, while *Microcerotermes tenuignathus* from family Termitidae was recorded from single location. Among all the species found, *Odontotermes redemanni* was recorded from the maximum number of locations (i.e., 20).

Acknowledgements

The authors would like to thank the Ministry of Environment and Forests, Government of India, for funding the biodiversity assessment study in

this region, which enabled us to do this survey. We are also grateful to the Gujarat State Forest Department for permitting us to work in the forest area.

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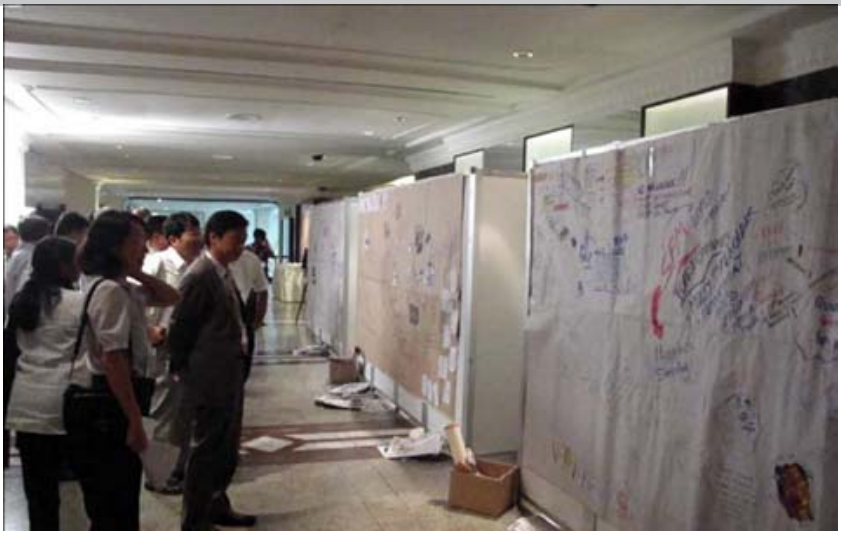
Table 1: Termite species recorded from the NGR

Family	Genus	Species	No. of locations of evidence
Rhinotermitidae	Coptotermes	Coptotermes heimi	18
	Heterotermes	Heterotermes indicola	3
Termitidae	Amitermes	Amitermes belli	7
	Microcerotermes	Microcerotermes beesoni	6
		Microcerotermes tenuignathus	1
	Odontotermes	Odontotermes assmuthi	2
		Odontotermes bhagwathi	4
		Odontotermes feae	10
		Odontotermes obesus	5
		Odontotermes redemanni	20
	Trinervitermes	Trinervitermes biformis	11

FOREST NEWS

Vol. XXV: No. 3 Jul-Sep 2011

SECOND REGIONAL FORUM FOR PEOPLE AND FORESTS



Participant's wrote their visions for the future on the Vision wall at the forum. (Photo: Courtesy RECOFTC)

The "Second Regional Forum on Community Forestry – Key to Solving Current and Emerging Challenges," was held in Bangkok, Thailand, 8-9 August 2011, under the aegis of the Royal Forest Department, Thailand, co-organized by The Center for People and Forests (RECOFTC), the ASEAN Social Forestry Network, the Food and Agriculture Organization of the United Nations (FAO), and the Japan International Cooperation Agency (JICA). Key supporters of the forum included the Norwegian Agency for Development Cooperation (Norad), the Swiss Agency for Development and Cooperation (SDC), Swedish International Development Cooperation Agency (SIDA) and the Thailand Convention and Exhibition Bureau.

The Forum attracted over 200 participants from 25 countries who came to support community forestry in the Asia-Pacific region.

The Second Regional Forum was well-timed to discuss further expansion of people-centered forestry in the years ahead. ASEAN Social Forestry Network Secretariat Chairperson Dr. Haryadi Himawan, emphasized the important role of local people in sustainable forest management and the importance of supporting the livelihoods of some of the poorest and most vulnerable populations in Asia – who often pay the highest price in forest loss and climate change.

Talks spanned a broad range of social and community forestry issues, from the origins of the movement and government decentralization to gender equity and REDD+. The morning sessions on each day were dedicated to presentations in plenary, with the afternoons reserved for presentations and discussions in smaller groups. Among the plenary speakers were Mr. Patrick Durst, FAO Senior Forestry Officer, Asia and the Pacific, who spoke on drivers of change in deforestation and

emphasized that "the only constant we can plan for is constant change."

Key Forum conclusions

The need for healthy and sustainable forest ecosystems cannot be understated. Forests in the Asia-Pacific region produce a significant amount of resources, including timber, demanded by modern society. Simultaneously, forests absorb large amounts of carbon dioxide, conserve biodiversity and provide ecosystem services such as watershed conservation. Forests must therefore be managed for multiple benefits.

Local people have a direct stake in forest resources and will affect the outcome of any forest management strategy. With secure rights and adequate incentives, local people have demonstrated time after time that they are capable stewards of their forests, resulting in benefits for forests, the local people themselves and society at large.

There is a need for community forestry to move beyond forest regeneration and protection to sustainable utilization of forest resources, supply of forest products not just for subsistence but for domestic and international markets, and move beyond recognizing local people's forest use/access rights to the actual realization of these rights and benefits by local communities.

The Forum participants called for:

National and sub-national governments to:

- Clarify and mainstream community forestry policies within national forest programs and development strategies.
- Develop and strengthen community forestry programs involving all stakeholders.
- Accelerate the recognition and protection of local communities' rights to forest lands, and give access to sizeable productive and good quality forest.
- Set up an independent agency and mechanism to resolve conflicts between stakeholders.
- Make the regulatory and incentive framework more enabling and transparent to promote the development of community-based timber and non-timber forest collectives and cooperative enterprises.
- Protect biodiversity and natural reserves while allowing local people access to food and medicine.
- Strengthen the capacity of forest and other agencies to become service providers to local forest managers.
- Increase funding and capacity-building support to community forestry at all levels.
- Recognize, support and engage with community forestry networks.
- Fulfill international commitments (including MDGs) and obligations with respect to indigenous peoples and women.

Local people to:

- Develop and join community forestry networks that strengthen collective voice and action to secure rights and promote sustainable forest management.
- Work actively with civil society and national and sub-national governments to develop and implement national community forestry and development programs.
- Respect, identify, implement and adapt indigenous and local approaches to community forestry and share the experiences.
- Ensure that marginalized groups within communities can participate effectively in and benefit from community forestry processes – in particular, women.

Donors and international organizations to:

- Encourage increased funding and explore alternative funding mechanisms that are transparent and flexible for development of community forestry sustainably at all levels.
- Support research, analysis, knowledge generation and capacity building.
- Strengthen international, including South-South, cooperation so community forestry can contribute towards fulfillment of MDGs and emerging challenges.
- Simplify the procedures to ensure that local communities can participate in and benefit from REDD+.
- Fulfill international commitments (including MDGs) and obligations with respect to indigenous peoples and women and adhere to social and environmental safeguards that protect local community rights.

Civil society to:

- Support local and central governments to develop and implement national community forestry programs.
- Raise public awareness and provide legal advice to communities on their rights and responsibilities and the establishment of forest-based enterprises.
- Share good practice and lessons learned with national governments to inform policy and legislative changes.
- Support information sharing and understanding on community forestry and its role in addressing emerging issues and needs.

Private sector to:

- Develop and strengthen business models that are responsible and equitably engage local communities in commercialization of timber and non-timber forest products and services.
- Invest in sustainable local businesses as an important element of rural economies.
- Maximize transparency and build trust with local stakeholders.
- Abide by national and international laws and regulations and adopt clearly defined social and environmental responsibility and safeguards, including Free Prior and Informed Consent (FPIC).

Research and educational institutes to:

- Mainstream community forestry and relevant issues in academic curricula and other professional institutions.
- Develop research on current and emerging issues, including sustainable use and enterprise development, and provide recommendations for policy makers and other stakeholders.
- Conduct more practical and applied research to improve local community forestry practices. Engage and reward communities in designing and conducting community forestry research.

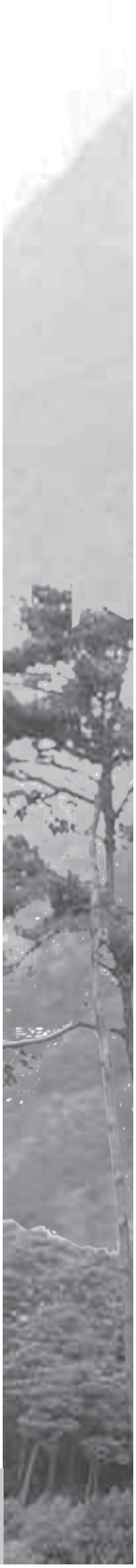
We urge Forum participants and all other interested parties to commit to these action points to ensure the best possible outcomes for the people and forests of the Asia-Pacific region.

FIRST APEC MEETING OF MINISTERS RESPONSIBLE FOR FORESTRY

The First APEC Meeting of Ministers Responsible for Forestry was convened 6-8 September 2011, in Beijing, China. The meeting was well attended by all 21 APEC economies (including nine ministers) and representatives of leading international forestry organizations (FAO, INBAR, ITTO, TNC) and invited resource persons from industry associations and the private sector. The meeting was opened by President Hu Jintao, in the Great Hall of the People. The opening and closing sessions were chaired by Mr. Jia Zhibang, Minister, State Forestry Administration.

The meeting consisted of the following segments:
Opening ceremony;
Setting the scene;
New opportunities and challenges facing forestry in Asia and the Pacific;
Wise use of forest resources to improve livelihoods and promote sustainable development;
Strengthening forest governance and management to promote multiple functions of forests for green growth;
Enhancing practical cooperation to achieve growth for the forest sector in the region;
Dialogue between ministers and entrepreneurs;
Adoption of the Ministerial Statement;
Closing ceremony.

In support of the meeting, FAO prepared the main background report: Situation and prospects for forests and forestry in the APEC region. The report drew heavily from FRA 2010 and the Asia-Pacific Forestry Sector Outlook Study (APFSOS II). Mr. Hiroyuki Konuma, Assistant Director-General and Regional Representative, presented the keynote address to introduce the session on: New opportunities and challenges facing forestry in Asia and the Pacific.



Beijing Statement on Forests and Forestry

We, the Ministers and senior officials attending the First APEC Meeting of Ministers Responsible for Forestry, held in Beijing, China on 6-7 September 2011,

Realizing that the world economy is recovering from the global financial crisis while still facing such challenges as resource and energy constraints, climate change, loss of biological diversity, poverty and food insecurity; and that improved management, conservation and rehabilitation of forests can make a significant contribution to the economic, environmental and social priorities and goals of the APEC economies and that enhanced international cooperation is needed to address these challenges;

Recalling the 2007 Sydney APEC Leaders' Declaration commitments to increase forest cover in the region by at least 20 million hectares of all types of forests by 2020 and to establish the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation;

Recalling also the 2010 Yokohama APEC Leaders' Declaration to "enhance work on meeting the aspirational goal in the Sydney Declaration and instruct our officials to take concrete steps toward this goal, and to enhance our cooperation to address concerns with illegal logging and associated trade and to promote sustainable forest management and rehabilitation";

Reaffirming the United Nations Conference on Environment and Development Forest Principles and the United Nations Non-Legally Binding Instrument on All Types of Forests, and noting that they have raised awareness of the important roles and contribution of forests in socio-economic development, ecological, sustainability, poverty eradication, climate change, and green growth which is one of the priorities to be discussed at the 19th APEC Economic Leaders' Meeting;

Recognizing that forestry, with its unique roles and contribution to sustainable development, has the potential to be a leading sector in achieving green growth;

Welcoming the Cancun agreements which include policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing economies and also include the role of conservation and sustainable forest management as well as the enhancement of forest carbon stocks in developing economies;

Bearing in mind the natural and socio-economic diversity of the APEC economies, their different development needs and objectives, and the great challenges related to the conservation, sustainable management and rehabilitation of the region's forests in support of green growth and sustainable development, we aspire to:

1. Maintain and further strengthen the political commitment in support of sustainable forest management, forest conservation and forest rehabilitation;

2. Facilitate implementation of forest-related agreements and foster a common understanding on sustainable forest management, through existing international processes such as the United Nations Forum on Forests, the International Tropical Timber Organization, and the Montréal Process on Criteria and Indicators for the Conservation and Sustainable Management of Temperate and Boreal Forests;

3. Strengthen international cooperation on sustainable forest management including consideration of innovative financial mechanisms, as a component of green growth.

4. Strengthen coordination and cooperation among APEC economies on forest policies and management, inter alia, to promote investment and trade in sustainable forest products, deepen economic and technical cooperation in the forestry sector; promote the multiple uses of forests in terms of products and services; and combat illegal logging, promote trade in legally harvested forest products, and build capacity in this area through the APEC expert group on this topic;

5. Enhance practical cooperation to conserve, rehabilitate and sustainably utilize forest resources through, inter alia, active participation of stakeholders, including indigenous and rural communities, in regional forestry initiatives, technical cooperation, and other measures that strengthen sustainable forest management in the region;

6. Promote better coordination among and effective action by established regional forestry organizations and processes, inter alia, the Asia-Pacific Forestry Commission of the Food and Agriculture Organization of the United Nations, the Asia Forest Partnership and the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation, to exchange information and experiences, foster greater cooperation among economies and promote sustainable forest management;

7. Encourage APEC economies to enhance afforestation, reforestation and tree planting programmes and avoid further deforestation and forest degradation to increase forest cover so as to achieve the aspirational goal set in the 2007 Sydney APEC Leaders' Declaration and improve forest quality, taking into account the best socially, environmentally and economically sustainable options;

8. Encourage the exchange of information on how forests can mitigate the effects of natural disasters and on measures needed for their recovery from such hazards, and strengthen exchange of information on monitoring and prevention of cross border forest pests, diseases and alien invasive species to prevent forest degradation;

9. Further strengthen forestry institutions, enhance forest management capability and mobilize financial resources for the forestry sector, to better manage emerging and growing demands on forests from increasing economic, social and environmental pressures;

10. Develop and improve forests and forestry legislation and policies in order to, inter alia, strengthen forest governance, protect forest lands, establish secure forest tenure systems, and improve forest law enforcement;

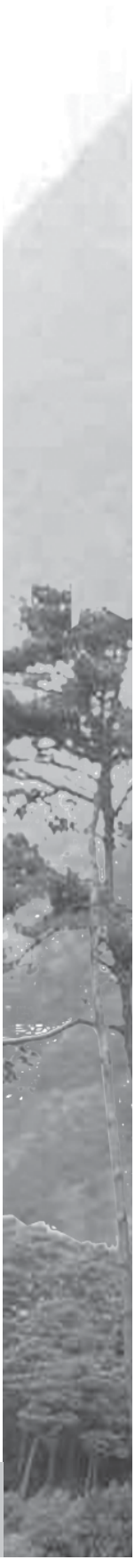
11. Encourage conservation, sustainable use and rehabilitation of forest resources, improve forest quality and enhance the capacity of forests to store carbon to address climate change; conserve and wisely use wildlife and wetland resources, combat land degradation and desertification, and protect biological diversity;

12. Promote the development of forest-related industries, create employment, build the capacity of indigenous and rural communities to manage forests sustainably and to participate in trade and the processing of forest products, facilitate development of forest-dependent communities and improve their livelihoods so as to achieve green growth;

13. Strengthen cross-sectoral collaboration, establish cross-sectoral policy coordination mechanisms and encourage participatory forest management to minimize potential conflicts and negative impacts on forestry;

14. Encourage technical innovation, accelerate the integration of forest technology with economic development and strengthen capacity building, research and development in the forestry sector, including through technology transfer, technical information sharing, scientific-practical conferences and the consideration of innovative financial mechanisms; and strengthen the application of new technologies and technical achievements to promote green growth; and

15. Strengthen outreach programs that raise public awareness regarding, inter alia, forestry-related regulations, the importance of ecological protection, and sustainable forestry practices.



NEW CHALLENGES AND NEW OPPORTUNITIES FOR FORESTRY IN APEC ECONOMIES

Address by Hiroyuki Konuma, Assistant Director-General and Regional Representative for Asia and the Pacific, Food and Agriculture Organization of the United Nations, at the First APEC Meeting of Ministers Responsible for Forestry

Excellencies, distinguished guests, ladies and gentlemen,

It is a great pleasure for me to be here today to address this landmark Ministerial meeting and discuss with you the future of forestry for APEC economies. In discussing this future, the key word is **change**. Rapid change is requiring that we better anticipate and plan for the future, and that we adapt to change faster than ever before.

Change brings with it immense challenges for forestry – considering the long time frames for growing forests – but, change also creates many exciting opportunities.

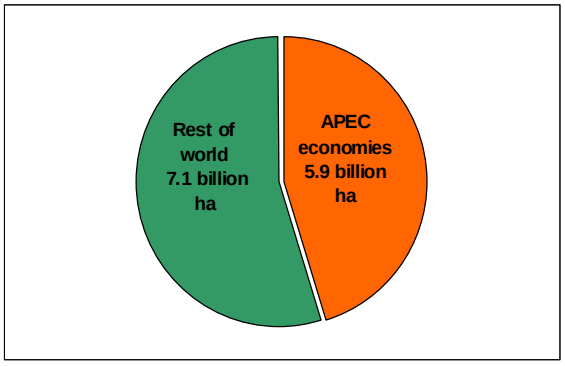
It is this framework of challenges and opportunities that my talk centers on today.

I want to talk about five key issues at the core of the challenges that confront APEC's forestry leadership:

- The need for rebuilding of the forest resource base.
- Challenges relating to carbon and climate change.
- The need to encourage and enable investment in forestry.
- The question of who should own the forests and who should manage them?
- And finally, leadership, policy and governance – including the critical importance of political will in meeting the challenges that confront us.

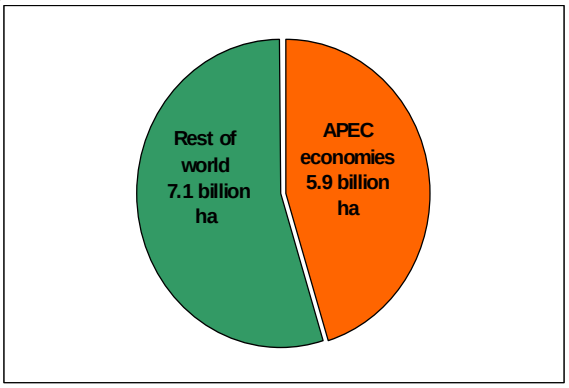
To start – let's take a quick look at some statistics that broadly describe where the APEC economies sit compared with the rest of the world. We can see that APEC economies encompass a land area of 5.9 billion hectares, approximately 45 percent of the global total (Figure 1). The APEC population is 2.7 billion people or 40 percent of the global population (Figure 2).

Figure 1: APEC and global land area



Source: FAO Global Forest Resources Assessment 2010

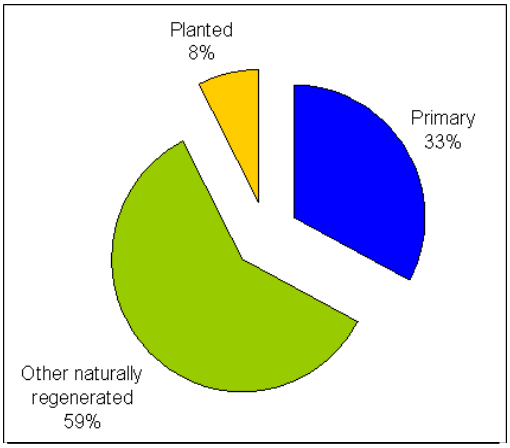
Figure 2: APEC and global population 2008



Source: FAO Global Forest Resources Assessment 2010

The APEC economies have forest cover of about 2.2 billion hectares; more than half the global total. Forests cover 36 percent of land area in APEC economies; significantly higher than forest cover in the rest of the world. Forests in APEC economies are mainly classified as "Other naturally regenerating" forests. Primary forests – those with little noticeable human impact – comprise 33 percent (one-third) of all APEC forests. Planted forests comprise 8 percent of forests. The majority of forests in APEC economies are temperate or boreal. Less than 20 percent of APEC forests are tropical forests (Figure 3).

Figure 3: APEC forests by type



Source: FAO Global Forest Resources Assessment 2010

During the past 20 years, forest cover in APEC economies increased by 22 million hectares, while the rest of the world lost 157 million hectares of forests. Almost half the APEC economies have increased their forest areas, while a similar number have suffered declining forest areas. The highest rates of increase have been in Viet Nam, China and the Philippines, while the highest rates of loss have been in Malaysia, Indonesia and Papua New Guinea. It's important to note, however, that some APEC economies, such as Indonesia, that had been losing forests at a very high rate in the past have significantly reduced deforestation rates in recent years (Figure 4).

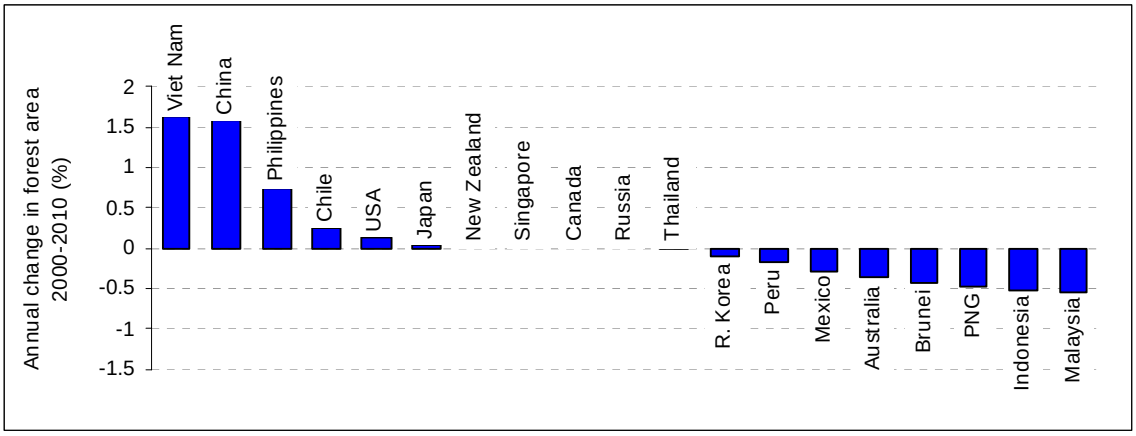
Despite the wealth in forest resources in several APEC economies, there remains a critical need to rebuild the forest resource base. In some economies, the extent and implications of forest loss are obvious. Some previously timber-rich economies have seen forest cover and wood supplies severely reduced; forest industries have become sunset industries. In many others, forests have become severely degraded as a result of poor management. This has altered forest ecosystems, led to biodiversity loss, and has left the forests more vulnerable to factors such as forest fires, invasive species, and storm damage.

In many places, forest ecosystem services have been seriously affected. We have inadequate supplies of clean water. We have serious soil erosion, leaching and sedimentation problems. We have many endangered species and high rates of species extinction. Carbon emissions from forest lands have increased and carbon sequestration potential has declined. In simple terms, we have not done as well as we should have in managing our forests, and we now need to repair our mistakes.

During the past decade, climate change has been the vehicle that has returned forestry to the center-stage of international dialogue. And without doubt, in the coming decade, where climate change goes, forestry will follow.

Climate change offers immense potential opportunities for forestry. Carbon markets are evolving in many APEC economies and we are right to be cautiously seeking opportunities to integrate forestry into these. In New Zealand, for instance, forestry is already part of the New

Figure 4: Forest area change by economy 2000-2010



Source: FAO Global Forest Resources Assessment 2010

Zealand Emission Trading Scheme. For developing economies, REDD+ potentially offers significant funding for reducing emissions from deforestation and forest degradation, implementing sustainable forest management and conserving and enhancing carbon stocks. For example, the recent Indonesia-Norway REDD+ partnership has earmarked up to a billion dollars to support reduction of greenhouse gas emissions from forests and peatlands.

However, with these opportunities also come challenges. Frequently we hear talk of carbon money being a "windfall" for forestry. But we must remember that people certainly want something in return for their money. That "something" is – in broad terms – forest conservation and sustainable forest management. And sustainable forest management is something that foresters have found extremely difficult to achieve in the past. We have to be sure that any additional funds coming to forestry through REDD+ mechanisms are put to good use and produce tangible results.

Carbon provides potential new avenues of forestry financing. But, more generally, attracting investment remains a major challenge for forestry. More investment is needed to make progress towards sustainable forest management. More money is required to effectively manage conservation areas. Investment is required in planted forest establishment. In some economies, promoting domestic value-adding will require new investment in wood processing facilities. Generally, we need more investment in research, education and capacity building.

In economies where forests are mainly publicly owned and managed, government investment is likely to be the key driver of improved performance. In this case, increased financing will largely depend on political will and stronger advocacy to build the case for higher budget allocations for forestry.

In economies where non-government ownership is significant, private investment in forestry will be an important component in increasing forest cover and improving forest management. Many APEC economies have used incentives to encourage forestry investments. Examples include providing seedlings for planting, land grants, subsidies, low interest loans, and tax breaks.

Generally, however, providing an enabling investment environment for the private sector has proven to have far greater impact on forest investments than direct incentives. An enabling investment environment includes such things as clear and secure tenure and property rights, consistent policies, strong governance, tackling corruption, reducing bureaucracy, developing infrastructure, and building an economy that reduces risk and encourages people to do business.

It was my late-FAO colleague Jack Westoby who famously pointed out that, "*Forestry is not about trees, it is about people. And it is about trees only insofar as trees can serve the needs of people*".

We have often been slow to recognize and react to this truth. In many cases the problems we have created have been because we haven't asked "who?" Who should own the forests? Who should manage the forests? Among the APEC economies, the answers have varied. But there is now a clear trend towards devolution of forest management to the private sector, communities and individuals. There is increasing recognition that giving people a stake and a say in how forests are managed results in better outcomes. In economies such as China, Philippines and Viet Nam, forest management rights and responsibilities are increasingly being devolved to communities and households. In Australia, Chile and New Zealand, governments have privatized commercial forests.

There is a wealth of experience in APEC of different ownership and management models and we can learn from all of them. But, if we are to have better forest stewardship and more efficient production of forest goods and services, governments must consider letting go of direct forest management responsibilities. Forest management will increasingly be in the hands of households, communities and the private sector – those able to react faster to change. Government roles will increasingly be to monitor, regulate, and facilitate.

Government roles in forestry will also include setting policy, ensuring quality of governance and providing leadership and direction.

Policies and legislation should empower people to be involved in decision-making and to do business. Policies should help to resolve conflicts and establish trade-offs among competing objectives. Policies should provide a stable, enabling environment that rewards 'good' behaviors and penalizes 'bad'. Key policy issues will continue to include forest rehabilitation, provision of ecosystem services, and progress towards sustainable forest management.

There is a need to strengthen governance in several APEC economies; both generally and within the forestry sector. Significant international attention is now being given to Forest Law Enforcement and Governance, or FLEG. Some significant progress is being made. Until recently, we couldn't even talk about corruption in international dialogues. Now we recognize it is a widespread problem and it is increasingly being confronted in most economies.

Better governance will be a necessary condition to continuing to export to high-paying markets – especially the United States and the European Union. Governance standards will also be of great importance in attracting carbon financing. Economies with poor governance will be severely disadvantaged in competing for carbon funds, with money moving away from more risky investments.

Finally, a key role for APEC governments is to continue to provide leadership – not only to their own forestry sectors, but globally. Greater resources, access to expertise and higher levels of economic development mean that most new developments in forestry are pioneered by economies in either the APEC or European blocs. For global forestry to continue to move forward and meet emerging challenges it is critical that APEC economies continue to invest in new developments. And that they provide leadership, guidance and assistance to less-developed economies.

In 2007, APEC leaders set an aspirational goal to increase forest cover in the APEC economies by at least 20 million hectares by 2020. We are making solid progress towards the goal, but at the rate of gain between 2005 and 2010, we will fall short. It remains a clearly achievable goal, but meeting it will require among others:

- Accelerating afforestation and reforestation efforts;
- Reducing agricultural encroachment into forest lands, and addressing unsustainable logging and other drivers of deforestation;
- Improving forest governance and controlling illegal timber trade;
- Improving fire management, and reducing invasive species incursions and other ecosystem health issues.

With the commitment evidenced by this unique meeting of the forestry leadership of APEC, I am confident that we will meet this challenge and I wish the Ministers every success in their deliberations.

Thank you.

NEW FAO FORESTRY WEBSITES

New website on forest governance assessment and monitoring http://www.fao.org/forestry/56678/en/

Good forest governance has a central role in achieving sustainable forest management (SFM). It is also critical to ensuring the effectiveness of schemes to reduce greenhouse gas emissions from deforestation and forest degradation in developing countries (REDD), as well as of efforts to reduce illegal activities in the forest sector. Governance assessment and monitoring are essential tools in promoting reforms towards better forest governance.

Since early efforts starting in the 1990s, parameters for country governance quality assessments have been gradually moving from external to local or national assessments, relying less on international experts and more on national institutions and local expertise. Purely technical approaches are making way to better integration of political and managerial issues. In the forest sector, similar shifts are underway at a time when forest governance quality assessments are assuming greater significance in the context of global climate change discussions.

On the website are discussions about the framework for assessing and monitoring forest governance and about forest governance monitoring. Recent publications and meetings about forest governance are also posted on the site.

Urban and Peri-urban Forestry bi-monthly newsletter http://km.fao.org/urbanforestry/

The aim of FAO's Urban and Peri-urban Forestry Newsletter is to be a tribune for all actors promoting UPF. The objectives are to share information on an international basis and facilitate the exchange of good practice. The Newletter is issued every two months and is available in English, French and Spanish

The Urban Forestry Community brings together stakeholders from all over the world looking to promote Urban and Peri-urban Forestry and Greening (UPFG). This interactive Community platform provides users with the opportunity to discuss, share knowledge and learn about good practices, related to optimizing the role of trees and forests in and around cities to alleviate poverty.

CLIMATE CHANGE AND FORESTS IN ASIA: IDENTIFYING THREATS AND OPPORTUNITIES

Prepared by Nikolai Beresnev

Background

There is a growing awareness that climate change presents significant threats to forests in Asia. These threats are likely to have negative impacts on forest-dependent people and the wider community, and can undermine future climate change mitigation efforts.

Many countries in Asia have not given sufficient consideration to the role of forests in climate change adaptation. More effort is required to integrate adaptation activities into national and regional climate change strategies and forest policies. As the integration of economies deepens, the benefits of harmonizing approaches to forest management and climate change adaptation are also

increasing. Sharing of information and experiences can play a significant role in achieving these goals.

To this end, on 26 October 2011, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP) and The Center for People and Forests (RECOFTC) organized a "Meeting on forests and climate change adaptation in Asia." Held in Bangkok, Thailand, the meeting sought to identify priority forest-based climate change adaptation measures in Asia, and suggest how these can be implemented. The meeting was attended by government forestry officials and representatives of various regional organizations, including the International Centre for Integrated Mountain Development (ICIMOD), the United Nations Development Programme (UNDP) and WWF.

Key findings

Following presentations and group discussions, the following key findings were elaborated:

- Climate change is expected to have significant negative impacts on forests in Asia. Anticipated temperature increases, changes in precipitation and the increased incidence of extreme weather events are likely to raise the risk of pest and disease outbreaks, species extinctions, forests fires, erosion and habitat loss. Unless addressed, these impacts will have knock-on effects for forest-dependent people and wider society.
- Climate change is one of many pressures on forests in Asia, including expansion of agriculture and infrastructure. Sustainable forest management provides an integrated framework for addressing these pressures. Increased funding and improved inter-sectoral planning are crucial in expanding sustainable forest management in the region.
- Climate change funding presents an opportunity for governments to expand sustainable forest management under the goal of climate change adaptation. To this end, national adaptation strategies should include a broad range of sustainable forest management activities.
- Adapting forests to climate change improves the permanence of carbon, making it a pre-requisite for effective climate change mitigation. Adaptation activities that assist mitigation should be eligible for carbon financing.
- Adaptive capacity of forest-dependent people can be improved through allocating adequate forestland use rights, sustainable forest management and improving access to markets for forest-based products.

The way forward

Participants agreed that improving the implementation of forest-based climate change adaptation measures in Asia required a concerted effort from governments and development partners. Recommended actions included:

- Speed up implementation of forest-based climate change adaptation measures as a part of wider efforts to expand sustainable forest management.
- Include comprehensive coverage of forestry in National Adaptation Programmes of Action (NAPAs) or equivalent strategies.
- Integrate forest-based climate change adaptation measures into forestry mitigation projects. The mitigation potential of such measures should be acknowledged and associated funding made available.
- Integrate forest-based climate change adaptation measures into national conservation and development policies.
- Acknowledge links between forestry and non-forestry sector activities and improve inter-sectoral communication and planning.

Using the findings of the meeting, FAO will develop a policy brief titled "Forests and Climate Change Adaptation in Asia." The brief will draw attention to the main issues in forest-based climate change adaptation measures, and assist forest policy makers and practitioners in developing plans and proposals to address the challenge of climate change.

INDONESIANS TAKING THE LEAD: INTEGRATING COMMUNITY FORESTRY AND CARBON MARKET OPPORTUNITIES

Prepared by Robert W. Solar, Consultant and Project Coordinator TCP/RAS/3210

Growing concerns over negative impacts of climate change effects have pressed the global community to address anthropogenic Greenhouse Gas Emissions (GHG). Beginning with the United Nations Framework Convention on Climate Change (UNFCCC) negotiated in 1992 and the Kyoto Protocol in 1997, legally binding emission reduction targets have paved the way for trading carbon credits generated by GHG reduction projects. In parallel to the Kyoto Protocol mechanisms, consumer demand for environmentally-friendly products and an increased importance of Corporate Social Responsibility (CSR) triggered the emergence of Voluntary Carbon Markets (VCM), with forests having a vital role in this market and in the global carbon cycle. As deforestation contributes approximately 20 percent percent of global GHG emissions, it comes as no surprise that a wide-range of forestry activities including afforestation, reforestation, forest conservation, forest management, and rehabilitation are part of the global carbon trade.

Supporting the development of forestry VCM in Indonesia, the Food and Agriculture Organization's Technical Cooperation Programme's "Linking communities in Southeast Asia to forestry-related voluntary carbon markets" project has actively engaged Indonesia and other Southeast Asian countries in the development of "model sites" for learning and replication, the building of a transparent and accessible communication portal for VCM stakeholders to link to carbon markets, and information, and capacity development workshops. In July 2011, non-governmental organizations came together with the private and public sectors, along with Corporate Social Responsibility initiators, in a workshop on "Community forestry opportunities in the voluntary carbon market in Indonesia." The workshop's purpose was to create space for stakeholders to reflect and review the progress of forestry carbon trading schemes, and the opportunities and challenges associated with integrating community forestry in forestry VCM initiatives in Indonesia.

Indonesian community forestry is implemented through many different processes, e.g. the Hutan Rakyat (private forests), the Hutan Adat (customary forests), and the Hutan Kemasyarakatan (community forests). Community forestry has had its challenges in becoming a mainstream forestry management option in Indonesia, like many other countries in the region; from the lack of willingness among local governments to deliver development services to local communities who apply community forestry management practices, to the perception that community forestry is only a central government initiative, rather than a new paradigm in forest management; to a general lack of capacity among local government offices to facilitate local communities in the development of community forestry. In addition, there is a lack of capacity to link community forestry to new issues and new opportunities (e.g., climate change and forestry VCMs).

Given that Reducing Emissions from Deforestation and Forest Degradation+ (REDD+) discussions are still dominating the arena of discourse, small-scale forestry VCM initiatives have not become well known, and opportunities not captured that could benefit both types of carbon sequestration initiatives (i.e., the integration of community forestry). Additionally, even though smaller forestry VCM

initiatives do exist, the market and seemingly therefore the "opportunities" are limited. But, as noted in the national workshop, opportunities for small forest holders lie with effective private sector engagement – a sector that has relatively greater access to informational resources, and possibly, markets. But challenges exist in bring the "two sides" (i.e., small forest holders and the private sector) together.

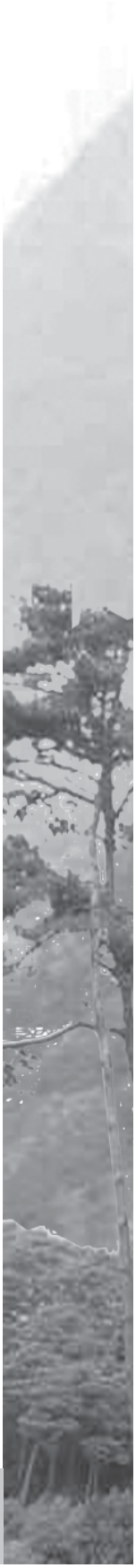
Local communities have forests and trees of potential interest to carbon offset schemes, but they do not generally have enough capacity to carry them through carbon accounting processes, clear through to market access. Financial and human resources are needed to develop qualified community facilitators, and applicable/ simplified support mechanisms to develop and market small-scale forestry VCM projects. Conversely, the private sector needs to understand more fully how to support communities and small-scale forestry VCM projects (i.e., beyond the mere purchasing of carbon credits, to include finance for start-up, through to negotiating community co-benefit packages).

Demand in the carbon market, either voluntary or mandatory, clearly indicates that opportunity exists with respect to increasing the value of community forestry management and its products (e.g., ecosystem services). Indonesia's President has stated the intent to reduce greenhouse gas emissions by 26 percent – opening opportunities for a domestic VCM market. Considering that Indonesia's oil and gas industry is mandated to reduce, as an obligation, 1 percent of its emissions, civil society organizations (CSOs) see this as a green opportunity for community forestry... and are willing to take on the challenge.

Building from the national workshop, forestry VCM stakeholders from government, the private sector and many CBOs, formulated a plan of action to further the development and integration of community forestry with smaller scale forestry VCM initiatives. Through pledges of roles and responsibilities, NGOs such as Lembaga Alam Tropika Indonesia (LATIN), the Indonesia Communication Forum on Community Forestry (FKKM), IDEAS, the Indonesian Conservation Community (WARSI), the Java Learning Center (JAVLEC), Kaliandra - Samanta, and Agus Sari (Citizen Forest), have formed a Working Group to mobilize short- to medium-term actions. Priority actions identified include:

1. Provide experiential sharing and learning opportunities for community forestry practitioners on Payment for Environmental Services, as this may offer greater potentials for local development and environmental conservation than REDD+.
2. Conduct studies on, and advocate for the standardization of carbon accounting, forest certification, and VCM standard bearers operating in Indonesia – a one-off integrated standard capable of reducing knowledge, financial, and logistical costs and constraints on forestry VCM facilitators and forest communities alike.
3. Develop "Guidelines" for Indonesian forestry VCM smallholder project developers – from assessment to accounting, to certification and verification, to marketing within various forestry VCM schemes.
4. Conduct studies on opportunity costs and elaborate the risks and benefits of forest products and services trading (e.g., carbon trading and other forms of environmental services such as water and tourism values).
5. Utilize and contribute to the FAO's forests VCM communication portal as a focal point for the development of an Indonesian information and delivery service center for community forestry VCM practitioners.

The national workshop highlighted that industries need Certified Emission Reduction (CER)/ Verified Emissions Reduction (VER) credits; and community forestry farmers can provide these. Hence, capacity-building efforts must focus on the farmer (i.e., the "generator" of the emission



reduction credits). Local communities need to know which standard is going to be most useful to them, and how to fulfill the requirements of various standards. Industries also need to be educated on the possibilities and opportunities related to community forestry projects with respect to providing the emission reduction credits sought.

For more information, please contact the Working Group coordinator, LATIN, at latin@latin.or.id and/or Robert W. Solar, TCP/RAS/3210 Consultant and Project Coordinator at Robert.Solar@fao.org

AN ASSESSMENT OF THE POTENTIAL IMPACTS OF FOREST PRODUCT LEGALITY REGULATIONS AND REDD+ ON FOREST PRODUCTION AND TRADE IN THE ASIA-PACIFIC REGION

Contributed by Jeremy Broadhead

Recently enacted and forthcoming forest products trade legislation, and expanding efforts to Reduce Emissions from Deforestation and Degradation (REDD+) have the potential to significantly influence the forestry sector in the Asia-Pacific region. A recently launched study implemented by the FAO Regional Office for Asia and the Pacific in collaboration with ITTO, aims to assess the extent to which these changes in the international forestry regime could affect the region's wood production and trade patterns, and forest resources.

Adoption of forest product legality-related measures, aimed at limiting the importation of illegal timber and wood products, such as the U.S. Lacey Act and the European Union's Illegal Timber Regulation, could affect forest products trade negatively if related requirements prove difficult for exporters to meet. Given the substantial proportion and value of wood products exported from the Asia-Pacific region to the U.S. and the EU, and the number of suppliers and manufacturers involved, questions have been raised as to how enacting these measures will affect current supply patterns.

REDD+ may also have a direct influence on wood supply if forest protection measures are supported in favour of sustainable forest management, including wood production and afforestation/ reforestation. Under such a scenario, the wood supply from some areas may fall and it is possible that the demand for wood will be diverted to other supply sources within and outside the region where REDD+ is not being implemented and/or enforcement capacity is low.

The primary objective of the study is to analyze how forest production and trade patterns, and demands on forest resources could be affected by FLEG-T and REDD+ and to identify responses to avoid unwanted consequences. Key questions include:

- How enacting forest products trade legislation in the U.S. and the EU will affect: i) current supply patterns given the substantial proportion of wood product exports from the Asia-Pacific region to these markets; ii) the region's forest products industry; iii) the value of the region's forest resources; and iv) consumption of wood substitutes such as plastics and concrete with larger carbon footprints than wood.
- How implementation of REDD+ could influence: i) wood products markets if forest protection measures are supported in favour of sustainable forest management, including wood production; and (ii) demand for wood from countries with poor enforcement capacity that are not involved with REDD+.

The Global Forest Products Model will be used to assess the potential impacts of these changes on Asia-Pacific forestry through development of a range of scenarios.

OUTSTANDING ACHIEVEMENTS IN ASSISTED NATURAL REGENERATION (ANR) WIN EDOUARD SAOUMA AWARD FOR EXCELLENCE

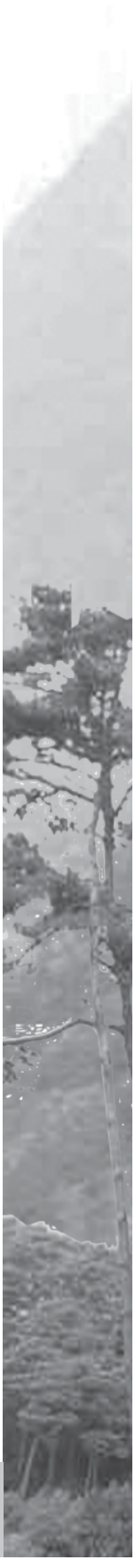
The Edouard Saouma Award is a biennial award conferred on a national or regional institution which has implemented with particular efficiency a project funded by FAO's Technical Cooperation Programme (TCP). The award bears the name of Dr. Edouard Saouma, Director-General of FAO from 1976 to 1993.

The Award for 2010-2011 was granted to the Forest Management Bureau (FMB) of the Department of Environment and Natural Resources (DENR), Philippines, for implementation of TCP/PHI/3101 – "Advancing the application of assisted natural regeneration for effective low-cost forest restoration." The Award was presented by FAO's Director-General, Jacques Diouf, during a special ceremony at the beginning of the 37th Session of the FAO Conference at FAO Headquarters in Rome, Italy. Ms. Neria Andin, OIC Director of FMB and Atty. Jonas Leones, Head Executive Assistant and representative of DENR Secretary Ramon JP Paje, attended the ceremony as the representatives of FMB and DENR.

The project aimed to promote the application of assisted natural regeneration (ANR) in the Philippines. Demonstration-cum-training sites were established in Bataan, Bohol and Davao del Norte and practical hands-on training was provided to more than 200 foresters, NGO staff and local community residents/leaders. Assessments of the cost-effectiveness of ANR approaches conducted by the project confirmed that ANR techniques could reduce the costs of forest restoration by as much as 50 percent compared with conventional reforestation approaches, while successfully preventing destructive forest fires and enhancing biological diversity. The project influenced major policy revisions prohibiting the clearing of natural vegetation in degraded natural forests.

FAO Director-General Jacques Diouf conferred the award to OIC Director Neria A. Andin

ANR is a method for enhancing the establishment of secondary forest from degraded grassland and shrub vegetation by protecting and nurturing the mother trees and their wildlings inherently present in the area. ANR aims to accelerate, rather than replace, natural successional processes by removing or reducing barriers to natural forest regeneration such as soil degradation, competition with weedy species, and recurring disturbances (e.g., fire, grazing and wood harvesting). Seedlings, in particular, are protected from undergrowth and extremely flammable plants such as *Imperata* grass. In addition to protection efforts, new trees are planted when needed or wanted (enrichment planting). With ANR, forests grow faster than they would naturally.



RAP NRE STAFF MOVEMENT

Michelle Hutchins, a national of Australia, joined the RAP forestry group in August 2011 as a Forestry Policy Officer under the Australian Youth Ambassadors for Development (AYAD) Programme. Ms Hutchins' main duties will include supporting the organization of the second Asia Pacific Forestry Week and APFC-associated events.

She will also assist an assisted natural regeneration project to be implemented in four Asia-Pacific countries and help to facilitate a project in Papua New Guinea which serves to strengthen systems of forest planning and monitoring.

Ms. Hutchins holds a Forest Science Degree from the Australian National University and has studied at the Faculty of Forestry on exchange at the University of British Columbia, Canada. Prior to joining the NRE group at RAP, she worked in the private forestry sector as an Environmental Coordinator and in local government as a Native Vegetation Officer. Most recently she has worked in the biodiversity policy section of the Australian Government, where she managed landscape-scale biodiversity projects and provided advice on carbon-offsetting polices and conservation covenanting programs.

Nachagahn Sathiensotorn joined the NRE group in August as an administrative clerk. She holds a Bachelor of Arts in German and Psychology from Chulalongkorn University, Thailand. Prior to joining RAP, she assisted and coordinated workshops for several UN agencies in Bangkok, including UNDP, UNAIDS, UNCC and FAO.

Ms. Wang Hong, Ms. Kristal Burry, **Ms. Elizabeth Fontain** and **Mr. Sverre Tvinnereim** have completed their respective assignments with the NRE group.

FAO ASIA-PACIFIC FORESTRY CALENDAR

21 February 2012. ***Post COP-17 consultation on implications of Durban for forestry.*** Manila, Philippines**.** Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

12-16 March 2012. ***31st session of the FAO regional conference for Asia and the Pacific***. Hanoi, Vietnam. Contact: Malcolm Hazelman, Secretary APRC, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Malcolm.Hazelman@fao.org

21-23 March 2012. ***Forestry strategic planning workshop for ASEAN countries.*** Ho Chi Minh City, Vietnam. Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

1-2 May 2012. ***Regional workshop on the role of reduced impact logging in emerging REDD+ mechanisms.*** Kota Kinabalu, Malaysia. Contact: Contact: Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

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

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

- East Asian forests and forestry to 2020 (RAP Publication 2010/15)
- Forests beneath the grass: Proceedings of the regional workshop on advancing the application of assisted natural regeneration for effective low-cost forest restoration (RAP Publication 2010/11)
- Forest policies, legislation and institutions in Asia and the Pacific: Trends and emerging needs for 2020 (RAP Publication 2010/10)
- Report of the Asia-Pacific Forestry Commission Twenty-third session (RAP Publication 2010/09)
- Asia-Pacific forests and forestry to 2020. Asia-Pacific Forestry Sector Outlook Study II (RAP Publication 2010/06)
- Forest law enforcement and governance: Progress in Asia and the Pacific (RAP Publication 2010/05)
- Forest insects as food: humans bite back. Proceedings of a workshop on Asia-Pacific resosurces and their potential for development (RAP Publication 2010/02)
- Strategies and financial mechanisms for sustainable use and conservation of forests: experiences from Latin America and Asia (RAP Publication 2009/21)
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- The future of forests: Proceedings of an international conference on the outlook for Asia-Pacific forests to 2020 (RAP Publication 2009/03)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04
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- Trees and shrubs of the Maldives (RAP Publication 2007/12)
- Developing an Asia-Pacific strategy for forest invasive species: The coconut beetle problem – bridging agriculture and forestry (RAP Publication 2007/02
- The role of coastal forests in the mitigation of tsunami impacts (RAP Publication 2007/01)
- Taking stock: Assessing progress in developing and implementing codes of practice for forest harvesting in ASEAN member countries (RAP Publication 2006/10)
- Helping forests take cover (RAP Publication 2005/13)
- Elephant care manual for mahouts and camp managers (RAP Publication 2005/10)
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- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
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- Applying reduced impact logging to advance sustainable forest management (RAP Publication: 2002/14)
- Trash or treasure? Logging and mill residues in Asia-Pacific (RAP Publication: 2001/16)
- Regional training strategy: supporting the implementation of the Code of Practice for forest harvesting in Asia-Pacific (RAP Publication: 2001/15)
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- Trees commonly cultivated in Southeast Asia: an illustrated field guide - 2nd edition (RAP Publication: 1999/13)

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