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*Featuring*

# FOREST NEWS

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**Front cover:** Hanuman langurs at sleeping site (Photo courtesy of Girish Chopra)

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# PREVALENCE OF NON-HUMAN PRIMATES IN MORNI HILLS OF HARYANA, INDIA: A SURVEY

by Girish Chopra, Madhu Bala Bhoombak and Parmesh Kumar



## Introduction

Langurs are one of the most fascinating non-human primates. Besides their importance in the fields of agriculture and medicine, the study of these animals has a close bearing on the understanding of human, social and psychological problems. The non-human primates are represented with 63 genera and about 600 species or subspecies in some 92 countries. Of the 25 species of these animals recorded from the Indian subcontinent, three, namely, the rhesus macaque (*Macaca mulatta*), the bonnet macaque (*Macaca radiata*) and the Hanuman langur (*Semnopithecus entellus*) have become urbanized (Rajpurohit, 2005). They occupy geographically vast areas (Prater, 1993) and exploit diverse habitats ranging from thick forests to human-dominated landscapes and thus are considered 'least concern' species in India (IUCN, 2003). Recently, habitat loss and degradation through human encroachment, overgrazing, building roads through forests, lopping, deforestation, agriculture, fire, unavailability of food, predation by carnivores and attack of several viral and bacterial diseases

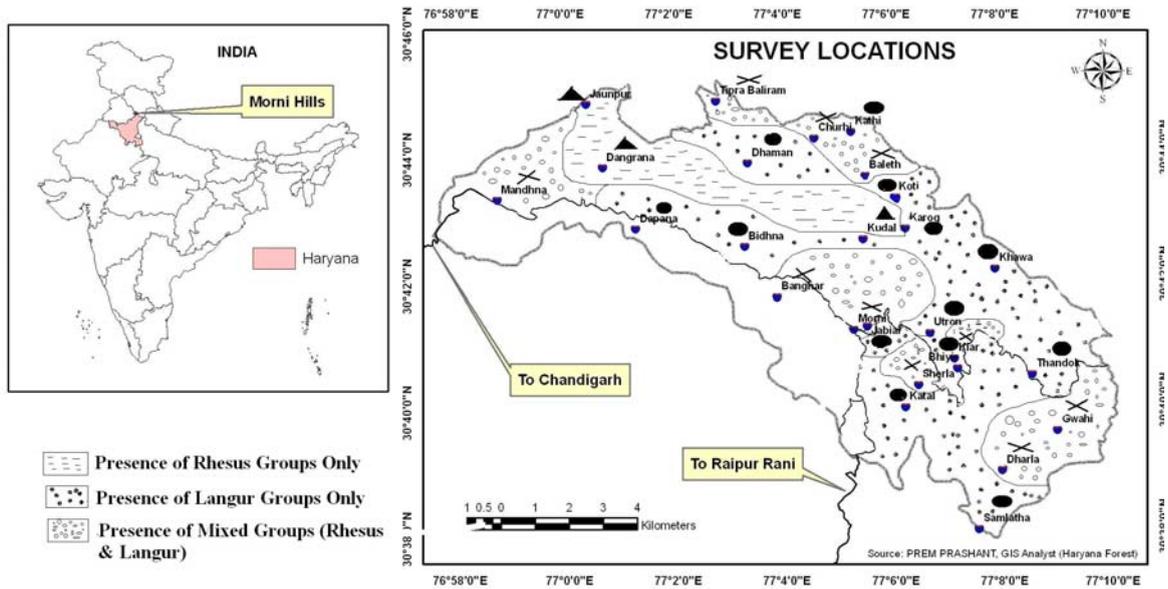
are a few factors affecting the primate taxa in South Asia in particular (Biswas and Sankar, 2002; Bagchi *et al.*, 2003; Nandi *et al.*, 2003; Minhas *et al.*, 2010). Hence, periodic monitoring is necessary to identify emerging threats in different pockets of their distributional range to provide a comprehensive picture of the conservation status of a widely distributed species, (Eudey, 2008).

The Morni hills form part of the lower Shiwalik ranges in north-east Haryana and harbor a rich flora and fauna. No scientific work has so far been conducted on primate populations in this border area of Haryana and Himachal Pradesh. The present study is an attempt to study the non-human primate populations in this region.

## Materials and methods

The Morni Hills (30°35' to 34°45' N and 70°00' to 75°15' E) form a part of the lower Shiwalik ranges in north-east Haryana with altitudes ranging from 300 to 1,400 m above sea level (Fig. 1). This region is sparsely vegetated. The river Ghaggar separates

**Figure 1. Location map of the study area with location of recorded primate groups (triangle where only rhesus were recorded, round where only langurs were recorded and cross where both langurs and langurs were recorded).**



the Morni hills from the Pinjore subdivision. The forest of the area is tropical deciduous in nature. The range includes two extremely picturesque lakes that are situated within these mountain ranges. Morni is further known for the ruins of an old fort at Morni village which is located at the top of the hill. The Morni hills have a fascinating range of flora and fauna.

A total of 70 transects were laid randomly in the Morni hills to cover the whole study area. The transects were walked by three observers from morning to evening covering an average of 10-13 km per day. The presence of primate groups was confirmed only on the basis of direct observations. The geographical information of all the primate groups or individuals encountered was tagged with GPS. Photographs of the primates were also taken whenever possible. Data on group size and interaction of the primates was collected during all counts and group observations respectively.

## Results and discussion

A survey from June 2009 to May 2011 of 70 localities in the Morni Hills of Haryana revealed

the existence of two non-human primate species namely, rhesus macaque and hanuman langur. In all, 24 groups of hanuman langurs (432 individuals) and 13 groups of rhesus macaque (532 individuals) were encountered in the study area. These results showed more abundance of rhesus monkey than hanuman langur in the study area. Of the 70 surveyed sites, the presence of these non-human primates was confirmed only from 27 sites. These primate groups were distributed in different habitats and elevations during the study period (Tables 1&2). Rhesus monkeys were recorded both at low altitude areas (below 500 m) and at high altitudes (from 600 m-1,200 m), whereas langurs were confirmed only from high altitudes (from 600 m-1,200 m). At 10 of the study sites, langurs and rhesus monkeys were found to co-exist in the same habitat, while at 3 sites only rhesus monkeys were found and at 14 sites only langurs were present. Out of 24 groups of langurs recorded, only 6 groups were found near human settlements, whereas the other 18 groups were confined to forest areas without human disturbance. As far as distribution of rhesus monkey is concerned, out of 13 recorded troops, only 4 troops (30.8%) were living in forest areas

Table 1: Recorded rhesus macaque groups with their location, group type, size and composition in the Morni Hills of Haryana

Study Groups	Location	Elevation (m)	Habitat Type	Group Type	Group Size	Group Composition							
						Adult		Sub-adult		Juvenile		Un-sexed	
						M	F	M	F	M	F	M	F
Mandana	N30°43'20" E76°58'46"	669	Forest area	MM-MF	28	4	10	3	2	2	2	2	5
Bangar	N30°41'44" E77°03'54"	993	Forest area	MM-MF	30	4	12	4	3	1	2	4	
Sherla	N30°40'18" E77°06'28"	1012	Forest area	MM-MF	25	3	10	2	4	2	2	2	
Kiar	N30°41'24" E77°08'43"	1041	Forest area	MM-MF	20	3	8	2	1	1	1	4	
Gwahi	N30°39'33" E77°09'01"	918	Near crop fields	MM-MF	52	8	17	6	4	3	3	11	
Dharla	N30°38'55" E77°07'59"	976	Near temple	MM-MF	56	7	20	5	4	6	4	10	
Morni	N30°41'13" E77°04'54"	1138	Near temple	MM-MF	40	4	12	3	5	6	2	8	
Baleth	N30°43'37" E77°05'33"	1156	Near crop fields	MM-MF	56	7	18	4	8	3	4	12	
Tipra Baliram	N30°44'51" E77°02'50"	1177	Near crop fields	MM-MF	38	5	11	3	5	4	3	7	
Churi	N30°44'14" E77°04'38"	1199	Near temple	MM-MF	42	5	14	2	4	5	4	8	
Jaunpur	N30°44'50" E77°00'26"	527	Near shops	MM-MF	50	6	15	5	6	4	6	8	
Dangrana	N30°43'49" E77°00'43"	686	Near temple	MM-MF	46	5	13	4	7	6	5	6	
Kudal	N30°42'37" E77°05'30"	1024	Near crop fields	MM-MF	49	5	13	5	6	7	5	8	
				Total	532	66	173	48	59	50	43	93	

Note: MM-MF, Multi-males – multi-females; M, Male; F, Female

Table 2: Recorded Hanuman Langur groups with their location, group type, size and composition in Morni Hills of Haryana

Study Groups	Location (Latitude, Longitude)	Elevation (m)	Habitat Type	Group Type	Group Size	Group Composition							
						Adult		Sub-adult		Juvenile		Un-sexed	
						M	F	M	F	M	F		M
<i>Mandana</i>	N30°43'20" E76°58'46"	669	Forest area	UMB	25	1	10	0	5	1	1	1	7
<i>Dapana</i>	N30°42'50" E77°01'19"	713	Forest area	UMB	16	1	6	0	3	0	2	4	4
<i>Katal</i>	N30°39'57" E77°06'13"	775	Forest area	AM	05	2	0	3	0	0	0	0	0
<i>Kharog</i>	N30°42'46" E77°06'17"	888	Forest area	UMB	18	1	9	0	4	1	1	2	2
<i>Koti</i>	N30°43'16" E77°06'06"	913	Forest area	UMB	20	1	10	1	2	2	2	3	3
<i>Bidha</i>	N30°42'32" E77°03'19"	972	Forest area	UMB	14	1	6	0	3	0	1	3	3
<i>Utryon</i>	N30°41'07" E77°06'42"	972	Forest area	S M	01	1	0	0	0	0	0	0	0
<i>Jabial</i>	N30°41'14" E77°05'33"	988	Forest area	AM	07	5	0	2	0	0	0	0	0
<i>Bangar</i>	N30°41'44" E77°00'54"	993	Forest area	UMB	20	1	8	0	4	3	0	4	4
<i>Samlatha</i>	N30°38'00" E77°00'32"	1003	Forest area	UMB	15	1	5	0	3	0	4	2	2
<i>Sherla</i>	N30°40'18" E77°06'28"	1012	Forest area	UMB	30	1	12	0	4	2	3	8	8
<i>Bhiyir</i>	N30°40'33" E77°07'12"	1038	Forest area	UMB	21	1	9	0	2	1	2	6	6
<i>Kiar</i>	N30°41'24" E77°08'43"	1041	Forest area	UMB	25	1	11	0	3	1	1	8	8
<i>Khawa</i>	N30°42'07" E77°07'55"	1050	Forest area	UMB	28	1	10	0	5	1	4	7	7

**Table 2: Recorded hanuman langur groups with their location, group type, size and composition in the Morni Hills of Haryana**

Thandok	N30°40'26" E77°08'33"	1083	Forest area	A M	07	7	0	0	0	0	0	0	0	0	0	0	0
Dhaman	N30°43'51" E77°03'24"	1087	Forest area	UMB	24	1	10	0	3	2	2	2	2	2	2	2	6
Kothi	N30°44'19" E77°05'19"	1112	Forest area	UMB	27	1	9	0	5	2	2	5	2	5	5	5	5
Churi	N30°44'14" E77°04'38"	1119	Forest area	UMB	22	1	10	0	3	0	0	3	0	0	0	0	8
Gwahi	N30°39'33" E77°09'01"	918	Near human habitation	UMB	15	1	6	0	2	0	2	0	2	0	2	2	4
Dharla	N30°38'55" E77°07'59"	976	Near human habitation	AM	10	8	0	2	0	0	0	0	0	0	0	0	0
Morni	N30°41'13" E77°04'54"	1138	Near human habitation	AM	09	9	0	0	0	0	0	0	0	0	0	0	0
Baleth	N30°43'37" E77°05'33"	1156	Near human habitation	UMB	26	1	12	0	2	2	2	2	2	2	3	2	6
Tipra Baliram	N30°44'51" E77°02'50"	1177	Near human habitation	UMB	27	1	9	0	5	1	5	1	5	5	5	6	6
Churi	N30°44'14" E77°04'38"	1199	Near human habitation	UMB	20	1	8	0	6	0	6	0	1	1	1	4	4
				<b>Total</b>	<b>432</b>	<b>50</b>	<b>160</b>	<b>8</b>	<b>64</b>	<b>19</b>	<b>38</b>	<b>64</b>	<b>19</b>	<b>38</b>	<b>93</b>	<b>93</b>	

while 9 troops (69.2%) were inhabiting areas near human settlements.

Langurs are a social non-human primate species with a variable social organization (Roonwal and Mohnot, 1977; Newton, 1988; Chhangani, 2000). The two basic types of social groups found among langurs are bisexual troops and all-male bands. The number of individuals in a group, however, varies (Koenig and Borries, 2001). Out of 24 recorded groups of langurs in the present study, 75% were uni-male bisexual, 20.8 % were all-male bands and only 4.1 % were solitary males. These results showed the predominance of unimale bisexual groups in the population of langurs in the study area. The predominance of unimale bisexual troops of hanuman langurs has also been earlier reported in other parts of India like Dharwar, Madhav National Park, Mt. Abu, Kanha, Jodhpur and Kumbhalgarh (Sugiyama and Parthasarathy, 1968; Hardy, 1977; Kankane, 1984; Newton, 1987; Chhangani, 2002). Similarly, only multi-male bisexual troops have been reported in some regions in India such as Kaukori and Orcha (Jay, 1965), Bhimtal (Vogel, 1971) and Shimla (Sugiyama, 1976). During the present study, only one solitary male was observed in Utryon locality in Morni Hill area. This old adult male might be an ousted resident male of an all-male band who started living a solitary life. Bhargava (1984), Rajpurohit and Mohnot (1988) and Rajpurohit *et al.* (2004) have also earlier reported cases of solitary or pairs of langur males in the arid and semi-arid region of Rajasthan.

The group size of hanuman langurs in the Morni Hills varied from 14-30 in bisexual groups to 5-10 in all-male bands. The average troop size calculated was 22.3 and average band size was 5.8. These langur groups are smaller compared to the ones reported from other places in India such as Jodhpur, Rajasthan (Chhangani, 2002; Chhangani and Mohnot, 2004), Sariska, Rajasthan and Gir, Gujrat (Rahman, 1973). However, group size in Morni Hills is close to the average recorded in many other regions such as Dharwar (Sugiyama and Parthasarathy, 1968), Bhimtal (Vogel, 1971, 1973), Kanha Tiger Reserve (Newton, 1987), Madhav National Park (Kankane, 1984), Shimla (Pitra *et al.*, 1997; Chauhan and Pitra, 2010) in India and Ramnagar, Nepal (Koenig *et al.*, 1998)

and Keshabpur in Bangladesh (Ashan and Khan, 2006).

Rhesus macaques live in large, multi-male and multi-female groups and have an average troop size of 8 to 180 individuals in diverse habitats such as temples, urban areas, villages, village-cum-ponds, ponds, road sides, canal sides and in forests with human interactions (Seth and Seth, 1983; Seth *et al.*, 1992; Southwick and Siddiqui, 2001). Troops may number in the hundreds in mountain regions and areas of high human food subsidization or agricultural habitats (Lindburg, 1971; Seth and Seth, 1986; Southwick *et al.*, 1996; Seth *et al.*, 2001; Hauser *et al.*, 2000; Wolfe, 2002; Gahlawat *et al.*, 2004; Chopra *et al.*, 2011). In the present study, all the recorded troops of rhesus monkeys were multi-male/multi-female types and troop size varied from 20 to 56 with an average of 40.9 individuals. Troop size was comparatively larger near human habitations than in the forest areas. These results are in conformity with the findings of earlier workers in different habitats including villages, roadside forest, towns, temples and near agricultural fields in Haryana (Seth *et al.*, 1992; Gahlawat *et al.*, 2004; Chopra *et al.*, 2011).

The sex ratio among non-human primates varies greatly from habitat to habitat and year to year. In the present study, the adult male to female ratio was calculated to be 1:3.2 and 1:1.26 respectively for hanuman langur and rhesus macaque, thereby indicating that the sex ratio in these primates is female-biased. These results are in conformity with the findings of earlier workers (Jay, 1965; Mohnot, 1974; Srivastava, 1989; Chhangani, 2002; Minhas *et al.*, 2010; Chopra *et al.*, 2011).

Langur and rhesus monkey groups were observed to co-exist peacefully in some regions in the Morni hills. Both these species were found to share their habitats with each other without any conflict. During the study period these primate groups were observed peacefully feeding in the same tree. They ignored the presence of each other. Only one incidence of fighting between alpha males of the groups was recorded from the Bangar troops. These primates groups inhabited the same habitat during the day time and moved towards their respective sleeping trees in the evening. However,

sharing of the sleeping trees by these two primate species was not recorded.

Other mammalian fauna observed in the study area included leopard (*Panthera pardus*), small Indian cat (*Viverricula indica*), jackal (*Canis aureus*), Indian hare (*Lepus nigricolis*), Indian wild boar (*Sus scrofa*), goral (*Nemorhaedus goral*), blue bull (*Boselaphus tragocamelus*), spotted deer (*Axis axis*), sambar (*Cervus unicolor*), common mongoose (*Herpestes edwardsi*) and Indian porcupine (*Hystrix indica*). Beside these wild mammals, domestic animals such as cows, goats, sheep and dogs were also present. Leopards, jackals and pet dogs are the main predators of the non-human primates in the Morni hills. Both the primate groups selected high trees with straight bark as sleeping sites. The sleeping sites of non-human primates seem to be selected to reduce the chance of being preyed upon during the night, with sleeping trees being very tall as well as free of low branches and with long trunks, providing effective physical barriers to potential terrestrial predators (Anderson, 1984). Similar patterns have been found in a number of primates (Anderson, 2000; Cui *et al.*, 2006; Li *et al.*, 2010; Phoonjampa *et al.*, 2010) including langurs (Chhangani and Mohnot, 2006; Minhas, *et al.*, 2010). The presence of animals such as goats, sheep, cows and mongoose was tolerated by these primates. They were found to feed alongside these animals without any conflict. All the animals benefited from the whooping calls of primates when a predator was nearby. As far as interaction with humans is concerned, rhesus monkeys and langurs depicted different behavior. The langur groups that were mostly confined to the forest area were shy of human presence. They relied on natural foods and showed no interest in provisioned food. The langur groups present near human habitations and crop fields were adapted to the human presence and occasionally raided the crop fields in the study area. As they are considered sacred, the animals were never hunted. Rhesus macaques, on the other hand, were very well adapted to human presence; these animals frequently raided crops, human settlements, vegetables shops and temples. The rhesus monkeys were given provisions regularly by local people due to religious sentiments, particularly on Tuesday near temples.

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*Rhesus monkey with provisioned food*

## AN OBSERVATION ON ODONATA DIVERSITY IN HADGARH WILDLIFE SANCTUARY, ODISHA, EASTERN INDIA

by Subrat Debata, Hemanta Ku. Sahu, Srustidhar Rout and Rabi Ku.

### Introduction

Odonates occupy a vital position in ecosystems as both adults and larvae are valuable indicators of water quality and landscape disturbance (Watson *et al.*, 1982; Castella, 1987). They are also important and widespread components of freshwater ecosystems, being top predators (Corbet, 1962). Eight super families, 29 families and some 58 subfamilies of dragonflies covering approximately 600 genera and 6,000 named species have so far been described all over the world (Silsby, 2001). According to Prasad and Varshney (1995), India lists odonates of three sub-orders (Anisoptera, Zygoptera and Anisozygoptera), 17 families, 139 genera and 499 species and subspecies. Fraser (1933-36) dealt in detail with the odonate fauna of India, including some species from Odisha. Odonate study in Odisha can be traced back to Laidlaw (1915), Fraser & Drover (1922), Srivastava & Das (1987), Mitra (2002), Sethy & Siddiqi (2007), Das *et al.* (2010, 2011) and Nair (2011) who have worked on odonate fauna in the state of Orissa. In this study we tried to explore the odonata diversity in Hadgarh Wildlife Sanctuary.

### Materials and methods

The study was conducted in Hadgarh Wildlife Sanctuary, Odisha. The area is located at 21°12' to 21°23' North latitude and 86°12'30" to 86°21'30" East longitude. A survey of odonates was carried out along streams and water bodies from February 2011 to January 2012, covering all 3 seasons viz. summer (March to June), monsoon (July to October) and winter (November to February). Visual encounter surveys (Heyer *et al.*, 1994) were used to study odonates. A number of trails were randomly made near different possible odonate habitats such as ponds, streams and river banks. Species were photographed.

Doubtful species were collected using an entomological net and identified with the help of Fraser (1933, 1934, 1936), Mitra (2002), Subramanian (2005, 2009), and Nair (2011).

### Results and discussion

Being an indicator species of water quality (Watson *et al.*, 1982; Castella, 1987) and as the presence of many species represents good habitat and unpolluted water quality (Nair 2011), it is crucial to monitor the diversity of the species (Jhala *et al.*, 2008).

In all, 110 species of odonates under 60 genera and 9 families were reported to inhabit Odisha (Nair, 2011). The present study recorded 55 species of odonates under 36 genera and 9 families from the area (Table-1). From all the recorded Anisoptera, Family Libellulidae is dominated by 31 species followed by Aeshnidae (3) and Gomphidae (3). In case of the sub-order Zygoptera, Family Coenagrionidae is well represented (7), followed by Calopterygidae (3), Protoneuridae (3), Chlorocyphidae (2), Platycnemididae (2) and Isonidae (1).

During the survey species such as *Ictinogomphus rapax*, *Paragomphus lineatus*, *Diplocodes trivialis*, *Neurothemis fulvia*, *Orthetrum pruinosum*, *Orthetrum sabina*, *Potamarcha congener*, *Rhinocypha bisignata*, *Agriocnemis pygmaea*, *Ceriagrion coromandelianum*, *Copera marginipes*, *Copera vittata* and *Caconeura ramburi* were found in abundance, whereas species such as *Anax guttatus*, *Gynacantha bayadera*, *Gynacantha dravida*, *Diplacodes nebulosa*, *Neurothemis intermedia*, *Neurothemis tullia*, *Orthetrum glaucaum*, *Zyxomma petiolatum*, *Neurobasis chinensis*, *Vestalis apicalis* and *Vestalis gracilis*, were less frequently sighted. The presence of

**Table 1- Checklist of Odonates from Hadgarh Wildlife Sanctuary**

Sl No	Scientific Name	Common Name
<b>A. Sub Order: Anisoptera</b>		
<b>a. Family: Aeshnidae</b>		
1	<i>Gynacantha bayadera</i> (Selys, 1891)	Parakeet Damer
2	<i>Gynacantha dravida</i> (Lieftinck, 1960)	Brown Damer
3	<i>Anax guttatus</i> (Burmeister, 1839)	Blue tailed Green Darner
<b>b. Family: Gomphidae</b>		
4	<i>Ictinogomphus rapex</i> (Rambur, 1842)	Common Club Tail
5	<i>Paragomphus lineatus</i> (Selys, 1850)	Common hook Tail
6	<i>Macrogomphus annulatulus</i> (Selys, 1854)	Deccan Bow Tail
<b>c. Family: Libellulidae</b>		
7	<i>Acisoma panorpoides</i> (Rambur, 1842)	Trumpet Tail
8	<i>Brachydiplax chalybea</i> (Brauer, 1868)	Rufous backed Marsh Hawk
9	<i>Brachydiplax sobrina</i> (Rambur, 1842)	Little blue Marsh Hawk
10	<i>Brachythemis contaminata</i> (Fabricius, 1793)	Ditch Jewel
11	<i>Bradynopyga geminate</i> (Rambur, 1842)	Granite Ghost
12	<i>Crocothemis servilia</i> (Drury, 1770)	Ruddy Marsh Skimmer
13	<i>Diplacodes nebulosa</i> (Fabricius, 1793)	Blacktipped ground skimmer
14	<i>Diplocodes trivialis</i> (Rambur, 1842)	Ground Skimmer
15	<i>Indothemis carnatica</i> (Fabricius, 1798)	Black Marsh Skimmer
16	<i>Neurothemis fulvia</i> (Drury, 1773)	Fulvus Forest Skimmer
17	<i>Neurothemis intermedia</i> (Rambur, 1842)	Ruddy Meadow Skimmer
18	<i>Neurothemis tullia</i> (Drury, 1773)	Pied Paddy Skimmer
19	<i>Orthetrum glaucaum</i> (Brauer, 1865)	Blue Marsh Hawk
20	<i>Orthetrum luzonicum</i> (Brauer, 1868)	Tricoloured Marsh Hawk
21	<i>Orthetrum pruinosum</i> (Burmeister, 1839)	Crimson Tailed Marsh Hawk
22	<i>Orthetrum sabina</i> (Drury, 1770)	Green Marsh Hawk
23	<i>Orthetrum taeniolatum</i> (Schneider, 1845)	Taeniolata Marsh Hawk
24	<i>Orthetrum triangulare</i> (Selys, 1878)	Blue tailed forest Hawk
25	<i>Palpopleura sexmaculata</i> (Fabricius, 1787)	Blue Tailed Yellow Skimmer
26	<i>Pantala flavescens</i> (Fabricius, 1798)	Wandering Glider
27	<i>Potamarcha congener</i> (Rambur, 1842)	Yellow Tailed Ashy Skimmer
28	<i>Rhodothemis rufa</i> (Rambur, 1842)	Rufous Marsh Glider
29	<i>Rhyothemis variegata</i> (Linnaeus, 1763)	Common Picture Wing
30	<i>Tholymis tillarga</i> (Fabricius, 1798)	Coral Tailed Cloud Wing
31	<i>Tamea basilaris</i> (Palisot de Beauvois, 1805)	Red Marsh Trotter
32	<i>Tamea limbata</i> (Desjardins, 1832)	Black Marsh Trotter
33	<i>Trithemis aurora</i> (Burmeister, 1839)	Crimson Marsh Glider
34	<i>Trithemis festiva</i> (Rambur, 1842)	Black Stream Glider
35	<i>Trithemis pallidinervis</i> (Kirby, 1889)	Long Legged Marsh Glider
36	<i>Urothemis signata</i> (Rambur, 1842)	Greater Crimson Glider

Sl No	Scientific Name	Common Name
37	<i>Zygomma petiolatum</i> (Rambur, 1842)	Brown Dusk Hawk
<b>A. Sub Order: Zygoptera</b>		
<b>a. Family: Calopterygidae</b>		
38	<i>Neurobasis chinensis</i> (Linnaeus, 1758)	Stream Glory
39	<i>Vestalis apicais</i> (Selys, 1873)	Black-tipped Forest Glory
40	<i>Vestalis gracilis</i> (Rambur, 1842)	Clear-winged Forest Glory
<b>b. Family: Chlorocyphidae</b>		
41	<i>Libellago lineata</i> (Burmeister, 1839)	River Helioder
42	<i>Rhinocypha bisignata</i> (Selys, 1853)	Stream Ruby
<b>c. Family: Coenagrionidae</b>		
43	<i>Agriocnemis lecteola</i> (Selys, 1877)	Milky Dartlet
44	<i>Agriocnemis pygmaea</i> (Rambur, 1842)	Pygmy Dartlet
45	<i>Ceriagrion coromandelium</i> (Fabricius, 1798)	Coromandel Marshdart
46	<i>Ischnura aurora</i> (Brauer, 1865)	Golden Dartlet
47	<i>Pseudagrion decorum</i> (Rambur, 1842)	Three lined Dart
48	<i>Pseudagrion microcephalum</i> (Rambur, 1842)	Blue Grass Dartlet
49	<i>Pseudagrion rubriceps</i> (Selys, 1876)	Saffron Faced Blue Dart
<b>d. Family: Lestidae</b>		
50	<i>Lestes viridulus</i> (Rambur, 1842)	Emerald Striped Spreadwing
<b>e. Platycnemididae</b>		
51	<i>Copera marginipes</i> (Rambur, 1842)	Yellow Bush Dart
52	<i>Copera vittata</i> (Selys, 1863)	Blue Bush Dart
<b>f. Family: Protoneuridae</b>		
53	<i>Caconeura ramburi</i> (Fraser, 1922)	Coorg Bambootail
54	<i>Disparoneura quadrimaculata</i> (Rambur, 1842)	Black-winged Bambootail
55	<i>Prodasineura verticalis</i> (Selys, 1860)	Black Bambootail

*Ictinogomphus rapex* and *Paragomphus lineatus* inside the sanctuary area indicates good water quality as the presence of Gomphids, Macromids, most Calopterygids, Chlorocyphids and Euphaeids indicate pure, unpolluted waters and good habitat quality. *Brachythemis contaminata* was less frequently sighted inside the sanctuary whereas this species was frequently sighted in human-occupied water bodies, thus indicating the presence of polluted water (Nair, 2011).

### Conclusion

Odonates are important indicators of water quality and pollution levels. They inhabit diversified

habitats near water bodies ranging from stagnant pond water to flowing streams. Although Hadgarh Wildlife Sanctuary has a diversified habitat for odonates, the gradual increase in human pressure in and around water bodies has adverse effects on the sustainability of these insects. Therefore, protection measures are necessary and human activities limited to those which will not endanger the sustainability of these valuable creatures.

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## ***OCCURRENCE OF THE INDIAN TREE SHREW *Anathana ellioti* (Waterhouse) (MAMMALIA : SCANDENTIA) IN CENTRAL INDIA***

by Ashish D. Tiple and S.S. Talmale



**Indian tree shrew *Anathana ellioti* in Melghat Tiger Reserve, Maharashtra (Photo: Ashish Tiple)**

### **Introduction**

Central India's forests are well distributed over all the agro-climatic zones. The forest types found in the area are classified as sub-tropical hill forests, tropical moist deciduous forests, tropical dry deciduous forests and lush green deciduous forests (Champion and Seth, 1968), which are home to a variety of flora and fauna. The most dominant floral element of the forest is teak (*Tectona grandis*). The climate is marked by three major seasons in central India: hot and dry summer (March to May), the south-western monsoon (June-September) and a mild winter (November to February; October being the post-monsoon transitory period (Tiple *et al.*, 2009).

The Madras tree shrew or Indian tree shrew (*Anathana ellioti*) is an Indian endemic species found in southern peninsular India. Its northern limit reaches up to the Satpura hills in the west and to West Bengal in east. This is a most

interesting species belonging to the mammalian order, Scandentia, and showing affinities with four other mammalian orders viz. Insectivora, Carnivora, Rodentia and Primates. It is usually mistaken for a stripeless squirrel or a young mongoose (Pradhan, 2006) because in appearance, a tree shrew is a combination of shrew, squirrel and a mongoose. Its long snout is shrew-like, the rounded ears, body, limbs and bushy tail suggests a squirrel, and while in motion with a long body and the extended bushy tail, its behavior suggests that of a mongoose. The feet are like that of a squirrel and well fitted for climbing. The dorsum is reddish brown to grayish brown speckled with black. There is an oblique pale shoulder stripe. The ventrum is whitish in color and the feet are a buff color (Alfred *et al.*, 2006).

The Indian tree shrew is terrestrial, arboreal and diurnal, preferring to move on the forest floor among fallen leaves in search of food. It prefers

to live in scrub jungle and dry and moist deciduous forests. It feeds on seeds, fruits, insects, birds and small mammals (Roonwal and Monhot, 1977; Theodore, 1986; Alfred *et al.*, 2006), earthworms (Bora, 2002) and also feeds on Agamid lizard (Kartikayan, 2003). It makes a rough nest on trees and lives singly or in pairs (Ghose and Bhattacharya, 1995). It marks its own territory by rubbing its chin and throat on the rocks and leaving drops of urine on rocks in its path. The tree shrew plays an important role in the ecosystem as seed-disperser (Kartikayan, 2003).

Corbet and Hill (1992) recognized three subspecies viz., *Anathana ellioti ellioti* (Waterhouse, 1850) (Eastern Ghats, Shevaroy Hills and other hills of Southern India), *Anathana ellioti pallida* Lyon, 1913 (Central India) and *Anathana ellioti wroughtoni* Lyon, 1913 (Satpuda hills of western India and Western Ghats of Maharashtra) from Peninsular India with a possibility of intergradations without definable boundaries. However, Ellerman and Morrison-Scott (1966) have synonymised *pallida* and *wroughtoni* with the nominate subspecies. Helgen (2005) also kept *pallida* and *wroughtoni* under *Anathana ellioti*.

There are number of sighting records from south India, Andhra Pradesh (Molur *et al.*, 2005; Srinivasulu and Srinivasulu, 2011; Giridhar and Srinivasulu, 2011), Kerala (George, 1989), Karnataka (Srinivasan *et al.*, 2009), Tamil Nadu (Karthikeyan, 2003), Orissa (Chakraborty, 2005), Uttar Pradesh (Srinivasan *et al.*, 2009), the western part of Maharashtra, Khandala, Bhimashankar, Matheran (Suter, 1922; Chakraborty, 2005, Talmale, 2007), Gujarat (Chakraborty and Agrawal, 2000), Jharkhand (Gupta, 1996) and West Bengal (Agrawal *et al.*, 1992). The present study is an attempt to examine the occurrence of the Indian tree shrew from Central India.

## Materials and methods

*Anathana ellioti* was surveyed in different reserve forest areas of Central India by the authors from 2008 to 2011 in Chhattisgarh (Guru Ghasidas National Park), Madhya Pradesh (Bori Wildlife Sanctuary, Bandhavgad Tiger Reserve, Kanha Tiger Reserve, Pench Tiger Reserve

(Priyadarshini), Pachmarhi Biosphere Reserve, Achanakmar-Amarkantak Biosphere Reserve, Muktagiri temple) and Maharashtra (Melghat Tiger Reserve, Navegaon National Park, Tadoba-Andhari Tiger Reserve, Pench National Park, Bor Reserve forest). The adults were identified with the help of identification keys provided by Corbet and Hill (1992) and Alfred *et al.* (2006).

## Observations and discussion

During the course of the study, 43 sighting records of Indian Tree shrew were recorded from different reserve forest areas of the Central India. Most of the sightings were recorded from Tadoba-Andhari Tiger Reserve, Dist. Chandrapur (19). There were 5 sightings from Melghat Tiger Reserve, Dist. Amaravati, Pachmarhi Biosphere Reserve, Dist. Hoshangabad and Guru Ghasidas National Park. Dist. Korea and 4 from Pench Tiger Reserve (Priyadarshini), Dist., Chhindwara & Seoni. Two sightings were recorded from Navegaon National Park, Dist. Gondia, Pench National Park, Dist. Nagpur, Bandhavgad Tiger Reserve, Dist. Umaria and Muktagiri (Table 1).

Interestingly, Indian Tree shrew was recorded earlier from Bori Wildlife Sanctuary, Dist. Hoshangabad, Kanha Tiger Reserve, Dist. Mandla, Achanakmar-Amarkantak Biosphere Reserve, Madhya Pradesh and Chhattisgarh and Nagpur city but were not seen during the present study. Compilations of the present observations and historic sightings indicate that the tree shrew is restricted to the forested area. D'Abreu (1927) observed that the tree shrew is plentiful in Central India (Bhandara, Chhindwara, Balaghat, Betul, Nimar (Khandwa), Nagpur, Bilaspur, Bastar, Raipur and Durg). Populations of this "Near Threatened" species are now low due to habitat fragmentation, loss of habitat by ever expanding urbanization and human interference.

The family Tupaiidae under which this species is included is listed in *CITES* (Convention on International Trade in Endangered species of Wild Fauna and Flora): Appendix II and the Near Threatened category as per IUCN CAMP Workshop (Molur *et al.*, 2005). Regular monitoring surveys are necessary to update the status of this endemic Indian tree shrew in Central India. It is

**Table 1. The sighting records of *Anathana ellioti* from different areas of the Central India**

S. No.	Name of the Area	Locality	Reference	No. of Sightings
<b>CHHATTISGARH</b>				
1	Guru Ghasidas National Park, Dist. Korea	Sonhat range	Chakraborty, 2008, and Present record	5
<b>MADHYA PRADESH</b>				
1.	Bori Wildlife Sanctuary, Dist. Hoshangabad	-	Shrivastava, 1995	-
2.	Bandhavgad Tiger Reserve, Dist. Umaria	Tala range	Harshey, 2009 and Present record	2
3.	Kanha Tiger Reserve, Dist. Mandla	Supkhar	Ghose and Bhattacharya, 1995	-
4.	Pench Tiger Reserve (Priyadarshini), Dist., Chhindwara & Seoni	Karmazari	Molur <i>et al.</i> , 2005 and Present record	4
5.	Pachmarhi Biosphere Reserve, Dist. Hoshangabad	Near bot. Garden	Chakraborty, 2005 and Present record	5
6.	Chhindwara District	Tamia	D'Abreu, 1927	-
7.	Balaghat District	Lamta	D'Abreu, 1927	-
8.	Muktagiri	Jain Mandir campus	Present record	2
9.	Achanakmar-Amarkantak Biosphere Reserve, Madhya Pradesh and Chhattisgarh		Not Seen	-
<b>MAHARASHTRA (Vidarbha)</b>				
1.	Melghat Tiger Reserve, Dist. Amaravati	Chikhaldara, Semadoh and Raipur	Pradhan (2005) and Present record in Kolkhaz	5
2.	Navegaon National Park, Dist. Gondia		Alfred <i>et al.</i> , 2006 and Present record Near Gate	2
3.	Gadchiroli District	Alapalli Range	Wroughton & Ryley, 1913	-
4.	Tadoba-Andhari Tiger Reserve, Dist. Chandrapur	Tadoba, Mahurli, Kolsa and Road accident record at Mahurli gate	Pradhan, 2006 and Present record	19
5.	Pench National Park, Dist. Nagpur	Kolitmara	Pradhan, 2004 and Present record	2
6.	Bor Reserve Forest, Wardha		Not Seen	-

(continued from p.16)

also strongly recommended that the species be brought under the Indian Wildlife (Protection) Act Schedule and the species be offered full protection considering its importance from the evolutionary point of view.

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*Indian tree shrew, Melghat Tiger Reserve (Photo: Ashish Tiple)*

## A CASE STUDY OF KUDREMUKH NATIONAL PARK

by Prakash S. Netalkar



*Kudremukh Peak*

**K**udremukh National Park, with an area of 600.32 km<sup>2</sup>, is part of the mid-Western Ghat range between Goa and the Nilgiris. It constitutes the geological barrier between the coastal area and the hinterland. It is spread over the three districts of Dakshina Kannada, Udupi and Chickmagalure in Karnataka State.

The highest hill peak is Kudremukh Peak, with an attitude of 1,892 m above mean sea level, and hence, the park is named after it. The park has many fascinating hillocks with shola forests adding beauty to these grassy hills. It has a host of places like Kigga, Valikunja, Narasimhaparvatha, Gangamoola, etc., which have mythical leanings. The park has beautiful forests, shining streams and broken, narrow valleys, waterfalls and abandoned iron ore deposits. It was initially declared a national park in 1987 and final notification was issued in June 2001. There are few enclosures inside the park and the co-operation of the stakeholders is taken into consideration to

manage the park. It has nearly 1,300 families with 98 settlements.

### **Climate**

The park comprises a hilly terrain and the climate is cool for most of the year. The annual temperature varies from 12°C to 30°C. Drops in the night temperature are very appreciable throughout the year. Rainfall ranges from 4,000 to 7,000 mm annually.

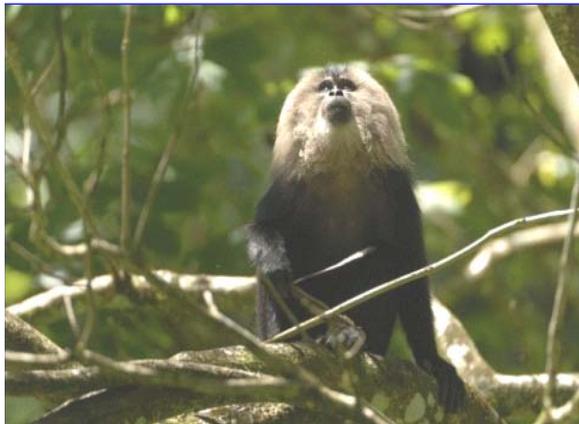
### **Water sources**

There are innumerable streams and lakes well distributed throughout the park. All of them eventually drain to the major rivers such as Tunga, Bhadra, Nethravathi, Gurupur and Swarna. Some of the waterfalls within the park are Suthanabbi, Narasibyle, Bandaje, Belle and Baregundi, which are visited by many tourists throughout the year.

## Flora and fauna

The flora and fauna of this park are highly specialized. Grasslands are the second largest eco-type within the park. There are good patches of Shola forests with evergreen species such as *Hopea parviflora*, *Terminalia tomentosa*, *Macaranga peltata*, *Poiceloneuron indicum*, *Syzygium cumminni*, *Mangifera indica*, etc. In addition, there are many varieties of medicinal plants found here. About 73 very rare species of orchids and insectivorous plants are present and have been recorded in the park. A few are kept in the Orchidarium and maintained by the department.

The important fauna found in the park are rabbits, mongoose, wild boar, king cobra, insects, snakes, lizards, spiders, lion-tailed macaque, giant Indian squirrel, rare fishes, spotted deer, sambar, bison, leopard and tiger. Elephants are migratory visitors. Each animal species has a highly specialized and unique functional role. Adequate forest is available to the ungulates almost throughout the year. Lion-tailed macaque is an endemic and endangered species found in the park.



*Lion-tailed macaque*

## Habitat management

The existing forests are very well suited for the flora and fauna and the species are adapted to the existing habitat. However, the habitat is managed to improve the native species of wildlife and plants. The habitat is under pressure from different sources such as human and cattle pressure, changes in the rainfall pattern, invasion of weeds, etc. However, this is managed under the following principles:

- Seeding and propagation of threatened and endangered species;
- Creation of wildlife corridors;
- Water resource development, including shallow water areas, waterholes and wet lands;
- Reducing man-animal conflicts;
- Rehabilitation of the villagers with due compensation;
- Promotion of native fruit yield species, premier grasses, legumes, etc.;
- Protection from poaching and encroachment of land; and
- Natural vegetation left to itself without any interference.



*King cobra*

## Ecotourism

Eco-tourism is gaining momentum in the Kudremukh National Park. The attractive landscapes and wildlife attract a lot of trekkers. The tourists spots are well disposed and there is no concentration of tourists in any one spot. There are three tourist zones around the three ranges, i.e., Belthangady, Kudremukh and Kerekatte.

The tourists zone is limited and is as follows:

*Tourism Zone 1* - This zone lies between Bandaje Falls, Navoor Rest House, Bolle Falls and Kadamagundi Falls along the Netravathi River.

*Tourism Zone 2* - This spreads over 2 km on either side of State Highway 66 from Kudremukh town to the S.K.Border. A number of places like Lakya dam, mining sites, Bhagavathi Nature Camp, Kadambi Falls, Singsar-Ganapathikatte game path, Gangamoola, Nagateertha, Bhagawathi, Kadambi game path and Suthanabbi fall in this zone. This is one of the key areas for tourism in the park. Many tourists and highway visitors visit and enjoy the beauty of the park.

*Tourism Zone 3* - This zone spreads around Kigga Temple, Narasimhaparvatha Peak, Sirimane Falls and Yalakkigudda Peak. Being close to the historical Sringeri Temple, it attracts a number of visitors.

The existing trekking paths lead to Kudremukh Peak, Valikunja and Kurinjal Peak. Tourists are accompanied by department staff as guides. There is a nature camp at Bhagavathi on the banks of the River Bhadra with 10 tented accommodations, a dormitory, a guest house and kitchen facilities. For children there is the Bhagawathi Nature Camp, games and ropeways, watch towers, etc. Bison and deer are commonly sighted near the camp.

Visitors are taken by vehicle to view the wild animals along the game road. They are charged entry, trekking and guide fees as per the State Government orders in force. The number of visitors visiting the National Park during the last three year are as follows:

		2008-09	2009-2010	2010-2011
1.	No. of visitors	43,896	53,869	55,488
2.	Revenue collected (Rps)	1,513,646.00	1,331,649.00	1,889,583.00

## Protection

The staff are young and energetic, and are well taught in wildlife knowledge during their in-service training. Night patrolling as well as surprise checks are carried out in all the ranges at regular intervals. There are three checking gates in service 24 hours every day on the state highway and national highway within the park. All ranges are well equipped with arms and ammunition.

## Research and monitoring

Various research work is being carried out in the national park with the help of NGOs and research institutes with the permission of the Chief Wildlife Warden. The department has also published a booklet on the lion-tailed macaque and a survey

of medicinal plants documented inside the MPCA plot. Some other rare and endangered species are also found within the park and new species have also been discovered.

## Species conservation

Importance is given to the conservation of endangered species such as lion-tailed macaque, tiger, orchids, king cobra, etc.:

- Lion-tailed macaque – This species is regularly monitored and a census is carried out every four years.
- Tiger – A census was carried out in 2010 and 10 scats were found.
- Orchids – Orchids species are recorded and an Orchidarium is maintained for their propagation and identification.

- King cobra – Studies are carried out by the Agumbe Research Centre, headed by herpetologists.
- Medicinal plants – The species are regularly monitored and documented with the help of botanists.

### Eco-developments

There are 13 eco-development committees (EDCs) within the national park and the cooperation of the members is sought for damages due to fire, poaching and development of the park. Solar lights, smokeless chullas, etc., are distributed to seek their cooperation. Regular meetings are held and suggestions are taken for improving the park activities. They are taken on study tours to other parks and EDC's to understand the working in other parks along with visits to some historical places. Training in beekeeping is given. Vaccination of cattle against the foot and mouth diseases is carried out every year.

### SWOT analysis

A SWOT analysis was made to determine the strengths and weaknesses in the park.

#### Strengths

- Scenic hillocks with good shola forests and grass lands
- Wide variety of flora and fauna
- Natural water sources and streams within the park with good rainfall and climate
- Not much interference from villagers or public
- Stakeholders cooperation is sought
- Park has been proposed for UNESCO World Heritage Site
- Young and energetic staff with three checking gates at the main entrance along the highways
- Park has been proposed to be declared as a Tiger Project
- Good forests surround the park forming a buffer zone
- Good water sources due to Lakya dam benefit the wild animals

#### Weaknesses

- Vehicles used for the protection of the park are old and due for replacement

- Inadequate funds available for management
- Fire is major problem
- National and state highways pass through the N.P.

#### Opportunities

- There are many scenic areas that could be developed for ecotourism.
- A wealth of flora and fauna that can be researched to discover new species
- A good breeding habitat for tigers
- The park is a corridor for the wild animals like tigers and elephants

#### Threats

- Militant groups have been active in the area for the last 5 years
- The weed Pteridium is gradually appearing in some patches
- Threat of fire due to the public travelling from the national highway and the state highway.
- KIOCL township within the park.

### Conclusion

From the above analysis we can conclude that the park has more strengths and opportunities compared to the weaknesses and threats. It is definitely a unique park for the restoration and development of the flora and fauna of the area to conserve biodiversity. It is a place where nature lovers, trekkers, researchers, naturalists and students and tourists can learn about nature and wildlife and thus help in the preservation and conservation of wildlife.

*The author is Deputy Conservator of Forests, Kudremukh Wildlife Division, Karkala.*

# *SUSTENANCE HUNTING BY NAPAN ETHNIC GROUP IN NABIRE, PAPUA, INDONESIA*

*by Freddy Pattiselanno and Agustina Y.S. Arobaya*

## **Introduction**

The Marine National Park of Cenderawasih Bay in Papua, located at 1°43' – 3°22'S and 134°06'–135°10'E, covers approximately 1,453,500 ha. The terrestrial part of the park covers 68,200 ha, consisting of 12,400 ha of coastal land, 55,800 ha of land in the satellite islands, and 1,385,300 ha of sea parts, including 80,000 ha of coral reef sites. A study by Pattiselanno (2004) produced evidence of the presence of cuscus (a cat-sized marsupial) as one of the terrestrial wildlife species found in the nearby Cenderawasih Bay area. They are one of the hunting targets of the local people. Cuscus hunting by local communities for subsistence purposes is conducted in various ways, including by traditional techniques such as felling the food and cover trees, or using modern hunting gear (Pattiselanno, 2003; Pattiselanno, 2006).

In tropical areas world-wide, the meat of wild animals has long been part of the staple diet of forest-dwelling peoples (Fa & Yuste, 2001). The need for wild meat consumption for animal protein sources in rural areas is very important; for example, families in the Congo Basin consume ten times the amount of wild meat compared to those in urban sites (Wilkie & Carpenter, 1999). In addition, Rao and McGowan (2002) indicated that wild meat contributes significantly to the diet of rural communities in Asia, Africa and Latin America because it is more accessible, and is the dominant dietary protein available in rural areas.

Wildlife hunting in tropical forests is different from in sub-tropic areas because it is mostly performed for subsistence and commercial purposes (Redford & Robinson, 1987). According to Bennet and Robinson (2000), currently, many people living in and around the forests still consume wild meat as

their major source of protein. However, nothing is known about wildlife extraction for food in Papua; therefore, this study is important to gain current information of the contribution of wild meat to rural household's consumption in Papua.

## **Materials and methods**

A study on cuscus hunting as part of subsistence hunting was conducted from July to September 2007 in Ratewi Island, a satellite island in Cenderawasih Bay, and also examined the possibility of developing a captive breeding program for cuscus. We focused our study to obtain information of cuscus hunting contribution for dietary protein supply of the Napan ethnic group in Nabire. Arui Village at Ratewi Island was selected to collect information on cuscus hunting as a source of protein meals to local communities. Arui was chosen because it was accessible and the villagers were known to obtain their animal protein supply from hunting. A descriptive method with interviews and direct observations was applied in collecting data in the field.

## **Methodology**

Direct observation and structured interviews by using a questionnaire were conducted with 28 respondents who utilized and carried out cuscus hunting. Respondents were purposely chosen from 50% of the total inhabitants in Arui who were assumed to actively perform cuscus hunting. Further identification found that of 28 respondents, 20 hunted and consumed cuscus; 6 did not hunt, but consumed cuscus; and 2 neither hunted nor consumed cuscus. To clarify information received from the respondents, three additional key respondents (community leader, tribal man and cultural leader) were interviewed to gather relevant information on cuscus species found in the study



Picture 1. Study site: Ratewi Island, Nabire

site and about cuscus hunting including the purpose of hunting, weapons, and cuscus consumption. The study area comprised 357 ha of lowland forest.

### Description of the study site

Ratewi Island (2°50' -3°00 S and 135°40' -135° E) is located about 45 minutes by boat from Nabire (Picture 1). Generally, the topography in Ratewi was flat with some undulating terrain. Ratewi Island is 7 km long, 3 km wide and approximately 10-15 m above sea level. Arui Village is located on the western tip of the island. The study site was secondary forest previously used by a logging concessionaire.

### Results

#### *Cuscus species*

Two species of cuscus were identified during the field observations: 1) common brown cuscus/eastern cuscus (*Phalanger orientalis*); and 2) common spotted cuscus (*Spilocuscus maculatus*). A dark strip along the dorsal from the head to the distal part was used to describe *P. orientalis*, while wooly type hairs were used to identify *S. maculatus*. Our identification was based on morphology characteristics recorded by Flannery (1994) and Menzies (1994).

#### *Cuscus hunting*

Hunting was an activity mostly done for consumption purposes and the sale of live animals. Of twenty respondents who actively hunted and utilized cuscus, fourteen did so to supply protein meals and the other six did it more to sell the animals. Respondents who actively hunted used different kinds of weapons, including bow and arrow, blade, spear, dog, wooden stick and modern guns such as air rifles. The various kinds of weapons used in the study site indicated the different techniques used by hunters. The use of blade and spear was more dominant because of the common practice of shaking and felling the trees where cuscus were found in order to catch or kill the animals after they fell to the ground. However, the use of modern tools was also identified during the study.

Solitary hunting was common in Ratewi Island because for Papuans, hunting was previously practiced by their ancestors and is considered a way of life, and practiced even in the modern era. The use of various hunting weapons was the choice of the individual hunters. On particular occasions, for example related to a big national celebration or religious ceremony, cooperative or group hunting was performed because guests and relatives were gathered and a village member must provide enough food for both guests and relatives. There was no hunting season acknowledged by the hunters at Ratewi Island.

Hunting was prevalent in all areas of the village, but the area covered by primary and secondary forest was always considered a favorite hunting site, because arboreal animals such as cuscus preferred to spend their time up in the high trees. In Ratewi Island, a previous logging concession area of PT Wapoga Mutiara Timber is currently in the forestry recovery program and it is used by village members as hunting tenure. Common vegetation found in the study site were Dipterocarpaceae with some other species such as Kayu Besi (*Intsia bijuga*), Matoa (*Pometia* sp.), Kayu Cina (*Podocarpus amarus*), Kayu Damar Merah (*Agathis labillardieri*), Kayu Binuang (*Octomeles sumatrana*), Kayu Bintanggor (*Callophylum inophyllum*) and other forest trees. Those trees were usually chosen by cuscus for cover plants. During our survey, we also encountered *Ficus benjamina*, *Merremia peltata*, *Sonneratia griffithi* and *Cocos nucifera* as cover plants as well.

The hunters had different preferences for the time of hunting. Like fishermen, they preferred to hunt during the day between 08.00 and 16.00 hours. When they could not go fishing due to bad weather conditions, they hunted at night from 19.00 to 24.00 hours. This is because the cuscus is a nocturnal animal and is active during the night time. Hunting frequency varied and depended mostly on supplying meat for the household members, or sometimes to fill an order for live animals for pets from Nabire.

## Contribution of hunting to the household consumption

All the respondents were fishermen, and their major livelihood was obtained from fishing. Most of the catch from fishing went to the market in Nabire, and the average daily income ranged from Indonesian Rupiah (IDR) 75.000 to 100.000. Revenue was usually used to purchase the daily needs of the household members. Sometimes excess catches from fishing were converted to dry salty fish that was usually combined with cuscus meat as a source of protein in their diets. For animal protein supply, they relied more on cuscus meat, though the fish supply was adequate.

During the survey, we allocated two weeks to observe the daily menu of 26 respondents who consumed cuscus meat as their protein diet. Every day we found that both fish and cuscus meat were parts of their meals, but cuscus meat was predominant because fish was often sold to gain household income.

We also counted how many days a week cuscus meat was served in their menu, and we found that consumption of cuscus meat ranged between two to five days per week. Thirty-three percent of the respondents were served cuscus meat four days a week in their meals, followed by 26.92 percent who consumed cuscus meat three days per week. About 23.08 percent of the respondents had cuscus meat every five days, while 11.54% only served cuscus meat in their menu two days a week.

## Discussions

The presence of *P. orientalis* at Ratewi Island supported a previous study conducted at the relatively comparable sites around Cenderawasih Bay (Dahrudin *et al.*, 2005; Supriyantono *et al.*, 2006; Pattiselanno & Koibur, 2008). It was obvious that the distribution of *P. orientalis* in Irian Jaya (Papua) was around the satellite islands close to Cenderawasih Bay, and then evenly distributed in the lowland rainforest sites from the coast up to the highlands reaching an altitude of 1,500 m above sea level (Petocz, 1994; Sinery, 2006; Fatem & Sawen, 2007).

On the other hand, according to Flannery (1994) *S. maculatus* was introduced to Papua, and their origin is still debatable (Australia or New Guinea Island). The presence of this species showed its fair dispersal in almost all parts of the Papua Island (Helgen & Flannery, 2004; Dahrudin *et al.*, 2005; Supriyantono *et al.*, 2006; Sinery, 2006; Fatem & Sawen, 2007; Pattiselanno & Koibur, 2008).

Hudson (1989) identifies hunting as one of four wildlife production systems based on management intensity. In hunting, animals are captured from the wild and usually taken for subsistence, commercial and recreational or sport purposes. Different from hunting for sport, subsistence and commercial hunting are important because hunters in tropical forests take a wide variety of animals (Robinson & Bodmer, 1999). Therefore, Kaul *et al.* (2004) emphasize that observations on hunting preference is as important to examine as the impact of hunting on the wild populations. This condition is relatively similar to cuscus hunting by the Biak ethnic group who used different kinds of weapons (blades, traps, snares and guns such as air rifles) in hunting (Pattiselanno & Koibur, 2008). In West Timor, East Nusa Tenggara for example, cuscus hunting was done using slingshots or blades (Farida *et al.*, 2001).

When hunting, modalities are required for hunters to maximize the harvest rate. Fa and Yuste (2001), for example, examined the means for animals harvested as commercial bushmeat in the Monte Mitra Forest of Equatorial Guinea, and found that while hunters use firearms and cable snares, snare hunting is the most commonly used method. Indigenous hunting in Western Panama utilizes technologies such as firearms, bow and arrows, hunting dogs, machetes, slingshots, and a variety of traps in order to minimize the damage from wildlife raids on farm crops. Rifles are used less frequently because of the extra costs attached to purchasing them (Smith 2005).

Wildlife hunting was done for different purposes. Some published documents reported that tropical forest peoples have been hunting wildlife for food since ancient times; for example, in Africa and Southeast Asia for at least 40,000 years and at least 10,000 years in Latin America, and is still practiced among many peoples across the tropics

(Bennet, 2002). The decision to hunt or trade in wildlife depends not only on nutritional and economic status, but also on the other opportunities available for food and generating income (Milner-Gulland *et al.*, 2003).

The studies by Farida *et al.* (2001) and Pattiselanno and Koibur (2008) found that cuscus hunting for household diets was normally done by the local people in West Timor Barat, East Nusa Tenggara and Biak, Papua. Wildlife hunting in the tropical forests for animal protein supply has been widely studied (Bennet & Robinson, 2000; Bennet, 2002; Madhusudan & Karanth, 2002; Milner-Gulland *et al.*, 2003; Pattiselanno, 2003; Hilaudin *et al.*, 2005 and Pattiselanno, 2006). Patterns of wild meat consumption in rural areas have been distinguished in Latin America, particularly Central and South America, indicating that wild meat contributes 30-50% of the protein (Zapata, 2001; Bennet, 2002). While in Sarawak, for those who lived far from coastal sites, 67% of their diets were from wild meat (Bennet *et al.*, 2000).

The increased use of wild meat for human consumption contributes significantly to the harvest rate and it is calculated that the current annual harvest rate of wild meat is 1-5 million tonnes in Central Africa (Wilkie & Carpenter, 1999; Fa & Peres, 2001), 67,000-164,000 tonnes in the Brazilian Amazon (Peres 2000) and 23,500 tonnes in Sarawak (Bennett, 2002), plus trading of more than 90,000 animals per year to supply an urban market in North Sulawesi Province of Indonesia (Clayton & Milner – Gulland, 2000). Therefore, Prescott-Allen and Prescott-Allen's study (1982) suggested that people in 62 countries utilized wild animal meat as protein sources in their meals, and this suggests that there is a strong relationship between hunting and wild meat consumption.

The preference of cuscus meat might be due to cultural taste attached to the local perceptions. Although the protein supply could be easily provided by fish or other marine sources, cuscus meat is always served in the household meals. Similarly, across Africa and Asia, dependence on wild meat was high, although there are easily available alternatives (Bennet, 2002). In Africa, for example, livestock rearing has been frustrated

by trypanosomiasis and low productivity (Milner-Gulland *et al.*, 2003; Rowcliffe *et al.*, 2005). People still depend on wild meat because it is cheaper than domesticated meat (e.g., in Latin America) (Wilkie & Godoy, 2001). However, reducing the price of fish and meat from domesticated animals relative to that of wildlife had a significant impact on wildlife consumption by the Tsimane' Amerindians of Bolivia (Apaza *et al.*, 2002).

If people switch from wild meat to other protein sources, like the locals at Ratewi Island who could afford fish, the percentage of cuscus meat in their meals could be reduced. The reason for less fish in their meals is because the fish catch is sold to gain the family's earnings, with excess catches then added to the food supply. According to Bennett (2002), in Southeast Asia and West Africa, where many large areas are close to the sea and seafood has long been a major source of protein, the proportion of people who can readily find other sources of protein was high. However, the study by Brashares *et al.* (2004) indicated that fish supply and wildlife decline occurred because of bushmeat hunting and consumption increased when fish became scarce. Therefore, poor fish harvests led some households to rely on bushmeat hunting for both income and sustenance.

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## WINTERING AVIAN POPULATION OF NANDANKANAN WILDLIFE SANCTUARY, ODISHA

by Rajesh Kumar Mohapatra, Sudarsan Panda, Kamal Lochan Purohit

### Introduction

Waterbirds are apex consumers in many aquatic habitats, feeding largely on fish and macro-invertebrates. They represent important linkages in energy and nutrient transport processes in the wetland nutrient cycles. Relatively few investigations on bird populations have been conducted at Nandankanan Wildlife Sanctuary, Odisha, India, despite its importance as a nesting and migration site for many bird species. The

present study reports the observations on wintering waterbird population at Nandankanan Wildlife Sanctuary, Odisha.

### Material and methods

Nandankanan Wildlife Sanctuary (NWLS) in Odisha spreads over an area of 4.37 ha of undulating topography with natural moist deciduous forest and water bodies, and encompasses Nandankanan Zoological Park, the State

Botanical Garden and Kanjia Lake, a “wetland of national importance” since 2006. A status survey of waterbirds of the important water bodies (Fig. 1), such as Kanjia Lake, Kiakani Lake and Katurighasapata, which are situated inside NWLS and Badabankapata, situated adjacent to NWLS, was conducted on 14 January, 2013. Observations were carried out on a fixed path using the line transect method (Gaston, 1973). Counting was done in the early morning, i.e., from 6:30 a.m. to 9:30 a.m., as counting needs to be carried out at the time of highest bird activity (Buckland *et al.*, 1993). Birds were sighted with the aid of binoculars and identification was done by using field guides (Ali, 2002; Balachandran *et al.*, 2009; Grimmett *et al.*, 2011). In addition to the waterbirds, other terrestrial birds sighted and noted during the transect, but were not included in the list.

## Results and discussion

A total of 2,374 wetland-dependant birds belonging to 20 species of 9 families were recorded (Table-1). Birds from the family Ciconiidae comprised the greatest numbers (52.69%) of the total population abundance, followed by Ardeidae (33.19%), Phalacrocoracidae (4.04%), Anatidae (3.45%), Jacaidae (2.16%), Rallidae (2.1%), Dendrocygnidae (0.75%) Alcedinidae (0.67%), Charadriidae (0.37%) and Motacillidae (0.08%).

Kamal *et al.* (2009) recorded 53 species of birds from “Kanjia” lake at NWLS. Panda *et al.* (2010) recorded 120 species of birds from NWLS. Waterbirds recorded during the study are only a subset of the entire avifauna that occupies NWLS. Sighting of the stork-billed kingfisher (*Pelargopsis capensis*) was an addition of species to the

**Table-1. Wintering wetland dependent birds recorded during the study from NWLS in January 2013**

Family	Common name	Species	Numbers
Anatidae	Indian cotton teal	<i>Nettapus coromandelianus</i>	82
	Lesser whistling teal	<i>Dendrocygna javanica</i>	18
Ardeidae	Grey heron	<i>Ardea cinerea</i>	6
	Purple heron	<i>Ardea purpurea</i>	2
	Black crown night heron	<i>Nycticorax nycticorax</i>	18
	Indian pond heron	<i>Ardeola grayii</i>	18
	Little egret	<i>Egretta garzetta</i>	628
	Cattle egret	<i>Bubulcus ibis</i>	114
	Intermediate egret	<i>Egretta intermedia</i>	2
Charadriidae	Red-wattled lapwing	<i>Vanellus indicus</i>	9
Phalacrocoracidae	Little cormorant	<i>Phalacrocorax niger</i>	96
Rallidae	White-breasted waterhen	<i>Amaurornis phoenicurus</i>	11
	Purple moorhen	<i>Porphyrio porphyrio</i>	27
	Common moorhen	<i>Gallinula chloropus</i>	12
Jacaidae	Pheasant tailed jacana	<i>Hydrophasianus chirurgus</i>	14
	Bronze-winged jacana	<i>Metopidius indicus</i>	48
Alcedinidae	White-throated kingfisher	<i>Halcyon smyrnensis</i>	14
	Stork-billed kingfisher	<i>Pelargopsis capensis</i>	2
Motacillidae	Pied wagtail	<i>Motacilla alba</i>	2
Ciconiidae	Asian open bill stork	<i>Anastomus oscitans</i>	1,251

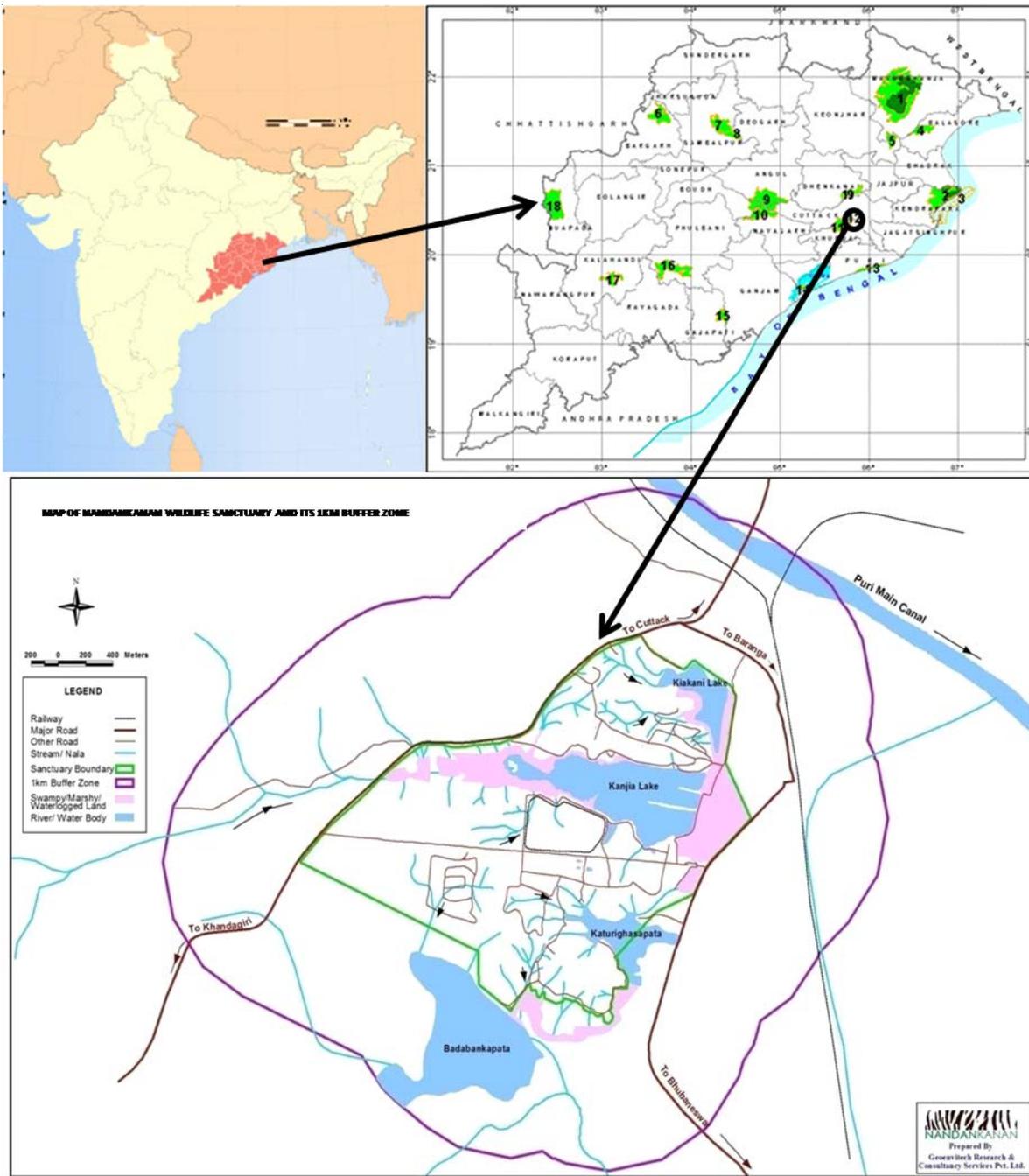


Figure 1: Map showing the location and important water bodies in and around NWLS

checklist of birds of NWLS. Previously, other species of kingfishers such as white-throated kingfisher (*Halcyon smyrnensis*), lesser pied kingfisher (*Ceryle rudis*) and little blue kingfisher (*Alcedo atthis*) were reported (Kamal *et al.*, 2009; Panda *et al.*, 2010) from NWLS. Stork-billed kingfisher was earlier reported from Bittarkanika National Park, Odisha (Gopi and Pandav, 2007). Wetlands and waterbirds are inseparable elements and thus form a rich array of waterbird communities (Grimmett *et al.*, 2011). They are important indicators of changes in aquatic systems (Amat and Green, 2010). Monitoring of water birds can be used as an indicator in conservation management and in studying the ecological effects of various man-made environmental changes. Further study of the diversity and abundance of waterbirds at NWLS will definitely enrich our knowledge and ultimately contribute to the conservation and management of waterbirds and wetlands as a whole.

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# FOREST NEWS

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(Photo: Jim Carle)



## **25<sup>TH</sup> “SILVER ANNIVERSARY” SESSION OF THE ASIA-PACIFIC FORESTRY COMMISSION (APFC)**

“Forests for Prosperity” is the theme of the “Silver Anniversary” session of the APFC, which returns to Rotorua, New Zealand after 49 years.

Rotorua is an area famous for its thermal activity – geysers, boiling mudpools, volcanoes – and forestry. Reserve the dates 5-8 November on your calendar and plan to attend as part of your country’s national delegation or as an international organization representative. Come early and attend one or more of the 7 pre-session workshops that will take place during 3-4 November with topics for everyone including: forests and natural disasters; forest rehabilitation; mainstreaming gender issues; Asia-Pacific Forestry Deans’ Meeting; forestry strategic planning and financing mechanisms; and invasive species.

For additional information about the programme and travel arrangements to attend the 25<sup>th</sup> session of APFC, please visit the session website: [www.apfc2013.org.nz](http://www.apfc2013.org.nz) or the APFC website: [www.fao.org/forestry/33587/en/](http://www.fao.org/forestry/33587/en/). Contact person: [Patrick.Durst@fao.org](mailto:Patrick.Durst@fao.org).

## ***APFC EXECUTIVE COMMITTEE MEETS IN CHIANG MAI***

The Asia-Pacific Forestry Commission Secretariat (FAO) organized the Ninth Meeting of the Asia-Pacific Forestry Commission (APFC) Executive Committee on 3 May 2013 in Chiang Mai, Thailand. The meeting was chaired by Mr Chunyu Su, APFC Chair, and was well attended by all APFC EC members, partners from international partner organizations (RECOFTC, APAFRI and SPC), and FAO staff from RAP NRE. Patrick Durst, Senior Forestry Officer (FAO Regional Office for Asia and the Pacific) serves as APFC Secretary.

The objectives of the meeting were to:

- review and discuss recent APFC events;
- update the progress of ongoing APFC activities and initiatives, including review of recommendations from the 24<sup>th</sup> session of APFC and related follow-up actions;
- brainstorm APFC's strategic plan and focus; and
- prepare for the 25<sup>th</sup> session of APFC.

### **Review and discussion of recent APFC events**

***Review of the 24<sup>th</sup> Session of APFC and Asia Pacific Forestry Week 2011:*** Mr. Chunyu Su, APFC Chair and Director General of the State Forestry Administration provided a summary review of the 24<sup>th</sup> Session of APFC and Asia Pacific Forestry Week 2011 (APFW 2011). While confirming the APFC and APFW have provided a good platform for information and experience sharing and promotion of collaboration and cooperation among partners and institutions within and beyond the forestry sector, participants also gave constructive and positive suggestions on how to balance APFC partner events to avoid time conflicts and participants' distraction from the main APFC meeting.

***COFO 21 and 8<sup>th</sup> Meeting of APFC Executive Committee:*** Mr. Durst gave a brief review of the recent COFO 21 meeting that was held in conjunction with the Third World Forestry Week in Rome and the proceedings of the 8<sup>th</sup> APFC Executive Committee meeting, both held in FAO HQs, Rome in September 2012. Mr. Durst informed the participants about the key recommendations and decisions made at COFO 21, particularly those most relevant to APFC. The suggestion of establishing a mechanism to monitor the follow up of recommendations of COFO and APFC was accepted by the APFC Executive Committee. Possible options were discussed, including frequent Heads of Forestry Dialogues, reporting and updating countries and seeking ways to motivate countries to be accountable, and so on.

***FAO management response to the strategic evaluation of FAO's role and work in forestry:*** Comments were raised on how to coordinate work and strategies among so many commissions within FAO, and what role RFCs would play in addressing forestry and corporate issues.

***Partners Roundtable Meeting:*** The APFC Secretariat organized a Partners Roundtable Meeting on 2 May 2013 in Bangkok, Thailand, before the 9<sup>th</sup> APFC Executive Committee meeting, which was attended by over 20 participants including those from Bangkok-based APFC partner organizations. Participants from each agency/country shared their ongoing initiatives and plans for the near future, and participated in the discussion on the thematic forestry issues and key forestry challenges for the region. Some priority areas were identified for possible collaboration in future, including:

- Climate change;
- Forest degradation;
- Green economy;

- Governance;
- Timber and forest products;
- People, communities, awareness raising; and
- Private sector engagement.

### **Progress of ongoing APFC and FAO activities and initiatives**

To facilitate the Executive Committee's review and assessment of activities of the Commission, Ms. Xiaojie Fan made a presentation reporting ongoing APFC- and FAO-supported activities and initiatives, linking these with the recommendations stemming from the 24<sup>th</sup> Session of the APFC. The FAO- and APFC-supported forestry activities in the region are planned and carried out focusing on the following four broad categories:

- Global FAO initiatives with relevance to the Asia-Pacific region;
- Activities in the areas of economics, policies and institutions;
- Activities designed to promote improvement in forest management for multiple benefits; and
- Activities designed to foster greater involvement of people in forestry.

The Committee expressed overall satisfaction with the direction and outcome of ongoing activities. There was active discussion and suggestions focusing on: i) how to maintain quality recommendations while reducing the number; ii) effective integration of recommendations into actions; iii) quality implementation of activities; iv) establishment of a functioning mechanism for M&E; v) collaboration with partners in the region; and vi) focus and priority areas in the region (e.g., activities relating to celebration of International Day of Forests; SFM, Climate Change and REDD+, forest restoration and rehabilitation and landscape, community forestry, communication network, etc.).

### **Brainstorming of APFC's strategic plan and focus**

A S.W.O.T analysis session was facilitated by Mr. Mars Amaro and Mr. Ben Vickers to review

the strategic focus and position of APFC in the region. Through discussions by small groups, the Executive Committee identified the strengths of the APFC, anticipated challenges (weaknesses as well), and opportunities for future work.

### **Preparing for the 25th session of APFC**

The 24<sup>th</sup> APFC session accepted the offer of the New Zealand government to host the 25<sup>th</sup> session. Mr. Paul Lane updated the Executive Committee about the preparations for the 25<sup>th</sup> APFC session made by the New Zealand government to date. The event will be held in Rotorua, New Zealand, 5-8 November 2013. During the week, in addition to the plenary sessions, in-session events and partner events and a 1-day field trip will also be organized. The Executive Committee discussed and commented on the proposed structure of session, field trip sites and some logistic matters presented by the host country.

Another focus of the discussion was on the theme and agenda items of the 25<sup>th</sup> session of the APFC and areas of side events. Subject to approval and confirmation it is proposed that the 25<sup>th</sup> session of APFC will adopt the theme "*Forests for prosperity.*"

Key agenda items are likely to include: (i) forests for prosperity; (ii) forest financing; (iii) FLEGT; (iv) Building resilience in forests and forestry; (v) Policies in support of wood processing development; and (vi) forests and climate change, as well as various items common to all Regional Forestry Commissions.

Proposed side events include: (i) Forests and natural disasters; (ii) Invasive species; (iii) Forest landscape rehabilitation and forest restoration; (iv) Emerging legality restrictions on forest products trade; and (v) Indigenous peoples and community-based forest management.



## FORESTS HELP FEED THE WORLD



Opening session of the conference, FAO Headquarters, Rome. (Photo: ©FAO/Guilio Napolitano)

The International Conference on Forests for Food Security and Nutrition was organized 13-15 May 2013, in Rome, Italy, by the Food and Agriculture Organization of the United Nations (FAO) in partnership with Bioversity International, the Center for International Forestry Research, the World Agroforestry Centre and the World Bank. This technical meeting was attended by more than 400 participants, comprising experts from governments, civil-society organizations, indigenous and other local communities, donors and international organizations in more than 100 countries.

Worldwide, 870 million people go hungry every day. With the world population projected to exceed nine billion people by 2050, global agricultural output must expand by an estimated 60 percent to meet global food needs.

Yet, in many places, deforestation triggered by escalating demand for food, fibre and fuel is degrading ecosystems, diminishing water availability and limiting the collection of fuelwood - all of which reduce food security, especially for the poor.

Natural forests are critical for the survival of forest-dwellers, including many indigenous

peoples, and they help deliver clean water to agricultural lands by protecting catchments.

Farmers increase food security by retaining trees on agricultural land, by encouraging natural regeneration and by planting trees and other forest plants. For most of the year, herders in arid and semi-arid lands depend on trees as a source of fodder for their livestock.

Forests, trees and agroforestry systems contribute to food security and nutrition in many ways, but such contributions are usually poorly reflected in national development and food security strategies. Coupled with poor coordination between sectors, the net result is that forests are mostly left out of policy decisions related to food security and nutrition. For additional information, see FAO's publication on *Forests for Improved Nutrition and Food Security*.

The **International Conference on Forests for Food Security and Nutrition** increased understanding of the crucial role that forests, trees on farms and agroforestry systems can play in improving the food security and nutrition of rural people, especially in developing countries. It proposed ways to integrate this knowledge in policy decisions at the national and international levels.

## Key messages

- The role of forests and trees outside forests in the fight against hunger demands much greater attention and should be integrated with strategies for food security and nutrition.
- Food security is grounded in diversity – in terms of biota, landscapes, cultures, diets, production units and management. Forests and trees are critical for maintaining that diversity.
- The ecosystem services provided by forests and trees make essential contributions to forest dependent communities and agriculture by, among other things, protecting soil and water, maintaining soil fertility, regulating the climate, and providing habitat for wild pollinators and the predators of agricultural pests.
- Forest foods and tree products have been important components of rural diets for millennia and today provide essential nutrition for millions of people. More than one-third of the world's people rely on woodfuel for cooking.
- Forests, trees outside forests and the sustainable management of these resources are crucial for ensuring the resilience of food-production systems in the face of climate change and economic, social and political instability. Forest and tree-based sources of income can contribute to building resilience.
- There are opportunities to use more forest species, especially plants and insects, for the large-scale production of food products. However, deforestation and forest degradation risks the loss of many such species.
- The single biggest cause of forest loss is agricultural expansion, but there is potential for both increasing agricultural production and protecting forests, including through the restoration of degraded forest land, the greater use of trees in agriculture, and the alignment of policies and institutional frameworks to that end.
- Secure land and forest tenure and more equitable access to resources for local communities and women will encourage sustainable forest and tree-based approaches to food security and nutrition.
- There is a need to retrieve, document and make better use of traditional knowledge and to combine it with scientific knowledge to

increase the role of forests and trees outside forests in food security and nutrition.

- Women often have specialized knowledge of forests and trees in terms of species diversity, uses or various purposes, and conservation and sustainable management practices, but the role of women in ensuring the food security and nutrition of forest-dependent communities is underappreciated.
- Greater collaboration at the national and international levels is needed to improve data collection on, and the communication, reporting and monitoring of, the contributions of non-wood forest products, forest ecosystem services and other forest and tree-related aspects of food security and nutrition.
- Training in the management of sustainable forest enterprises can help forest-dependent communities, particularly women and youth, to gain access to equitable value-chains, such as those applied in fair trade, thereby improving the food security and nutrition of such communities and helping them to capitalize on their traditional knowledge.

## Recommendations

Governments, civil society, indigenous peoples, bilateral and multilateral development assistance agencies, the private sector and other stakeholders are invited to strengthen the contributions of forests and trees outside forests to food security and nutrition by:

1. Participating in broad partnerships to promote the sustainable use of forests and trees outside forests by rural communities to contribute to the achievement of food security and nutrition.
2. Ameliorating conditions that currently keep forest-dependent people in low-status and low productivity jobs.
3. Providing access to resources by indigenous peoples and other local communities and marginalized people by, for example, applying the *Voluntary Guidelines for the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security*.
4. Creating, as appropriate, and strengthening rural community-based institutions and increasing social dialogue and representation with the aim, among other things, of improving

- access to knowledge, finance, markets, better prices and technologies for local people and their equitable involvement in decision-making and recognizing the rights, roles and responsibilities of communities as stewards and beneficiaries of forests and wildlife.
5. Eliminating all forms of discrimination in forests and promoting equal opportunities for youth, women and men and the protection of the rights of indigenous peoples and other local communities, including the right to free, prior and informed consent and the right to territory.
  6. Reviewing all relevant laws, policies and actions so that they uphold the food-related rights set out in the Universal Declaration of Human Rights, the Covenant on Economic, Social and Cultural Rights and other relevant treaties and documents, and so that, among other things, they: do not violate the right to food; protect citizens from such violations; provide mechanisms to ensure that marginalized and excluded forest-dependent communities have access to justice if such violations occur; and provide for concrete possibilities to enable people to feed themselves, including through the use of forests and trees.
  7. Protecting forests and seeking ways in which agricultural production can be expanded without the loss or degradation of forests, such as through the restoration of degraded forest lands and the greater use of trees outside forests as a means of intensifying agricultural productivity.
  8. Taking an integrated approach to food security and nutrition so that relevant sectoral policies, including those on agriculture, forests, trees, wildlife, and food security and nutrition, have well-defined objectives, targets and time frames for their implementation and are coordinated intersectorally, and that all stakeholders, from forest-dependent communities to all relevant ministries, are involved actively in their development, implementation and monitoring.
  9. Encouraging spatial land-use planning that takes into account the many important roles of forests and trees outside forests in food security and nutrition.
  10. Encouraging intersectoral cooperation to promote the sustainable management of forests and trees outside forests at the landscape scale, include forests and trees outside forests in resilience strategies, and investigate the lessons from sustainable forest management that could be applied to achieve sustainability at the landscape scale.
  11. Supporting sustainable wildlife management as a source of food with scientific, technical and traditional knowledge, balancing the economic, social and environmental values of wildlife for present and future generations.
  12. Increasing opportunities for green jobs and improving conditions for forest workers, especially the most vulnerable, and integrating decent employment concerns in forest into other natural resource policies and programmes.
  13. Encouraging the development of markets for forest ecosystem services, such as the provision of clean drinking water and other innovative financing mechanisms to support the role of forests and trees outside forests in food security and nutrition.
  14. Promoting long-term investments in forests and trees outside forests to build resilience so that food aid is less necessary.
  15. Training institutional staff on gender issues, involving women in monitoring, reporting and verification activities, and developing a gender-sensitive intersectoral global roadmap for forests and trees outside forests.
  16. Making better use of traditional knowledge about natural resource management and working with local stakeholders to improve the management of wild forest foods to ensure their sustainability.
  17. Increasing the efficiency of biomass-based cooking systems through integrated approaches that take into account both the fuelwood production chain and the fuelwood conversion chain.
  18. Supporting the development of entrepreneurial, financial and planning skills among small-scale forest producers to encourage their participation in, and maximize the remuneration they receive from, market-oriented activities in agroforestry, tree-growing, NWFPs, small-scale wood processing and the provision of ecosystem services.

19. Supporting the development of producer associations to assist them to gain access to markets and receive equitable benefits from forests, including through local added value.
20. Collaborating nationally and internationally to improve data collection, reporting and monitoring of NWFPs, forest ecosystem services, forest wildlife and other forest-related aspects of food security and nutrition.
21. Encouraging research that supports the sustainable use of wild forest species of plants, as well as insects and other animals, to improve yields and increase the sustainability of food production.
22. Establishing transparent and inclusive platforms for the dissemination and exchange of knowledge and experiences and to build awareness of the importance of NWFPs and forest ecosystem services, the socio-economic circumstances of forest-dependent people, and the role of forests and trees outside forests in food security and nutrition, with a strong emphasis on robust data.
23. Creating incentives for greater collaboration between scientific disciplines, government sectors and rural institutions to synthesize scientific data and traditional knowledge on the role of forests and trees outside forests in food security and nutrition.
24. Supporting efforts and investments to communicate knowledge on the role of forests and trees outside forests in food security and nutrition in accessible, compelling formats to key stakeholders, including civil society, rural institutions, scientists and policy-makers.
25. Recognizing and celebrating the cultural value, emotional connection and public appeal of forest foods and tree products to rural and urban communities with a view to leveraging political will and public support for practices and policies that support the sustainable management of these resources and their contributions to food security and nutrition.
26. Developing indicators, tools and methods of data collection for food security and nutrition that incorporate forests and trees outside forests and the concerns of women and youth, and develop the necessary capacity.
27. Developing safeguard mechanisms to ensure that the full impacts of forest conversion and other activities such as mining on food security and nutrition are taken into account.

## ***FOOD SECURITY AND SUSTAINABILITY TOP AGENDA AT EXPO 2015***

Creating sustainable and secure food systems will be high on the agenda for Expo 2015 in Milan, Italy, said Eduardo Rojas-Briales, FAO Assistant Director-General for Forestry, who has been named Commissioner-General for the United Nations' preparations for the event.

The theme of Expo 2015 will be 'Feeding the Planet, Energy for Life'. Participants will focus on issues like food security, women and nutrition, sustainable development, and climate change, which tie directly into the work done by FAO and other UN system agencies.

"Our challenge for Expo 2015 is to provoke thought and inspire action, as part of an ongoing process to create sustainable and secure food systems,"

said Rojas, who was appointed Commissioner-General by United Nations Secretary-General Ban Ki-moon.

FAO, in collaboration with the International Fund for Agricultural Development (IFAD), the World Food Programme (WFP), and Bioversity International, will lead the effort to showcase the activities and best practices of the United Nations in fields related to the themes of the Expo.

The Expo (or World's Fair) was first held 160 years ago and is a global non-commercial exposition that aims to promote the exchange of ideas on culture, economy, science and technology.

*FAO Press Release 83-39 EN*

## ***TWO STEPS FORWARD IN ADDRESSING THE CONCERNS OF FOREST-DEPENDENT PEOPLE***

*Prepared by Ben Vickers, Programme Officer, UN-REDD+*

In June 2013, for only the second time, the Policy Board of the UN-REDD Programme held its biannual meeting in Asia. Hosted by the Indonesian government, on the island of Lombok in West Nusa Tenggara province, this meeting was notable for two significant measures to address the concerns of indigenous peoples and local communities regarding the implementation of programme activities in partner countries.

In February 2013, the UN-REDD Programme had received perhaps its most serious public criticism to date, when the National Coordinating Body of Indigenous Peoples in Panama (known as COONAPIP), withdrew their consent to the UN-REDD national programme in Panama. As one of the original nine partner countries, the progress of the programme in Panama serves as a source of lessons for other countries in Latin America, similar to the role of the Viet Nam UN-REDD national programme in Asia. The response of UN-REDD to the criticisms leveled by COONAPIP, and to their withdrawal of consent, would therefore be closely scrutinized, particularly by indigenous peoples' representatives and civil society organizations around the world.

Following the February announcement, UN-REDD launched an independent investigation and evaluation mission to Panama. The mission team was recognized as independent by all stakeholders and was able to conduct a comprehensive analysis of the programme in the country. In the presence of COONAPIP and the Government of Panama, the evaluation team presented its initial findings to the UN-REDD Policy Board in Lombok. The report presentation, and ensuing discussions, led directly to an agreement among country stakeholders to resume dialogue, based on a formal proposal which the Government of Panama will submit to COONAPIP. The outcome of this dialogue will not be evident for some time yet, but

the progress made in Lombok held important lessons for the UN-REDD Programme as a whole, in terms of identifying and responding to the needs and priorities of indigenous peoples.

In a separate development, the Policy Board approved a proposal to launch an initiative for Community-Based REDD+ (CBR+), as part of the UN-REDD Programme. Building on the experience and lessons of the Small Grants Programme (SGP) of the Global Environment Facility (GEF), CBR+ will channel financial and technical support directly to grassroots initiatives aimed at catalyzing REDD+ Readiness from the ground up. Financed equally by the UN-REDD Programme and the SGP, the initiative will support activities to demonstrate local-level strategies for addressing the drivers of deforestation and forest degradation. It will prioritize projects that will deliver practical benefits to local communities regardless of the speed of progress towards full REDD+ implementation at national and international levels.

CBR+ recognizes the need for visible, practical demonstrations of how REDD+ will work in specific local social, cultural and environmental conditions. To begin with, the initiative will be piloted in two countries in Africa, Latin America and the Asia-Pacific region, to complement the activities of existing UN-REDD country programmes.

More information on the 10<sup>th</sup> meeting of the UN-REDD Policy Board can be found at <http://www.un-redd.org/PolicyBoard/tabid/102628/Default.aspx>

For more information on the UN-REDD Programme in the Asia-Pacific region, contact Ben Vickers ([ben.vickers@fao.org](mailto:ben.vickers@fao.org)) and Joel Scriven ([joel.scriven@fao.org](mailto:joel.scriven@fao.org))

## BRING ON THE DISMAL SCIENTISTS

*The Economist* magazine calls its main subject matter the “dismal science.” Dismal or not, economics is at the heart of REDD+. Yet how many of us in this field have a working knowledge of the topic? Economic literacy is not often near the top of competency requirements in vacancy notices for REDD-related jobs. Should this worry us? A review of articles in a recent issue of the journal [“Review of Environmental Economics and Policy”](#) (REEP) indicates that it should.

Rose and Lubowski look at how the economic models that have been used to predict the extent and impact of REDD+ have changed over the years, from rosy, idealized assumptions after Bali through the gathering gloom of the global financial crisis and the more complex analyses of today, which take account of experiences in the real world.

One of their key messages is that early estimates of the potential of REDD+, based on opportunity costs of changing land use, were simplistic and misleading. Many of these early projections were based on aggregating the results of opportunity cost studies at specific sites. But such studies cannot be extrapolated directly to the regional and global context of REDD+, where macroeconomic factors, capacity and legislative and political barriers come into play. Opportunity costs can indicate the relative potential for REDD+ through different methods or in different locations, but cannot be used as the sole basis for calculating costs or benefits on a national scale. Some studies find that political, economic and financial costs and risks at the country level, which opportunity cost models do not capture, could reduce the global mitigation potential of REDD+ by up to 60 percent.

Furthermore, Rose and Lubowski note that earlier models assumed that a global REDD+ mechanism would emerge under near-perfect conditions – with all countries able to start implementing comprehensive national REDD+ programmes at the same time. In reality, as we know, different countries will be ready at different times, and the methodologies for different activities may not all be ready at once. These imperfect conditions will affect the cost of REDD+ implementation, particularly for those countries that start early.

The authors highlight one key proviso to their conclusions – very few economic models for REDD+ have taken account of the potential for reduced degradation, focusing almost exclusively on land use change and avoided deforestation. In some countries in this region, such as Cambodia and Viet Nam, where reducing emissions from forest degradation is envisaged as a major part of national REDD+ strategy, all models to date are therefore of very limited use.

Emerging from this analysis is a familiar message – a lot of our discussions on REDD+ are framed by simplistic assumptions which were made several years ago. Given credibility through repetition, it has become very difficult to shift these assumptions, and in this case it requires a certain level of economic literacy to penetrate the arguments. The papers in REEP are not an easy read, but are worth the effort and (like most economists we know) not quite as dismal as you might think.

*Ben Vickers*



## ***COLLABORATIVE PARTNERSHIP ON SUSTAINABLE WILDLIFE MANAGEMENT***

In collaboration with other organizations addressing wildlife issues, FAO recently took steps to establish a collaborative partnership on sustainable wildlife management (CPW). It is anticipated that the new partnership will significantly enhance coordination and facilitate concerted action among organizations working in wildlife management.

The new partnership was mandated by the 11<sup>th</sup> meeting of the Conference of Parties to the Convention on Biological Diversity, convened in Hyderabad, India, in October 2012, where it was agreed to establish the new mechanism for cooperation. The first meeting of the CPW was co-convened by the CBD Secretariat and FAO on 10 March 2013, in Bangkok, Thailand.

**Hiroyuki Konuma**, Assistant Director-General and FAO Regional Representative for Asia and the Pacific welcomed participants to the Thailand meeting on behalf of FAO. He stressed that FAO supports mainstreaming biodiversity in sustainable forest management, conservation and sustainable use of wildlife for improved livelihood and food security of rural communities – working in an interdisciplinary manner, including nutrition, food security, health, biodiversity conservation, social, economic, institutional and policy aspects. He highlighted that FAO promotes a “One Health” approach to improve animal, human and ecosystem health in a holistic manner, with specific attention given to zoonotic disease risks associated

with the human and wildlife interface. He further noted concern over practices of wild meat consumption, trade and marketing, and food-borne pathogens impacting the health of people. Konuma informed the meeting that FAO had launched a new initiative, called “FAO-WILD,” in 2012, as a programmatic framework for addressing these activities in collaboration with other partners.

The agenda for the first meeting of the CPW focused on review and consideration of the core items to be included in the CPW’s Terms of Reference and its initial Programme of Work.

### **Proposal for the CPW Terms of Reference, Operational Procedures and Programme of Work**

Participants made various recommendations on the draft terms of reference, operational procedures, and programme of work, which had been provided to participants prior to the meeting. Participants agreed on the following issues:

- A realistic Programme of Work will help bring the wildlife debate to high level.
- Members need to concentrate on one or two issues that are of relevance and which cannot be effectively addressed by a single member organization. Therefore, the focus of the CPW during its first year should be on establishing the partnership and consolidating its functions.
- From a thematic point of view, a strong focus will be on bushmeat as an “umbrella” issue

for the CPW. It was felt necessary to take stock of the wider issues around bushmeat, and prepare a gap analysis to better define elements of relevance for CPW.

- It was agreed, in principle, to retain the concept and scope of the lead agency system similar to that used by the Collaborative Partnership on Forests (CPF).
- Poaching was identified as an issue of urgency that needs to be discussed on a broader scale. Participants noted that several international conferences and meetings are being convened on the topic in the coming year. It was felt that these meetings would provide a good

opportunity for CPW members to take stock of issues to be synthesized and made known to respective target audiences.

Based on the inputs provided by participants, the Secretariat will revise the draft CPW Terms of Reference, Operational Procedures and Programme of Work, and circulate them to members for their further review and approval.

The meeting elected Braulio F. de Souza Dias, CBD Executive Secretary, on behalf of CBD, as the first Chair on the CPW. Jan Heino, on behalf of CIC, was elected as Vice-chair.

## ASIA-PACIFIC FORESTRY CHIPS AND CLIPS

### INDONESIAN MORATORIUM EXTENDED

In May, Indonesian President Susilo Bambang Yudhoyono extended the Moratorium on the issuing of new licenses for the conversion of primary forests and peatlands in Indonesia for a period of two years. This demonstrates the serious interest of the government to contribute to global climate change mitigation by reducing greenhouse gas emissions, and their acknowledgement that this will require an improved management of its primary forests and peatlands. Although the Moratorium comes with a number of exceptions, in general it will prevent any new concessions in primary forest areas and peatlands.

– *Wetlands International Global Newsletter June 2013* –

### CHINA CONTINUES AFFORESTATION EFFORTS

According to the 2012 report on national afforestation by China's State Forestry Administration, the key forestry projects completed 2.74 million hectares of afforestation area, including 520,000 hectares of natural forest protection, 590,000 hectares of returning farmland

to forest afforestation, 540,000 hectares of Beijing and Tianjin sandstorm source control project and 1.09 million hectares of shelterbelt construction project in the Yangtze River and other key protection areas.

– *China Daily 11/03/13* –

### TIMBER IMPORTS HELP J&K CONSERVE FORESTS

In a bid to conserve a precious resource, the Jammu and Kashmir government has adopted a dual policy of liberalizing timber imports and enforcing measures that have brought down timber smuggling by a staggering 99 percent.

“From the year 2009 to 2013, the state imported 14.7 million cubic feet of timber from abroad and from other parts of the country and simultaneously brought down timber smuggling by 99 percent,” according to Forest Minister Mian Altaf Ahmad.

During this period, 1.2 million cubic feet of timber grown in the state was also sold.

– *Daijiworld.com 08/03/13* –

## ***B.R. SEN AWARD***

### ***For outstanding contributions***



*Patrick Durst receives the B.R. Sen Award from FAO Director-General José Graziano da Silva at FAO Headquarters in Rome, Italy.*

Each year the B.R. Sen Award is bestowed on FAO field officers who make the most outstanding contribution to the advancement of the country, or countries, to which they are assigned. Established in 1968, this award pays tribute to former Director-General, Mr. B.R. Sen, and recognizes the important role he played in transforming FAO from a study organization to a development agency.

The B.R. Sen Awards for 2011 and 2012 were announced and presented at the FAO Conference in June 2013 in Rome, Italy. The 2011 winners are Mr. Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, and Mr. David Doolan, International Project Manager, FAO Pakistan. The winner for 2012 is Mr. Luca Alinovi, Senior Emergency and Rehabilitation Coordinator & OIC FAO Somalia.

*“By the very nature of our work, all FAO employees everywhere contribute their talents*

*and hard work to improving global food security and the lives of the people we serve, which is something we all take great pride in,” said Director-General José Graziano da Silva. “But the individuals honoured through these awards went well beyond the call of duty and made exceptional achievements in our shared fight against hunger, and for this we all extend our appreciation.”*

**Patrick B. Durst** was recognized for his extensive contributions to forests and forestry over his 19-year FAO career, particularly in the Asia-Pacific region. The Award citation noted that Mr. Durst’s leadership, intellectual and policy-related contributions have resulted in a variety of widely-used knowledge products, innovative capacity-building activities, and strengthened national forest policies, which have raised FAO’s visibility and credibility in the region. His efforts have ensured that forestry and forest-related issues are top priority areas in the Asia-Pacific region.

### Acceptance Speech by Patrick B. Durst

*Mr. Chairperson, Honorable Director-General, Excellencies, distinguished delegates, ladies and gentlemen,*

*It's a great honor for me to be here this afternoon to accept this award. I do so, not so much for myself, but on behalf of a vast number of peers, colleagues and mentors who have guided and helped me in my career.*

*I first started work in Asia and the Pacific more than 35 years ago, and over the years, I've witnessed incredible changes in the region, including in forestry. During that time, it's been particularly satisfying for me to work on grassroots forestry efforts, and policies and programs that support them. Collectively, Asia and the Pacific can take considerable pride in being the first developing region of the world to turn the corner from net forest loss to actually increasing forest cover.*

*Undoubtedly, whatever I've achieved with FAO, the greatest part hasn't been in technical forestry. It's been in working with and for people. In line with this, I wish to use the award funds granted to me to support scholarships for students in Bohol, Philippines, whose families are engaged in regenerating degraded forests, using assisted natural regeneration techniques introduced by FAO. I consider this to be very much a "team award," recognizing the dynamic forestry community in Asia and the Pacific, my colleagues in FAO Headquarters, in country offices, and especially the fantastic team I work with at the Regional Office in Bangkok. I also want to acknowledge my recently deceased parents, who taught me to work hard, pursue my dreams, and be stubbornly persistent. Finally, I want to thank my wonderful wife and daughter, who have supported me tremendously over the years in countless ways.*

*Thank you very much!*

## ***E-LEARNING COURSE FOR SAFER TRADE IN FOREST COMMODITIES***

A new free online course is helping to ensure safe international trade by highlighting the important role of phytosanitary measures in cross-border trade of forest products. The course was developed by FAO, the International Plant Protection Convention (IPPC) Secretariat and other partners.

“The course is a very practical tool for exporters and importers. It provides a checklist of the steps they need to take to comply with phytosanitary standards before entering foreign markets,” said FAO Forestry Officer Gillian Allard. “It should also help strengthen communication between forestry officials, national plant protection organizations and the private sector.”

The global production value for wood and furniture is worth \$900 billion per year, with an export value of \$200 billion, according to FAO. It is of global importance that internationally traded wood- and non-wood forest products are free from pests.

The e-learning course, “Trade in forest commodities and the role of phytosanitary measures,” provides information on the geographic distribution of important forest pests and outlines pest-related risks for every type of product, by country.

### **Pest threats exacerbated by international trade**

Pests covered include ash dieback (*Chalara fraxinea*) which is currently causing massive tree deaths in the United Kingdom and much of Europe; the blue-gum chalcid (*Leptocybe invasa*), which for the past decade has been spreading throughout Africa, Asia and the Pacific, Europe, Latin America and the Caribbean and the Near East; and the pinewood nematode (*Bursaphelenchus xylophilus*) which was introduced from North America into Asia and Europe.

Control costs for the pinewood nematode in Portugal alone were €24 million between 2001 and

2009. Japan annually spends around €10 million to control this pest, which is suspected to spread via wood packaging materials and untreated roundwood and sawnwood.

### **Easy to use**

The course is presented in clear, simple language and is easy to navigate. It contains five modules covering everything from the possible threats to forest health associated with international trade to what information is needed to safely import/export forest products.

The course is based on the successful *Guide to implementation of phytosanitary standards in forestry* which was published by FAO’s Forestry Department in 2011 with input from the IPPC Secretariat and a range of global experts on forestry and phytosanitary issues. Prior to release it was piloted in Zimbabwe.

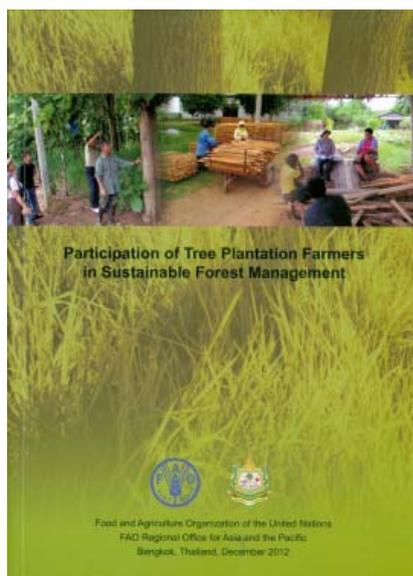
The course was launched during the 8<sup>th</sup> Session of the Commission on Phytosanitary Measures (CPM), IPPC’s governing body in Rome (8-12 April).

*Press Release FAO Media Centre*



*Asian longhorned beetle emerging from a tree.*

## NEW FAO FORESTRY PUBLICATIONS



### **PARTICIPATION OF TREE PLANTATION FARMERS IN SUSTAINABLE FOREST MANAGEMENT**

*Edited by S. Appanah, K. Pragtong, J.K. Sharma and R. Leslie*

In 2009, with funding from its Technical Cooperation Programme, FAO and the Government of Thailand initiated the project “Participation of Tree Plantation Farmers in Sustainable Forest Management (TCP/THA/3203)” to promote sustainable wood production in private lands for the livelihood of farmers, as well as to support the Small and Medium Enterprises of the wood processing industry. The development objective of the project was to contribute to the diversification of livelihood options, improve environmental sustainability and increase the domestically available wood supply through creating enabling environments for planting, harvesting and processing long-rotation tree species.

The project looked into several aspects, the principal ones being:

- Problems and issues with the promotion of long rotation tree species;

- How to promote plantations in farmers’ private land for sustainable timber production;
- Forest industry that would support small scale wood growers;
- Forest extension services appropriate for such farms;
- New policies for promoting small scale forest plantations;
- Amendments to land acts for promoting tree plantations; and
- Draft Act for promotion of tree plantations in non-forest lands.

The project came up with several specific action-oriented recommendations. The greatest value of the project work is that not only does it support wood production in the village context, it also attends to raising the quality of jobs and income generation opportunities in rural areas. As Thailand moves into a more industrialized state, the migration of people from rural to urban areas is expected to accelerate. By reversing the conditions and employment opportunities available in rural areas, such migration problems can be stemmed. In this context alone, this Report has far reaching consequences for the overall socio-economic development of Thailand.

## **FAO ASIA-PACIFIC FORESTRY CALENDAR**

6-8 August 2013. *Asia Regional Technical Workshop on Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (“Guidelines”)*. Bangkok, Thailand. Contact: Yuji Niino, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Yuji.Niino@fao.org

17-19 September 2013. *Inauguration Workshop for the Asia-Pacific Forestry Communications Network*. Hanoi, Vietnam. Contact: Patrick Durst, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

15-17 October 2013. *Fourth UN-REDD Regional Lessons Learned Workshop: National Forest Monitoring Systems for REDD+*. Bangkok, Thailand. Contact: Ben Vickers, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Ben.Vickers@fao.org

16-17 October 2013. *Regional Workshop on Capacity Building Needs to Support FLEGT in Asia*. Bangkok, Thailand. Contact: Bruno Cammaert, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Bruno.Cammaert@fao.org

21-23 October 2013. *International Symposium on Transition to Sustainable Forest Management and Rehabilitation: The Enabling Environment and Roadmap*. Beijing, China. Contact: Patrick Durst, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

23-27 October 2013. *Alien Invasive Species and International Trade*. Qingdao, China. Contact: Patrick Durst, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

5-8 November 2013. *Twenty-fifth Session of the Asia-Pacific Forestry Commission*. Rotorua, New Zealand. Contact: Patrick Durst, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.Durst@fao.org

25-28 November 2013. *Strength in numbers: International Conference on Forest Producer Organizations*. Guilin China. Contact: Sophie Grouwels or Jhony Zapata, FAO Forestry Department, Via della Terme di Caracalla, 00100, Rome, Italy. E-mail: forest-farm-facility@fao.org

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# 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 resources and their potential for development (RAP Publication 2010/02)
- Strategies and financial mechanisms for sustainable use and conservation of forests: experiences from Latin America and Asia (RAP Publication 2009/21)
- Asia-Pacific Forestry Week: Forestry in a changing world (RAP Publication 2009/04)
- The future of forests: Proceedings of an international conference on the outlook for Asia-Pacific forests to 2020 (RAP Publication 2009/03)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04)
- Reaching consensus. Multi-stakeholder processes in forestry: experiences from the Asia-Pacific region (RAP Publication 2007/31)
- Trees and shrubs of Maldives: An illustrated field guide (RAP Publication 2007/12)
- A cut for the poor: Proceedings of the International Conference on Managing Forests for Poverty Reduction Capturing Opportunities in Forest Harvesting and Wood Processing for the Benefit of the Poor (RAP Publication 2007/09)
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- Helping forests take cover (RAP Publication 2005/13)
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- Forest certification in China: latest developments and future strategies (RAP Publication 2005/08)
- Forests and floods – drowning in fiction or thriving on facts? (RAP Publication 2005/03)
- In search of excellence: exemplary forest management in Asia and the Pacific (RAP Publication 2005/02)
- What does it take? The role of incentives in forest plantation development in Asia and the Pacific (RAP Publication 2004/27)
- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
- Practical guidelines for the assessment, monitoring and reporting on national level criteria and indicators for sustainable forest management in dry forests in Asia (RAP Publication: 2003/05)
- Applying reduced impact logging to advance sustainable forest management (RAP Publication: 2002/14)
- Trash or treasure? Logging and mill residues in Asia-Pacific (RAP Publication: 2001/16)
- Regional training strategy: supporting the implementation of the Code of Practice for forest harvesting in Asia-Pacific (RAP Publication: 2001/15)
- Forest out of bounds: impacts and effectiveness of logging bans in natural forests in Asia-Pacific: executive summary (RAP Publication: 2001/10)
- Trees commonly cultivated in Southeast Asia: an illustrated field guide - 2nd edition (RAP Publication: 1999/13)

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