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@ PRADEEP VYAS

*Featuring*

# FOREST NEWS

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## TIGERPAPER



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**Front cover:** Leopard (Photo: Pradeep Vyas)

**Back cover:** Leopard attacking forestry officials (Photo: Forest Department, Government of West Bengal)

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# HUMAN-LEOPARD CONFLICT IN NORTH BENGAL, INDIA

by Pradeep Vyas and K. Sengupta



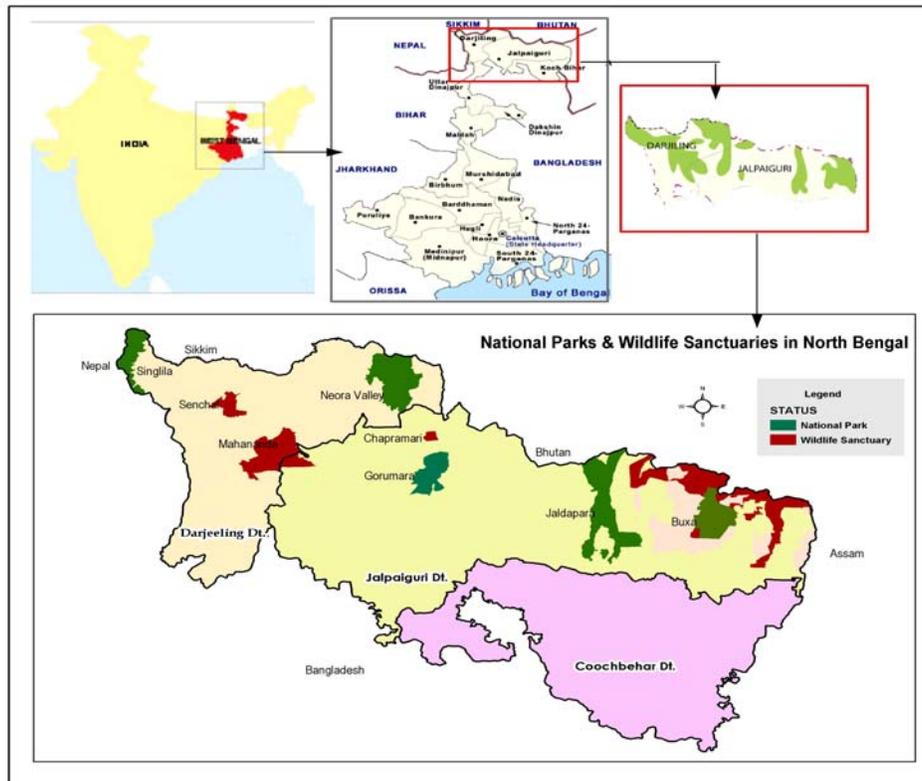
## Introduction

Human-wildlife conflict refers to the interaction between wild animals and people and the resultant negative impact on people or their resources, or wild animals or their habitat. According to the 2003 IUCN World Parks Congress, human-wildlife conflicts occur when wildlife requirements encroach on those of human populations, at costs both to residents and wild animals (IUCN, 2005; FAO, 2009). The by-products of human existence offer unnatural opportunities for wildlife in the form of food and shelter, resulting in increased interference and potentially destructive threats for both man and animals. Leopards (*Panthera pardus*) are the most widely distributed of all the world's large cats (Bailey, 1993). Leopards are adapted to live well in savannah, rain forest, mountain elevations, dense vegetation, low scrub and thickets and even quite close to human habitations (Bailey, 1993). Leopards are widely distributed over all of India and are found even in the drier and sparsely forested regions of

the northwest. They are widely distributed in the forests, fringe tea gardens and fringe villages of North Bengal. Leopards in North Bengal may be broadly divided into two major groups, namely forest dwelling and tea garden dwelling. The problem of human-leopard conflicts has recently increased in North Bengal due to changes in the land use pattern.

## Study area

West Bengal, with an area of 88,752 km<sup>2</sup>, is in the eastern part of India, stretching from the Himalayas in the north to the Bay of Bengal in the south. It has 4,031 km<sup>2</sup> of recorded forest and large tracts under tea gardens established during the 19<sup>th</sup> century and onward. The leopard population is confined to only three districts of North Bengal, i.e., Jalpaiguri, Darjeeling and Cooch Behar which lies at the foothills of the great Himalayas. The area covers the moist and dense riverine forests of the Bengal *duars* and *tarai* regions. The *tarai* ("moist land") is a belt of marshy grasslands, savannas, and forests



**Figure 1. Location-North Bengal**

at the base of the eastern Himalayas, whereas duars are flood plains at the foothills of the eastern Himalayas in northeast India.

### Methodology

To determine the extent of the human-leopard conflicts in North Bengal, data relating to the 13-year period between 2000 to 2013 were collected from the Forest Department, Government of West Bengal. The data were analyzed statistically and in light of the available literature on the subject to make recommendations.

### Human-leopard conflicts in India

Human-leopard conflicts have existed in India for over 100 years and 11,909 people have been reported to have been killed by leopards during 1875 to 1912 (Abstracts relating to British India, 2013). Occupying a position almost at the top of the food pyramid, the animal has gained a controversial status owing to its peculiar shifting of habitat from forest to villages and tea gardens,

which has paved the way for man-animal conflicts in different parts of India.

Kumar and Chauhan (2011) reported 162 attacks on humans by leopards in the Mandi district of Himachal Pradesh State of India, of which 13 persons were killed and 149 were injured. The western Indian State of Maharashtra reported trapping of 103 leopards between 2001 and 2003 (Vidya *et al.*, 2013). The State of Uttaranchal has had a history of human-leopard conflicts and about 140 people succumbed to leopard attacks between 1988-2000, while 93 leopards were killed in the same period (Chauhan and Goyal, 2000). The human-leopard conflict in the Borivile National Park in the metropolitan city of Mumbai is an example of how leopards have adapted to an urban landscape.

### Human-leopard conflict in North Bengal

The North Bengal landscape is a mosaic of forest and tea gardens, regularly interspersed by rivers flowing from north to south. The past century has seen vast changes in the land use pattern in North Bengal with the establishment of many tea

**Table: 1. Persons Killed/ Injured by Leopards during 2000-2013**

Year	Death	Injured	Total
2000-2001	0	0	0
2001-2002	0	0	0
2002-2003	0	0	0
2003-2004	0	17	17
2004-2005	1	13	14
2005-2006	0	8	8
2006-2007	0	0	0
2007-2008	3	2	5
2008-2009	1	1	2
2009-2010	3	2	5
2010-2011	1	0	1
2011-2012	0	19	19
2012-2013	1	29	30
Total	10	91	101

**Table: 2. Death of Leopards during 2000-2012 in North-West Bengal**

Year	Natural Death	Accident	Poaching	Retaliatory killing	Declared rogue and killed to save human lives	Total
2000-2001	6	1	1	4	0	12
2001-2002	3	0	3	0	0	6
2002-2003	10	1	2	0	0	13
2003-2004	13	0	0	0	2	15
2004-2005	10	1	1	4	0	16
2005-2006	11	2	1	2	0	16
2006-2007	10	2	0	1	0	13
2007-2008	13	2	0	2	0	17
2008-2009	22	7	1	1	0	31
2009-2010	18	2	0	2	0	22
2010-2011	24	1	1	0	1	27
2011-2012	26	1	0	2	0	29
2012-2013	19	5	0	4	0	28
Total	185	25	10	22	3	245

gardens, conversion of forest land to army cantonments, diversion of forestland for railways and highways, etc. These changes have made the forest highly fragmented. The development of the area coupled with the rapid increase in the human population has seen increases in conflicts between humans and leopards in this landscape. Besides leopards some other wild animals known for conflicts with humans in North Bengal are elephant, gaur and greater one-horned rhinoceros.

In North Bengal during the period 2000 to 2013, a total of 101 humans were attacked by leopards, of which 10 persons died (Table 1). During the same period 245 leopard deaths were recorded, of which 185 were recorded as natural deaths and 60 leopard deaths as unnatural for the reasons of road accidents, retaliatory killings, poaching and elimination as rogues (Table 2).

The man-leopard conflicts in North Bengal are primarily handled by ten “Wildlife Squads” under the Forest Department, which are strategically located in various parts of North Bengal. The Forest Department has adopted a policy of capturing leopards from the conflict areas and a total of 25 leopards were captured during the period 2010 to 2013. During the same period a total of 8 leopards were immobilized when they strayed to human settlements and failed to return back to the forest and there was threat to human life or to the leopard’s life. After medical treatment, all such captured leopards are released back into the nearest national park or wildlife sanctuary and there exists no post-release mechanism.

### Results and discussions

In the North Bengal landscape, since the year 2000 a total of 101 persons have been attacked by leopards, of which 10 persons (10%) were killed and 91 (90%) suffered injuries (Table 1). This indicates that such attacks are more accidental in nature rather than intentional killings of the humans. The trend shows an increased rate of deaths of people during the same period, but it is not a significant increase ( $R^2=0.188$ ). Almost similar observations were made for the period 1990 to 1997 when 121 people were attacked by leopards in North Bengal (WWF India report, 1997), of which 10 died and 111 escaped with injuries.

No record has been found to confirm man-eating behaviour by leopards in North Bengal, proving that these attacks were not for food. This observation differs greatly from Uttarakhand, where leopards have been found to kill people, especially children, for food (Technical report WII, 2000). It is observed that leopards attack adults (78%) more often than children (22%), confirming that children are not the main victims of leopard attacks in North Bengal. However, casualties among children are higher than the adults primarily for the reason that children have less capacity to bear with leopard attack injuries compared to adults.

Higher conflicts have been observed in the tea gardens (77%) than in the forest areas and its fringes (23%). It is a general belief that most of the leopard attacks involve women engaged in gathering tea leaves in tea gardens who are attacked by a mother leopard to protect her cubs; however, an analysis of the data does not confirm this belief as leopard attack victims comprise 73% male and 27% female.

There is a very significant spatial variation and the districts of Jalpaiguri (93%), Coochbehar (6%) and Darjeeling (1%) are the most affected districts in North Bengal. There does not seem to be a seasonal variation of attacks between pre-monsoon, post-monsoon and monsoon.

As per the official records of the Forest Department, Government of West Bengal, a total of 245 leopard deaths have been reported since 2000. Of these deaths, 185 (75.50%) were natural and 60 (24.50%) were the result of accidents, poaching, retaliatory killings and eliminations of rogues to save human lives. The trend line shows a significant increase in the death rate ( $R^2=0.826$ ) during the same period (Table 2), which is indeed a matter of concern for leopard conservation in the North Bengal landscape. The 9% of leopard deaths that were the result of retaliatory killings is a highly significant indicator of conflict and there is a likelihood that many retaliatory killings went unnoticed. WWF India has observed a large number of leopard deaths due to conflict-related incidents in the region between 1990 to 1997, in which 25 leopard deaths were caused by people, out of a total 39 leopard deaths recorded (WWF India, 1997).

As per Forest Department records since 2002-03 to 2012-13, a total of 1,649 livestock have been killed by leopards in tea gardens and forest fringe villages and a total compensation of Rs. 1.03 million has been paid. This does not include the loss of livestock killed inside the forest areas, as no compensation is paid for the same by the Forest Department and hence are not reported. This loss of livestock is the primary cause of conflict between the forest fringe human population and leopards. No records of dog lifting by leopards are available, but it is a general observation that dogs, which act as human settlement sentinels, constitute one of the main prey of leopards residing in the forest fringes.

The latest estimation of the leopard population in the North Bengal landscape was carried out in 2004, which recorded a total of 164 leopards; however, the exercise was incomplete as no estimation of leopards was carried out in Buxa Tiger Reserve. As per the Forest Department's records, a total of 82, 108 and 331 leopards were recorded in North Bengal in the years 1984, 1989 and 2002 respectively. No leopard estimation exercises have been carried out in the entire North Bengal landscape since 2002. This has resulted in a serious management gap for leopard conservation in North Bengal. Often leopard attacks are concluded to be an outcome of increases in the leopard population, but it could be for many other reasons including a diminished prey base, fragmentation of habitat, an increase in disturbances in leopard habitats due to biotic interferences, etc.

### Recommendations

The following recommendations are made for leopard conservation in the North Bengal landscape:

- There is urgent need to conduct a census of the leopard population in North Bengal, since no counts have been made since 2002. The leopard estimation exercise should be carried out in forest and non-forest areas so as to assess the forest dwelling and tea garden dwelling leopard populations.
- There is little knowledge about the ecology of leopards of North Bengal so a research project

on leopard ecology using radio-telemetry should be initiated.

- Microchips and camera traps should be used for the post-release monitoring of captured leopards.
- Strict enforcement and alternate livelihood programmes should be taken up to reduce biotic pressure on the forest for the conservation of forest dwelling leopards.
- Extensive education and awareness programmes should be taken up, especially in tea gardens, to create awareness about leopard behaviour and precautions to be taken up for the leopard-related conflicts.
- The Wildlife Squads need to be better equipped. The trap cages are too heavy and often result in injuries to the captured leopards. Trap cages of better design and material with technology to display the weight of the captured animal are available and should be procured.
- Training in immobilization techniques and leopard handling should be imparted to forest staff involved in leopard conservation.

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## CONSERVATION STATUS OF THE ASIAN ELEPHANT IN THE CHUNATI WILDLIFE SANCTUARY OF BANGLADESH

by Mohammad Shamsuddoha and Md. Abdul Aziz

### Introduction

Asian elephants are critically endangered in Bangladesh (IUCN Bangladesh, 2000) and are often focused on as a flagship species for biodiversity conservation in the Asia range countries (Nath and Sukumar, 1998). In

Bangladesh, the estimated population size of wild elephants may range from 300 to 350, of which approximately 200 are residents, and 100-150 are trans-boundary migrants (Islam *et al.*, 2011). Resident wild elephants are present only in the south-east districts of Chittagong, Cox's Bazar and Chittagong Hill Tracts (Islam, 2006; Aziz *et al.*,



2005). The migratory elephants come from the neighbouring country India to several districts of northern and south-eastern Bangladesh. Of the 17 wildlife sanctuaries of Bangladesh, Chunati Wildlife Sanctuary is one of the few sanctuaries in the country that supports wild elephants. Importantly, this sanctuary is the only MIKE (Monitoring Illegal Killing of Elephants) site in Bangladesh. Several herds are known to forage in this sanctuary and population size may range from 21 to 40 (Islam *et al.*, 2011). They also use the Banskhali Eco-park located next to the north-western part of the sanctuary.

A number of studies have been carried out on Asian elephants in Bangladesh (Al-Zabed, 1992; Chakraborty, 1996; Islam *et al.*, 1999; Aziz, 2002; Aziz *et al.*, 2005; Sarker and Roskaft, 2010; Islam *et al.*, 2006, 2011), including conservation research and management action projects by the Bangladesh Forest Department and different conservation agencies (IUCN Bangladesh, 2004; 2011). Over-exploitation of forest resources and illegal human activities within the sanctuary have

led to severe habitat destruction over decades which have been detrimental to elephants as well as other wildlife fauna (Molur *et al.*, 2005; Aziz, 2013). Consequently, along with the overall conservation interventions implemented by the Nishorgo Support Project and Integrated Protected Area Co-management (IPAC) since 2005, community-based alternative income generation (AIG) schemes were promoted to the communities living around the Chunati Wildlife Sanctuary. Interventions were designed to reduce the scale of resource extractions from the forests so that elephants can have enough fodder and human-conflicts are reduced (Kabir, 2012). However, the performance of the AIG programmes introduced needs to be evaluated so that current levels of resource extractions are abated because the human-elephant conflicts in these areas appear to be consistent with what it was before these project interventions. We present here the current situation of the human-elephant conflict with notes on population and habitat status of elephants in the Chunati Wildlife Sanctuary. We also provide a

small conclusion section for future management and conservation initiatives.

### Study area

Chunati Wildlife Sanctuary (21°58' N, 92°04' E) is located about 70 km south of Chittagong city in southeast Bangladesh. The sanctuary was established in 1986 and covers an area of about 7,764 ha of forests. The sanctuary falls within the administrative upazila Banshkhali and Lohagara of Chittagong district and Chakaria upazila of Cox's Bazar district. There are seven forest beats under two ranges created for the effective management of forest and wildlife. The topography of the area is hilly terrains with shallow to deep gullies and gentle slopes. The average elevation ranges from 30 m to 90 m above the mean sea level. The areas are traversed by numerous creeks amongst the hills and creeks which are believed to enhance the quality of wildlife habitats along with providing irrigation facilities for the local people. The forest type of the sanctuary is mixed tropical semi-evergreen in nature. This sanctuary is known to support around 1,200 species of plants and 178 wildlife species (Khan, 1990). Of the wildlife fauna, six species of amphibians, eight reptiles, 137 birds and 27 mammals have been recorded (Husain, 1990). The forest habitats of the sanctuary have been degraded by illegal extraction of trees, encroachment, and agricultural practices, among others that have led to a number of wildlife species to become extinct locally, including the Hoolock gibbon *Hoolock hoolock* (Molur *et al.*, 2005; Aziz, 2013).

### Methodology

A combination of survey methods was used during this study including sign surveys following forest trails, direct counts of elephant herds, random surveys, focus group discussions (FGDs), and semi-structured questionnaire interviews. We have walked through 25 transects repeated over 2 times, including 2 random surveys during the study period between 2012 and 2013. Data on elephant herd size, age-sex structure, dung piles, browsing plants, movement signs and directions, etc., were noted during these surveys. Our questionnaire survey interviewed 38 respondents from a random selection of local people living in 7 forest beats.

We also arranged 11 FGDs to understand the conflict situation and for validation of interview data. Participants were selected based on their involvement with resource collection and agricultural activities relating to the sanctuary. Some forest officials were also included in the interviews. During interviews and FGD, we addressed questions to assess the frequency of elephant attacks, scale and nature of damages, number of elephants involved in conflicts, and the major factors that might have driven conflicts (Islam *et al.*, 1999).

### Results and discussion

Our study estimated a population size of 35-40 elephants in the Chunati Wildlife Sanctuary and Banshkhali Eco-park. There were 3-4 elephant herds in the areas, but some of them might have diverged from one group or dispersed to cover wider ranges for enough fodder. We have recorded a highest group size of 8 individuals in the Banshkhali Eco-park, and 4-5 solitary males in the study areas. However, previous studies estimated the elephant population at lower numbers of 15-30 (IUCN Bangladesh, 2004), and 21-40 (Islam *et al.*, 2011).

We recorded 55 species of plants under 23 families that have been used by elephants in the study areas (Table 1). The plant species range from grasses to trees, including homestead vegetation. Of these, trees represented 36%, followed by herbs (27%), bamboos (13%), climbers (11%), grasses (7%) and shrubs (6%). Our study suggests that cultivated crops in and around the study areas might have provided the major diet to elephants. Elephants ventured into paddy fields during two main crop seasons: February-May and September-December. They have started to feed on paddies from the stage of green foliage and continue till to harvesting.

Because most of the study areas have been degraded and are almost devoid of trees, several locations in the study areas seemed to be critical to elephants for grazing and resting. Of these discrete patches of forests, 'bush and medium canopy' (Figure 1) areas located along the eastern sides of Jaldi, Napura and Puichari forest beats were found to be most heavily used by elephants.

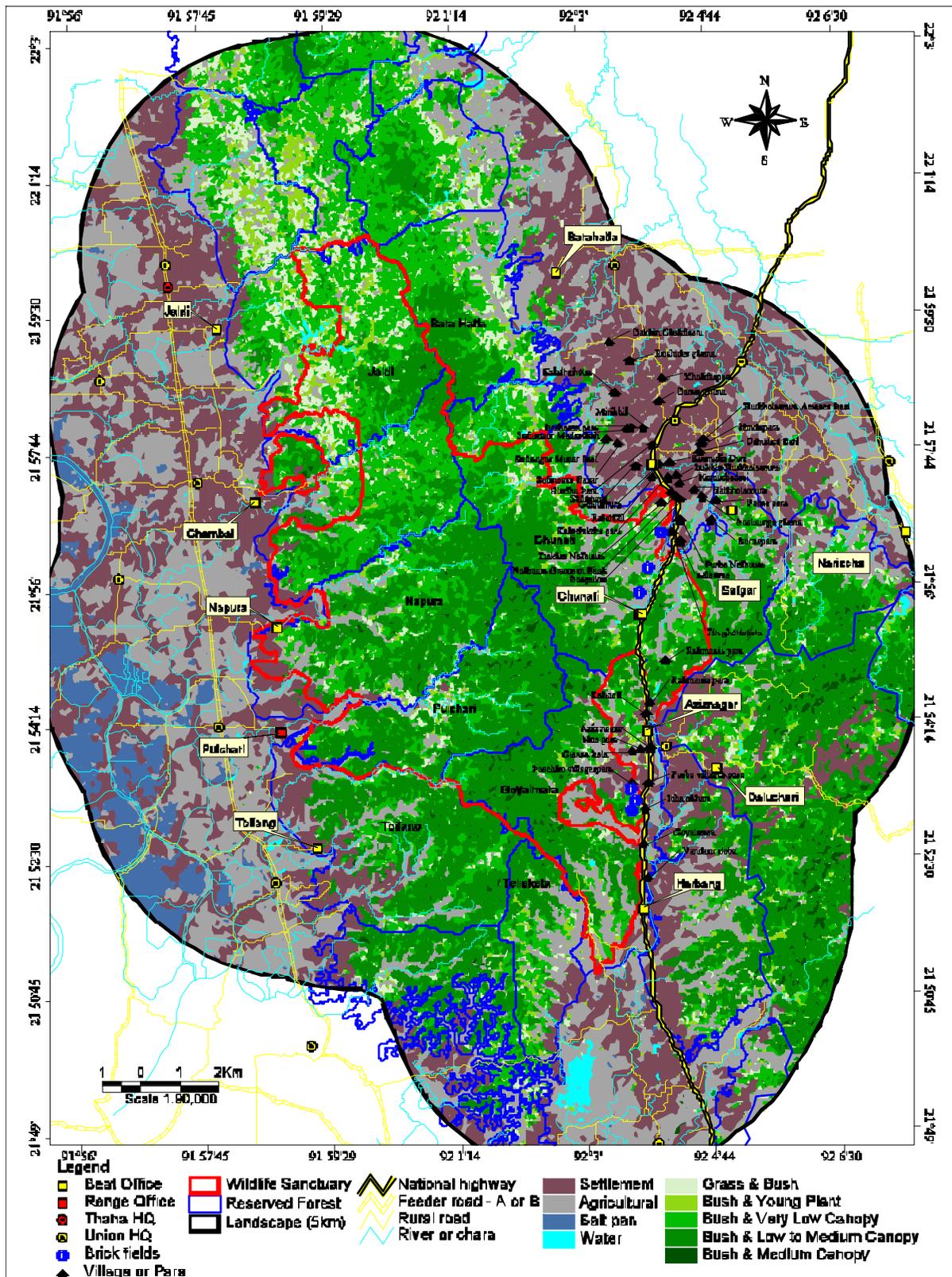


Figure 1. Land-use and habitat patterns of the Chunati Wildlife Sanctuary (Adapted from Nishorgo Support Project, 2005).

Family	English name	Scientific name	Plant parts eaten	Locality
Musaceae	Bronze Banana	<i>Musa omata</i>	Almost all parts, except roots	2
	Banana	<i>Musa</i> sp.	Almost all parts, except roots	1
	Banana	<i>Musa sapientum</i>	Almost all parts, except roots	1
	Dwarf Cavendish	<i>Musa acuminata</i>	Almost all parts, except roots	2
Brassicaceae	Radish	<i>Raphanus sativus</i>	All parts	1
	Cabbage	<i>Brassica oleracea</i> var. <i>batrytis</i>	All parts	1
	Cauliflower	<i>Brassica oleracea</i> var. <i>capitata</i>	All parts	1
Myrtaceae	Guava	<i>Pisidiumgaujava</i>	Young leaves, fruits	1
	Blackberry	<i>Syzygium cumini</i>	Bark, fruit	1
Febaceae	Bean	<i>Vigna unguiculata</i>	Young leaves, stem, grain	1, 2
Anacardiaceae	Mango	<i>Mangifera indica</i>	Flower, fruits	1
	Mango	<i>Mangifera longipes</i>	Flower, fruits	2
Verbenaceae	Teak	<i>Tectona grandis</i>	Bark	1, 2
Solanaceae	Bringal	<i>Solanum melongena</i>	Fruits, leaves	1
Cucubitateae	Bitter Melons	<i>Momardica charantia</i>	Fruits, leaves	1
Rhamnaceae	Jujube	<i>Zizyphus mauritiana</i>	Fruits, flowers	1
	Wild Jujube	<i>Zizyphus rugosa</i>	Fruits, flowers	2
Caricaceae	Papaya	<i>Carica papaya</i>	Fruits	1
Convolvulaceae	Water Spinach	<i>Ipomoea aquatica</i>	Stem, leaves	2
Graminae	Sungrass	<i>Imperata cylindrica</i>	Leaves, shoots	2
	Bamboo	<i>Bambusa</i> sp.	Almost all parts, except roots	1
	Makhal Bamboo	<i>Bambusa teres</i>	Almost all parts, except roots	2
	Tulda Bamboo	<i>Bambusa tulda</i>	Almost all parts, except roots	2
	Polymorpha Bamboo	<i>Bambusa polymorpha</i>	Almost all parts, except roots	2
	Berry Bamboo	<i>Melocanna baccifera</i>	Almost all parts, except roots	2
	Dolu Bamboo	<i>Neauhozia zeylanica</i>	Almost all parts, except roots	2
	Kali Bamboo	<i>Oxytenanthera nigrociliata</i>	Almost all parts, except roots	2
	Paddy	<i>Oryza sativa</i>	Grains, leaves	1
	Wheat	<i>Triticum aestivum</i>	Leaves, stem	1
	Sugarcane	<i>Saccharum officinarum</i>	Leaves, shoots	2
	Wick grass	<i>Hymenache pseudointerrupta</i>	Leaves, shoots	2
	Tiger grass	<i>Thysanolaena maxima</i>	All parts	2
Grass	<i>Sacciolepis myosuroides</i>	All parts	2	
Wild sugarcane	<i>Saccharum spontaneum</i>	All parts	2	

Family	English name	Scientific name	Plant parts eaten	Locality
	Wick grass	<i>Hymenache pseudointerrupta</i>	Leaves, shoots	2
	Tiger grass	<i>Thysanolaena maxima</i>	All parts	2
	Grass	<i>Sacciolepis myosuroides</i>	All parts	2
	Wild sugarcane	<i>Saccharum spontaneum</i>	All parts	2
Moraceae	Rubber	<i>Hevea brasiliensis</i>	Bark of young trees	2
	Jackfruit	<i>Artocarpus heterophyllus</i>	Leaves, twigs, fruits	1
	Monkey Jack	<i>Artocarpus laucha</i>	Fruits	1
	Banyan tree	<i>Ficus bengalensis</i>	Leaves, twigs, fruits	1, 2
	Australian Fig	<i>Ficus auriculata</i>	Fruits	1
	Chapalish	<i>Artocarpus chama</i>	Fruits	2
Dioscoreaceae	Wild potato	<i>Dioscorea alata</i>	Fruits, leaves	2
	Sweet Potato	<i>Dioscorea batatas</i>	Fruits, leaves	1
	Yam	<i>Dioscorea pentaphylla</i>	Fruits, leaves	1
Rutaceae	Pomelo	<i>Citrus grandis</i>	Fruits	1
Smilacaceae	Greenbrier	<i>Smilax</i> sp.	Fruits, entire tree	2
Fabaceae	Indian Rosewood	<i>Dalbergia sissoo</i>	Leaves, twigs	1
	Catechu	<i>Acacia catechu</i>	Leaves, twigs, bark	2
Malvaceae	Cotton tree	<i>Bombax ceiba</i>	Leaves, twigs, bark	1
Dipterocarpaceae	Sal	<i>Shorea robusta</i>	Bark	2
	Garjan	<i>Dipterocarpus turbinatus</i>	Bark	2
Bromeliaceae	Pineapple	<i>Ananas comosus</i>	All parts	1
Amaranthaceae	Data spinach	<i>Amaranthus gangeticus</i>	All parts	1
Palmae	Coconut	<i>Cocos nucifera</i>	Central rachis, pith, leaves	1
	Reeds	<i>Phragmites karka</i>	Leaves, stem	2
Caryophyllaceae	Tara	<i>Stellaria wallichiana</i>	Fruits, entire tree	1

**Locality code:** 1 - Plants recorded in the homestead after raids; 2- Plants recorded in the forest areas.

Our FGD and interview data suggested that elephants intensively used these areas for breeding and nursing their calves. Although tree cover was scarce in these areas, there were a number of creeks that provided good sources of water for elephants. We recorded a herd of 8 elephants with two new born calves in April 2012 in one of these areas. Priority-based comprehensive management actions along with plantation programmes may improve the conditions of these areas so that elephants may find more fodder and shelter. Original tree species (e.g., Fig, *Ficus* spp.; Chapalish, *Artocarpus* spp.; Garjan, *Dipterocarpus* spp.; Jam, *Syzygium* spp.) which

have been wiped out from the study areas could be the priority species for plantation. Current extraction of resources including fuelwood and sungrass should be arrested to prevent further degradation of habitats.

In terms of human-elephant conflicts, our analysis showed that 63% of losses incurred were due to the damage of fruit trees, followed by crops (23%), houses and properties (8%), and bamboo grooves (6%). Elephants raided paddy fields during the two main paddy seasons, and much of the paddy fields are within the boundary of the sanctuary and eco-park. Other crops raided by elephants are

presented in the Table 1. Farmers claimed that they have had to invest many hours to guard crop fields from elephant raids, including establishment of guard-sheds, and using flashlights and kerosene-fire to deter elephants. Due to frequent raiding since the early stage, net productions of crops were also reduced significantly. It was observed that elephants preferred to vandalize thatched houses with sungrass roofs, and houses that contained stored grains.

During this study, humans and livestock being killed by elephants were not reported. However, an estimated 14 people were reported to have been injured due to elephant attacks, although some of the incidences occurred within the forests during illegal resource extractions. No elephant deaths were reported in the areas during this study. The human-elephant conflicts in the areas appeared to be a persistent problem (Islam *et al.*, 1999; IUCN Bangladesh, 2011) and have been negatively affecting elephant conservation efforts. A long-term conflict situation will contribute to losing the support of local people for elephant conservation initiatives in future. This sort of conflict often reduces the local support for conservation in areas where human life and property are at high risk of elephant destruction (Thoulesand Sakwa, 1994).

Major factors leading to human-elephant conflicts included habitat loss and fragmentation, extraction of forest resources (e.g., fuelwood, timber, bamboo, sungrass), agricultural activities within the sanctuary and grazing of elephant habitats by livestock (e.g., herds of buffalo, cows). Habitat encroachment and pressure from the expansion of agricultural fields over fringes also threaten the long-term survival of elephants in the areas.

### Conclusion

The elephant population in the study areas may fluctuate due to migration and movement to forests outside of the sanctuary and eco-park. Local people have not abandoned illegal resource extractions, although a number of conservation efforts appear to have contributed to the overall habitat improvement in the recent past. Resource extractions should be strictly regulated and should only be permitted for selected forest users in the

restricted buffer areas so that local people will have a positive feeling towards forest management and wildlife conservation. Some areas identified in this study are critical to elephant conservation and these areas should be urgently improved by arresting further resource extractions and by plantation programmes. Bio-fencing and unattractive crop cultivation initiatives can be introduced to minimize future crop raiding. The majority of the local people who have either legal or illegal stakes with the sanctuary and eco-park appeared to be non-supportive to elephant as well as overall biodiversity conservation. However, their support for elephant conservation is a must and the authorities should take up this issue to be resolved in future management efforts. Finally, political will and a bottom-up conservation approach can play a vital role in elephant conservation in Bangladesh.

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## PALLAS' CAT IN ANNAPURNA CONSERVATION AREA OF NEPAL

by Neeru Thapa

Since the passing of the National Parks and Wildlife Conservation Act 2029 (1973), Nepal has established many protected areas in order to protect its biodiversity. These protected areas include 10 national parks, 3 wildlife reserves, 6 conservation areas, 1 hunting reserve and 12 buffer zones, covering 34,185.62 km<sup>2</sup> (23.23%) of the total geographical area of the country.

The National Trust for Nature Conservation (NTNC) is managing the Annapurna Conservation Area (ACA) through the establishment of the Annapurna Conservation Area Project (ACAP). ACA is the first and largest conservation area of Nepal. ACAP is considered to be a pioneer in adopting the Integrated Conservation and Development Program (ICDP). Behind the success of the ICDP model is the strong motivation and commitment of the local people towards conservation. ACAP has strengthened the grass-roots level people by entrusting them with the responsibility of managing the natural resources. ACAP has developed an innovative approach for preventing environmental degradation and loss of natural resources in ACA by creating a sustainable balance of needs among local people, tourism management and nature conservation. ACA is home to many fauna and flora and is by far the most popular mountain tourism destination in the Nepal Himalayas.

ACAP, in partnership with the Snow Leopard Conservancy – Nepal, has installed several cameras in ACA to monitor snow leopard status. Of a total eleven cameras installed in the Manang area of ACA, two camera traps have captured the first live pictorial evidence of Pallas' Cat (*Otocolobus manul*) in ACA of Nepal. The photographs were captured on December 10, 2012 (4,200 m) and on December 26, 2013 (4,650 m). The photographed cat with a long, ringed tail and dark spots on the forehead was confirmed by

national and international experts to be a Pallas' Cat and was announced as a new species to Nepal at a press conference organized at the ACAP Headquarters in February 2014.

Pallas' Cat is the eighth species recorded in ACA that are new to Nepal. The other seven species are: Kiang (*Equus kiang*), Tibetan Argali (*Ovis ammon hodgsoni*), Tibetan Gazelle (*Procapra picticaudata*), Tibetan Sandgrouse (*Syrrhaptes tibetanus*), Eurasian Eagle Owl (*Bubo bubo*), Tibetan Argus (*Argusianus argus*) and Varnished Apollo (*Parnassius acco*).

In 2012, when Bhutan recorded the first photographic evidence of Pallas' Cat, it was assumed that it would also be present in the Eastern Himalayas of Nepal, but there were no records of its presence in any geographical area of the country. Thus, the new photographic confirmation of its presence in Nepal is a great boon for the country and for those dedicated to working in the conservation sector. ACAP aims to ensure a detailed study regarding the Pallas' Cat's status, distribution and potential habitat. The International Union for Conservation of Nature (IUCN) has listed Pallas' Cat as "Near threatened" because of the globally declining population and disappearance from most of their former ranges. The Pallas' Cat's survival is threatened by hunters for its fur, fat and organs which have medicinal value worldwide. Today, protecting wildlife against poachers is one of the main challenges and the participatory conservation practices adopted by ACAP seem to be very effective.

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## ***ECOLOGICAL RESTORATION OF DEGRADED FOREST SYSTEMS IN THE TROPICS***

by Jaap Kuper

The area of natural forest in the tropics is diminishing at a rapid pace. Much of it is being replaced by crops that quickly bring profits to a limited number of investors. At the same time, the area of wasteland is increasing. Much of the wasteland is the result of ongoing unsustainable timber harvest. The annual fires that often follow prevent secondary forest from developing, with the result that forests that are degraded, or in the worst case destroyed, are unlikely to recover and so the wasteland remains.

The limited area that has been “restored to forest” has generally been transformed into tree plantations. We have tended to call these “forest” too, because they are composed of trees and produce timber. But in no way do plantations have the wide spectrum of values that natural forests have and in general they serve only the interests of individuals who have no links with local people. There are, however, some examples where degraded or destroyed forest systems have been restored to as natural a forest as possible, but their area is very limited. This is surprising, considering that many communities in remote areas are very dependent on commodities from natural or semi-natural forests, and that millions of people who live in valleys are dependent on water resources that are regulated by forest-covered mountains.

Why are there so few such examples? Why is there so much wasteland? Typical arguments against restoring forest are:

- “Tree planting is expensive and it takes too long to get returns on investments.”
- “Nobody takes responsibility for the land, so why invest in restoration?”
- “There’s no point in planting trees because fire and livestock will prevent forest from developing.”

If we accept these arguments then there is no hope that the wastelands will ever be converted into forests, nor is there any hope for the remaining natural forest: it will all be destroyed sooner or later. (More than likely it will be sooner).

Can something be done to counter these arguments? There are some possible solutions:

- Make planting cheap and with quick returns.
- Make people concerned about the land so they will take responsibility for it.
- Ensure land management benefits those who take responsibility.

In this article I will show that tree planting can be cheap and beneficial, that people can become concerned about the land use and that land management can be well organized.

### **Make tree planting cheap**

Traditionally, foresters think only of planting plantations. They plant huge numbers (3,000 to 5,000) saplings per ha so that the tree trunks will grow optimally for industrial timber products. After decades, such plantations produce large volumes of commercial timber. As well as being very expensive, the system is also vulnerable to fire and pests. Plantations are an investment-driven exercise. They are applied if prospects are good for returns on investment; if prospects are not good, plantations are not planted and the land is abandoned after the original forest has been cut. The sole objective of plantations is to generate returns on investment for the investors. The protection of water catchment, of forest resources for local communities or conservation of biodiversity have never been arguments for establishing plantations.

But meanwhile, it has become apparent that worldwide, water catchments, forest resources for

communities and biodiversity are diminishing. So, who should take responsibility for these issues? And how?

### *Plantations are not the answer*

Let us first consider how forest could be restored. It is unrealistic to expect much of the wasteland to be converted into plantations. And that is not even desirable! It would be much better to transform the wasteland into forest (natural or semi-natural). Compared with plantations, semi-natural forest is far more effective as a water catchment, as a resource providing a mix of forest products for local communities and as habitat for biodiversity. To guarantee permanent soil cover, the full spectrum of forest products and also the natural biodiversity, the forest should ideally be composed of a variety of indigenous tree species.

Just as importantly, to restore semi-natural forest it is not necessary to plant large numbers of saplings: 400 to 500 per ha is sufficient (see below), and they could be seedlings or seeds obtained from remnant natural forests in the vicinity – for free! The seedlings or seeds collected should include the various species that compose the natural forest. They must be planted in a random mix of species, but taking care that the characteristics of the species match the conditions of the planting site (see below).

So, compared with conventional thinking in forestry, such restoration to semi-natural forest requires a completely different strategy that produces a completely different kind of forest.

### *Three levels of degradation*

How degraded systems are converted into semi-natural forests depends on the level of degradation. It makes a great difference if some “forest climate” still remains on the site, and if there are wildings rather than completely destroyed forest such as pure grassland.

It is useful to recognize three levels of degradation:

- A. Totally destroyed forest - no trees remain.
- B. Severely degraded forest - some trees and forest climate remain, no wildings.

C. Moderately degraded forest - some trees, forest climate and wildings occur.

#### A. Completely destroyed forest

*Strategy: plant entire area with mixed species in low numbers per ha*

The starting position is no trees and therefore to create the new forest, saplings must be planted. They could be seedlings collected or raised from seeds from remnant natural forests somewhere in the vicinity. In order to increase their chances of survival after planting, the seedlings need to be grown on or in a nursery. Collected seeds must also be germinated and raised in the nursery.

Once the seedlings are fit for planting they are planted in lines in the field, to make it easy to do the weeding during the first two to three years. The saplings are planted as mixed species. To reduce working time, the numbers are kept low: 400 – 500 saplings per ha is sufficient. The main purpose of the planting is to have sufficient numbers to create a forest and to shade out the competing grasses and weeds. Once the main competing vegetation has been shaded out, the forest develops by itself. Birds and mammals (notably fruit bats) will bring in new tree seeds from the natural forest.

It should be kept in mind that the microclimate in grassland is harsh. It is only fit for pioneer species that can tolerate the full light and heat. So, in such conditions the saplings must also include pioneer species, among them coppicing species that can soon be used as a source of firewood. Intermediate species can be added only in limited numbers. It is up to the birds and bats to bring in the tree species of subsequent succession stages once the grasses have been shaded out and some sort of forest climate has been created. Experience from Uganda has shown that this happens surprisingly quickly: only five years after the first saplings were planted, seedlings of climax tree species appeared spontaneously!

During the first two to four years, and especially in the first year, competing vegetation must be weeded out. The traditional way is to slash the competing vegetation, but trampling it has also proved efficient. The most important way to reduce competitive species that have rhizomes is repeated weeding, to weaken the rhizomes. This means

*(continued on p.17)*

(continued from p.16)



*Seedlings in the natural forest, for free*

investing extra effort in the first six months after planting the saplings. If the competing vegetation is given time to overgrow the saplings it will hamper their growth and rhizomes of competing plants will build up their reserves, making them more difficult to eradicate. This must be prevented, to avoid a setback in the coming years.

Summing up, the actions needed are:

- Collect seedlings or seeds from nearby forest;
- Grow them on or raise them in a nursery;
- Plant a mix of sapling species;
- Weed for two to four years.

B. Severely degraded forest  
*Strategy: enrichment planting.*

In this case some trees and forest climate remain after the logging. Because of the sudden increase in light, climbers often become dominant and cover the entire area. Under such conditions the development of the forest is hampered for a long period. Most of the tree species that were at home in this site have been cut, and so cannot supply seed. Even if some seedlings of these trees are present, they will not survive competition from the climbers. The problem can be solved by cutting the climbers for two consecutive years and planting saplings of intermediate and climax tree

species in the “half-shade” of the sparse older trees. The saplings should have been collected as seedlings or seeds and grown on or raised in a nursery, as described above. In enrichment planting too, a maximum of 400 to 500 saplings per ha planted in lines suffices.

Summing up, the actions needed are:

- Collect seedlings or seeds from nearby forest;
- Grow them on or raise them in a nursery;
- Plant a mix of sapling species as enrichment in the degraded forest; and
- Weed for two/three years.

C. Moderately degraded forest  
*Strategy: release wildings*

Some trees remain, creating a forest climate. Wildings of intermediate and climax tree species are present. However, similar to the previous situation, the development of the forest is blocked by an abundance of climbers, and sometimes by less desirable pioneer trees. It is sufficient to cut the climbers and some of the pioneer trees. Again, a maximum of 400 to 500 saplings per ha need to be released from competitive vegetation.

Summing up, the actions needed are:

- Find saplings of desired tree species in the degraded forest; and
- Release the saplings from climbers and less desirable competitors during two/three years.

### *Nursery management*

The seedlings or seeds collected in forest remnants need to be grown on or raised in a nursery until they have reached 30 to 50 cm tall and have developed a good root system. The nursery may be simple and small. Many farmers are capable of setting up such a nursery. The seedlings should be planted in polyethylene bags containing soil that is mainly forest soil, because in order to grow properly, the seedlings need the beneficial soil fungi (mycorrhizae). Regulate the shade in the nursery to mimic the conditions in the forest from which the seedlings were collected and gradually accustom them to the conditions at the site where they will be planted later on. Planting must be done at the start of the wet season.

### **Make people concerned about the land use**

Who will do this forest restoration? And who will protect and manage the restored forest?

The forest could, of course, be restored by the authorities that are responsible for assuring water supply and protecting biodiversity. But so far they have not done so, perhaps because they have other priorities. Even if they were to restore the forest, that would not solve the question of who is responsible for the land use. For this, it is worth looking to the local communities. After all, they live on the spot and will benefit most from the ecologically restored forest.

Let us look at the needs of local communities. These are firewood, building materials, fodder, grass and many other non-timber forest products. That is precisely the product mix that can be taken from restored natural or semi-natural forests.

Would local communities be capable of restoring and managing the forest? Certainly! Their strength is that they can literally oversee their forest: they are aware of its benefits, they can spread the restoration activities over longer periods, and they welcome the small returns the forest brings them as individuals. Very importantly, once they have

invested in restoration they will organize themselves in order to protect and manage their restored natural resource.

### **Deadlocks to be broken**

Why do local communities not engage in massive forest restoration? Is it because they are unaware of how relatively easy and cheaply it may be done? They may have been reluctant to act because they believe that forest restoration can be done only by creating (unwanted) plantations. This could be solved by creating demonstration plots. But someone needs to take the initiative to set these up!

A more intractable problem is the absence of land titles. Much wasteland is neither communally nor privately owned.

Much wasteland is state-owned in one way or another and therefore individuals or communities are reluctant to risk investing in such land because of the uncertainty about whether they will later be able to reap the rewards of their investment. It is therefore necessary for communities to get in touch with the authorities so that formal agreements can be made about the long-term usufruct of the land on which communities are investing in forest restoration. Such agreements should be possible if it is acknowledged that communities and authorities have compatible interests in forest restoration: the communities because of the mix of forest commodities produced and the authorities because they want erosion control, water regulation and economic development. Both parties benefit from mountain slopes that are permanently covered by sustainably managed forest.

### **Conclusions**

Ecological forest restoration is easy to apply. It can be done at low cost and by local communities. Not only may the ecologically restored forest be sustainably used by local communities, it also provides restored water catchment and habitat for the indigenous flora and fauna.

To start ecological forest restoration on wasteland it is necessary to make long-term agreements with



*Completely destroyed forest, showing erosion and landslide*



*Severely degraded forest showing climber carpet*

the landowner. Forest restoration benefits everyone.

### Who will take the first steps?

It is clear from the above that once they have been trained in ecological restoration, the most logical parties to involve in ecological forest restoration are local communities. However, they are seldom in a position to start the restoration. The most frequent obstacle is the absence of land titles. Local communities are rarely considered to be serious candidates for negotiating these with the authorities. On the other hand, the authorities

do not take the initiative either. They do not recognize the opportunities and probably have other priorities.

So, who can break the deadlock? YOU can, reader of this article. YOU are in a position to start this discussion with communities and authorities and bring both parties together. If YOU do not take action, who will? So, if you are concerned about forest restoration, start the discussion TODAY.

Need more information? Need help? Get in touch!  
[www.jaapkuper.com](http://www.jaapkuper.com)



*Wildling hidden under competing vegetation*

# CITIZEN SCIENTISTS SURVEY OF URBAN BIRD DIVERSITY AT BRIXTON NATURE RESERVE IN PERTH, WESTERN AUSTRALIA

by Subas P. Dhakal



**Figure 1:** A typical winter wetland vista of Brixton Nature Reserve showing three layers of vegetation: a) Twine Rush [Front], b) Native Broom [Left edges], and c) Marri Trees [Back]

## Introduction

Countries around the world are increasingly being urbanized and the urban population is expected to reach nearly 5 billion by 2030 (Secretariat of the Convention on Biological Diversity, 2012). This rapid pace of urbanization has led to a biodiversity crisis across the globe (Loreau *et al.*, 2006; Seto *et al.*, 2012). For instance, with more than two-thirds of the population living in major cities, Australia is one of the most urbanized nations in the world. While the country is one of 17 mega-diverse countries with 70% of the world's flora and fauna (Australian Bureau of Statistics, 2010), urban Australia is also home to nearly half of the threatened flora and fauna (Yencken and Wilkinson, 2001). Since the places people have

chosen to live are also the preferred habitat of native wildlife, there is a need for concerted efforts from government agencies, academia, businesses, and citizens to protect remnant urban biodiversity. This is particularly urgent in cities like Perth, which is situated within one of 25 biodiversity hotspots in the world (Myers *et al.*, 2000).

A comprehensive understanding of the scale and size of urban biodiversity is often confounded by the scarcities of human resources such as the lack of technical expertise for long-term data collection and analysis, financial resources (i.e., budget cuts associated with governmental austerity measures), and institutional capital (i.e., inadequate and ineffective policies). Consequently, a voluntary role

of everyday citizens has been increasingly considered a viable approach to biodiversity conservation measures. The term *citizen scientists* generally refers to volunteers who participate in various aspects of scientific inquiry (Cohn, 2008). In the case of biodiversity-related studies, the term profoundly refers to the connection between science and everyday ordinary people (Pandya, 2012) who are willing to contribute their time to care for, conserve, document, monitor, and create awareness/educate about biodiversity. It is in this context that this paper presents: a) a case study of a citizen scientists group associated with the Brixton Nature Reserve Perth, Western Australia (WA); and b) the findings of the citizen scientists' survey of urban bird diversity at the reserve.

### **Citizen Scientists for Brixton Nature Reserve**

The Perth metropolitan area covers an area of 542,300 ha and has a population of about 1.9 million (Australian Bureau of Statistics, 2013). Perth is a hydropolis - a city of wetlands. Almost one-quarter of Perth's area is classified as wetlands and nearly 4,000 wetlands have been officially registered, of which 29 are wetlands of national importance and three are of global significance, i.e., Ramsar sites (Environment Australia, 2001). However, two-thirds of the wetlands in and around Perth have already been lost in the past one and half century (Davis and Froend, 1999) and remnant wetlands are under continual threat from unsustainable development (Dhakal, 2013). The Brixton Street Wetland (BSW) is located about 14 kilometres southwest of Perth and spreads over 19 ha (Payne, 1993). BSW is home to more than 320 species of plants, which is equivalent to more than 20% of Perth's flora in only 0.005% of the area (Phillimore, 2003). While this seasonal wetland is waterlogged between late autumn and early spring, several ponds that form in deeper depressions in the heavy clay soils last much longer. These ponds are commonly called clay-pans, which completely dry off during the summer. Tall trees (e.g., Marri *Corymbia* sp.), an understorey of shrubs (e.g., Native Broom *Viminaria* sp.), and seasonally submerged sedges (e.g., Twine-rush *Leptocarpus* sp.) dominate the clay-pan wetlands vista (Figure 1). Apart from being enlisted in the Directory of

Important Wetlands in Australia, BSW is also one of the 287 significant urban bushland sites in Perth (Dhakal, 2013).

The Friends of BSW is one of the hundreds of citizen scientists groups in Perth that has been actively engaged in biodiversity conservation since the late 1980s. The citizen scientists group initially came together to lobby for the appropriate biodiversity assessment and recognition of the wetland's significance. BSW was originally under the ownership of a government-operated housing agency that revealed its plan to reclaim the wetland in order to build a medium density residential complex in the 1980s. Because of the mounting pressure from the group, the housing plan was subjected to an environmental impact assessment. Recognizing the use and non-use values of the wetland, the assessment recommended against the development, and supported the protection of BSW as an urban nature reserve (Keighery and Keighery, 1995). The wetland was formally designated as the Brixton Nature Reserve in 2004 with the primary objective to conserve biodiversity and is jointly managed by the WA government, local government and citizen scientists group (Dhakal, 2011).

### **Bird diversity survey**

Having succeeded in increasing awareness about the significance of the reserve, the citizen scientists are now involved in maintaining the reserve amenities, i.e., fencing, paths and entrances, restoring the wetlands, documenting and monitoring biodiversity. The group has been meeting at least once a month for over two decades. A dedicated team of volunteers has been interested in surveying flora and fauna at the reserve and keeping photographic records. The baseline report of the mid-nineties (Keighery and Keighery, 1995) reported that 41 bird species were found in the area. In order to update the bird diversity information, a long-term and systematic bird survey was carried out between the February 2009 and January 2012, using the Area Search Method (Department of the Environment, Water, Heritage and the Arts, 2010). Using this particular technique, citizen scientists explored set patches within the



**Figure 2:** Carnaby's Black Cockatoos (Right); Red-tailed Black Cockatoos (Left)

reserve for birds and recorded data every month for three consecutive years.

A total of 63 species of birds were recorded (Table 1) during this timeframe, an increase in bird diversity of nearly 35% across six orders. The survey recorded six species of previously undocumented Psittaciformes in Brixton Nature Reserve, two of which are significant species: a) the endangered Carnaby's black cockatoo; and b) the vulnerable Red-tailed black cockatoo. These species are protected under the 1950 *Western Australian Wildlife Conservation Act* and the 1999 *Environmental Protection and Biodiversity Conservation Act* of the Commonwealth of Australia. Both cockatoo species were recorded on multiple occasions between the months of April and October, and often in groups of 4-10 individuals. On the afternoon of 25<sup>th</sup> April 2011, between 500 and 1,000 Carnaby's Black Cockatoos were observed within the reserve.

Carnaby's Black Cockatoos weigh up to 790 gm, measure between 53 and 58 cm in length, and have a wingspan of approximately 110 cm. The Red-tailed Black Cockatoos are slightly larger, measuring between 55 and 60 cm in length and weighing up to 870 gm. White patches on the cheeks and white bands on their tails distinguish Carnaby's Black Cockatoos from Red-Tailed Black Cockatoos that have broad red tail panels (Figure 2). Both of these species have strong short bills for cracking hard nuts and seeds (e.g., Marri). Male birds have reddish eye rings, whereas females have greyish eye rings. The survival of

these cockatoo species has been of increasing concern because they are endemic to WA and threatened by the loss of native habitat associated with rapid urbanization in and around Perth.

### Conclusion

The purpose of this paper was to capture and communicate the contributions of a citizen scientists groups in Perth towards protecting significant urban wetlands and biodiversity, especially that of birds. The findings of the paper indicate that appropriate conservation efforts of citizen scientists can lead to significant increases in biodiversity in urban areas. Because of the persistent interest and motivation of volunteers, a valuable ecosystem was prevented from being lost forever. Most of the native vegetation in the reserve has been restored supporting at least 63 urban birds, including two protected cockatoo species. The photographic evidence of a significant increase in urban biodiversity is significant for cities like Perth because it can provide valuable information for shaping evidence-based policy to protect remnant urban habitats. The case of Brixton Nature Reserve in Perth is a reminder that the role citizen scientists play in monitoring and documenting urban biodiversity should not be overlooked.

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**Table 1: List of Birds at Brixton Nature Reserve**

<b>S. N.</b>	<b>Common Name</b>	<b>Scientific Name</b>
	Order: Anseriformes	
1	Australian Shelduck*	<i>Tadorna tadornoides</i>
2	Australian Woodduck	<i>Chenonetta jubaiia</i>
3	Grey Teal	<i>Anas gibberifrons</i>
4	Mallard*	<i>Anas platyrhynchos</i>
5	Pacific Blackduck	<i>Anas superciliosa</i>
	<u>Order: Pelicaniformes</u>	
6	Little Pied Cormorant	<i>Phalacrocorax melanokucos</i>
7	Great Egret	<i>Ardea alba</i>
8	White Faced Heron	<i>Egretta novaehollandiae</i>
9	Australian White Ibis	<i>Threskiornis molucca</i>
	<u>Order: Falconiformes</u>	
10	Australian Hobby*	<i>Falco longipennis</i>
11	Black-shouldered Kite*	<i>Elanus axillaris</i>
12	Brown Goshawk*	<i>Accipiter fasciatus</i>
13	Little Eagle	<i>Hieraaetus morphnoides</i>
14	Nankeen Kestrel	<i>Falco cenchroides</i>
15	Wedge-tailed Eagle	<i>Aquila audax</i>
	<u>Order: Gruiformes</u>	
16	Eurasian Coot	<i>Fulica atra</i>
	<u>Order: Columbiformes</u>	
17	Common Bronzewing*	<i>Phaps chaloptera</i>
18	Feral Pigeon*	<i>Columba livia</i>
19	Laughing Turtle-dove	<i>Streptopelia senegalensis</i>
20	Spotted Turtle-dove	<i>Streptopelia chinensis</i>
	<u>Order: Psittaciformes</u>	
21	Australian Ringneck	<i>Barnardius zonarius</i>
22	Carnaby's Black Cockatoo*	<i>Calyptorhynchus latirostris</i>
23	Galah*	<i>Eolophus roseicapilla</i>
24	Rainbow Lorikeet*	<i>Trichoglossus haematodus</i>
25	Red-tailed Black Cockatoo*	<i>Calyptorhynchus banksii</i>
26	Red Capped Parrot*	<i>Purpureicephalus spurius</i>
27	Western Corella*	<i>Cacatua pastinator</i>
	<u>Order: Cuculiformes</u>	
28	Pallid Cuckoo	<i>Cuculus pallidus</i>
	Order: Coraciiformes	
29	Laughing Kookaburra*	<i>Dacelo novaeguineae</i>
30	Rainbow Bee-eater	<i>Merops ornatus</i>
31	Sacred Kingfisher	<i>Halcyon sancta</i>
	Order: Passeriformes	
32	Australasian Pipit	<i>Anthus australis</i>

33	Australian Magpie	<i>Gymnorhina tibicen</i>
34	Australian Raven	<i>Corvus coronoides</i>
35	Australian Reed-warbler*	<i>Acrocephalus australis</i>
36	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>
37	Black-faced Woodswallow	<i>Artamus cinereus</i>
38	Brown Honeyeater	<i>Lichmera indistincta</i>
39	Grey Butcherbird	<i>Cracticus torquatus</i>
40	Grey Fantail	<i>Rhipidura fulginosa</i>
41	Magpie-lark	<i>Grallina cyanoleuca</i>
42	Masked Woodswallow	<i>Artamus personatus</i>
43	Mistletoebird	<i>Dicaeum hirundinaceum</i>
44	New Holland Honeyeater*	<i>Phylidonyris novaehollandiae</i>
45	Red Wattlebird	<i>Anthochaera carunculata</i>
46	Red-eared Firetail*	<i>Stagonopleura oculata</i>
47	Rufous Whistler	<i>Pachycephala rufiventris</i>
48	Scarlet Robin*	<i>Petroica boodang</i>
49	Silvereye	<i>Zosterops lateralis</i>
50	Singing Honeyeater	<i>Lichenostomus virescens</i>
51	Splendid Fairy-wren	<i>Molurus splendens</i>
52	Striated Pardalote	<i>Pardalotus striates</i>
53	Tree Martin	<i>Hirundo nigricans</i>
54	Weebill*	<i>Smicromis brevirostris</i>
55	Western Gerygone	<i>Gerygone fusca</i>
56	Western Thornbill*	<i>Acanthiza inornata</i>
57	White Browed Scrubwren*	<i>Sericornis frontalis</i>
58	White Cheeked Honeyeater	<i>Meliphaga virescens</i>
59	White-backed Swallow	<i>Cheramoeca leucosternus</i>
60	White-breasted Robin	<i>Eopsaltria georgiana</i>
61	White-fronted Chat	<i>Epihianura albifrons</i>
62	Willie Wagtail	<i>Rhipidura leucophrys</i>
63	Yellow-rumped Thornbill*	<i>Acanthiza chrysorrhoa</i>
*Newly recorded species		

# STATUS AND NATURE OF HUMAN-WILDLIFE CONFLICT IN SHIVALIK HILLS, HIMALAYAS: A CASE STUDY FROM LANSDOWNE FOREST DIVISION, UTTARAKHAND, INDIA

by Mohan Kukreti and Dinesh Bhatt

## Introduction

It is believed that human-wildlife conflicts are the product of negative interactions between humans and wildlife. These conflicts arise because of the socio-economic and political landscapes. They are often controversial because the concerned resources involved have economic value and the species involved are of extreme concern and legally protected (Woodroffe, 2000 & 2001; Treves & Karnath, 2003, Woodroffe *et al.*, 2005; Messmer, 2009). The hills of Uttarakhand have a rich cultural heritage and scenic natural beauty; however, with expanding habitation and other anthropogenic disturbances, the frequency of human-animal conflicts has increased in recent years. In general, the severity of the conflicts has increased in India (Marker & Sivamani, 2009) and especially in Uttarakhand (Johnsingh & Negi, 2003; Mishra, 2010). Other states that have conflict areas include the hills of Himachal Pradesh, Jammu-Kashmir, Junnar in Maharashtra and the scrubs of Andhra Pradesh (Athreya & Belsare, 2007). The hills of Uttarakhand are the worst affected by this problem because after becoming a new state there was increasing construction of new highways, housing and agricultural activity near the boundaries of protected areas, resulting in a higher frequency of man-wildlife interactions as seen in India (Madhusudan, 2003) and other regions of the world (Woodroffe & Ginsberg, 1998; Ogada *et al.*, 2003). This paper discusses the status and nature of human-animal conflicts with special reference to leopard (*Panthera pardus* Linnaeus, 1758), elephant (*Elephas maximus* Linnaeus, 1758), black bear (*Ursus thibetanus* Cuvier, 1823) and wild boar (*Sus scrofa* Linnaeus, 1758) in the worst affected villages lying in the vicinity of Lansdowne forest division, Uttarakhand. We made an attempt to generate statistical data on the magnitude of human-animal conflicts in the

area, as no national or state level statistical data are available about the effects of damage caused by wild animals on the social and economic status of the villagers. We also suggest a few measures for policy makers, the concerned forest department and other stakeholders.

## Materials & methods

### Study area

Lansdowne forest division is situated between 29° 37' to 30° 2' North latitude and 78° 19' 13" to 78° 43' 0" East longitude in Uttarakhand state of India. The forest division lies in the southwest portion of Pauri Garhwal district and includes Jaiharikhal, Dwarikhal, Yamkeshwar and Dugadda development blocks. The headquarters is located at Kotdwar. The forest division is situated between Rajaji National Park on its western side and Corbett Tiger Reserve to the east. The division includes protected forest area of 453.66 km<sup>2</sup>. In the northeastern part of Lansdowne range, pine (*Pinus roxburghii*) and oak (*Quercus leucotrichophora*) can be found. The remaining parts are occupied by sal (*Shorea robusta*) and associated species. This forest division is divided into five forest ranges namely, Kotdwar, Dugadda, Lansdowne, Laldhang and Kothri range (Lal, 2004). Physically, Lansdowne forest division can be divided in two types of landscapes viz., Sub-Himalaya or Shivalik and Lesser Himalaya.

Sub Himalayas or Shivaliks includes low foothills having the main boundary fault of the Lesser Himalayas, consisting of older rocks. This restricts the Shivalik hills in north and because of this fault, older rocks have thrust over Shivalik. The altitude of the forest division varies from 200 m to 2,000 m; the slope and relief of the forest division is somewhere less than 200 m/km and in some

places between 200-400 m/km. Climatically the area is divided into three distinct seasons viz., rainy season (June to September), winter (October to February) and summer (March to May).

### *Villages studied*

The survey was carried out in 94 villages with reports of conflicts in various development blocks, namely Jaiharikhal, Dwarikhal, Yamkeshwar and Dugadda of Pauri Garhwal District of Uttarakhand State. These villages lie in the Kotdwar, Dugadda, Lansdowne, Laldhang and Kothri ranges of Lansdowne forest division.

### *Methodology*

A door-to-door questionnaire survey was carried out from 7 September 2008 to 31 March 2009 in 94 villages in five forest ranges of Lansdowne forest division and information was collected on sighting records about attacks/killings, time, season, area and gender, etc. by problematic wild animals in the area. The informal and unstructured interviews and public meetings were carried out with the help of local people, community leaders and members of village panchayats (local self-government at the village level or small town level in India) to get more information about the conflict status and nature in the area.

## **Results and discussion**

### *Nature and status of conflict*

The problem of human-animal conflicts in the five forest ranges of the division studied shows negative interactions between humans and wildlife and may include retaliatory killing as evidenced in our study and elsewhere (Saberwal *et al.*, 1994; Mishra, 1997). There was loss of 74 human lives and 134 incidences of attacks (with injuries) within 12 years (1997 - 2009). The number of man-eating tigers/leopards killed with government permission because of pressure from the local people was approximately 12 between the years 1999 to 2009. Of the five forest ranges of Lansdowne forest division, the problem is severe in the low elevation ranges, for example in Kotdwar, where 104 cases of man-wildlife conflicts were recorded. This is because of high anthropogenic disturbances in

low-lying areas and also human disturbances in reserved forest areas for gathering fuel and fodder, livestock grazing and illegal wood cutting (Balakrishnan & Ndhlovu, 1992; Pitkin, 1995; Stander, 1997; Madhusudan, 2003).

Our survey revealed that tigers and leopards are the major problem animals in the study area and also in protected areas like Gir (Vijayan & Pati, 2002) and other parts of the country (Athreya & Belsare, 2007). About 47 people were killed and about 55 people were attacked by leopards; we did not find any confirmation about killings by tiger and only 9 cases of attacks were found. Elephants killed 19 and attacked about 23 people. Bears killed 8 and attacked 44 individuals. Wild boars attacked only 3 people and killed none. In forest ranges where conflicts were reported, it was found that adolescent females comprised the highest percentage of victims that were killed/attacked by wild animals. The main reason for this is that in rural areas women are generally responsible for household work, which includes visiting forest areas to gather fuel and fodder more often than male members of the family. Out of 208 cases observed in the survey, the highest percentage (72.22%) of attacks/killing by leopards was near habitations. This could be due to the fact that rural areas have agricultural fields and home gardens close by. 60.42% of attacks took place in scrub and adjoining degraded forest used by the local population for fuel, fodder, etc. This may be due to the presence of high foliage cover in and around villages which may provide better cover for attacks and predation. After leopards, bears committed the highest number of attacks: 34% in the forest interior; 21.87% in degraded forest and 22.22% near habitations. This species usually keeps to the forest interior and only a few cases were known around habitations in the area. In the case of elephants, higher attacks were observed in forest (54%), than in scrubs (11.46%) and habitations (5.56%); this area is protected but human incursions for fuelwood and fodder are common and result in negative interactions. A lower percentage of elephant attacks was also observed in habitations/agricultural fields; these attacks were common during the harvesting time of paddy during Rabi and Kharif seasons in the area. The wild boar had a similar attack pattern in agricultural fields (19.21%), probably due to close households

and scrubs on the boundaries of villages and forests. Since the overall attacks by tiger were low (9) and uncommon in the area, high attacks were found in degraded forest/scrub (6.25%) compared to forest (4%).

The percentage of attacks showed variations along seasons; tiger, leopard and wild boar attacks/killings were high in the rainy season and then in the winter season. It has been noted that most of the areas are under thickets and heavy growth of weeds like *Lantana*, *Xanthium* and *Eupatorium* species, which in the rainy season provide good cover to leopards and other species for attacks. Elephants and bears were responsible for a high percentage of attacks in the winter season (55.26%) compared to the rainy season (34.21%). This is attributed to the interaction with humans, which are elevated during the winter season because of high pressure for fuelwood collection for household usage. A high percentage of attacks took place in the evening and night time, i.e., between 5:00 pm to 8:00 pm for leopard and tiger. These attacks/killings coincide with the timings of daily activities of people; in the evening women usually return from the jungle after collecting fodder and fuelwood and children return from school. In winter, when the day length is short, the chances of attacks increased because of heavy growth of weeds and shrubs in village boundaries due to the preceding rainy season. Agricultural activities near scrubs or adjoining forest during midday may be one of the probable reasons of attacks. Also, in villages there are usually no toilets and morning and evening attacks may occur when people used toilets close to scrubs at these times.

Elephant attacks occurred more often in early morning and daytime, while bear attacks were higher in the morning and evening. A high percentage of wild boar attacks occurred in the morning. In the area, out of the total number of cases of bear attacks, females were the most likely victims. Human mauling by bear was also found common in some cases because of the vulnerability of the area. There is need of behavior studies related to attacks/killings.

In the case of elephant-human conflicts, a main reason is the increased human population around

the boundaries of protected areas, especially in lower forest ranges like Kotdwar, Laldhang and Kothri. This area is used as a corridor for elephant movement in and around adjoining Corbett and Rajaji National Parks for their feeding and breeding places, but is continuously encroached on by humans.

Sometimes uncontrolled fire is also responsible for the movement of wild animals into adjoining villages.

Because of increasing human-wildlife negative interactions the economic losses are also growing. Between April 1997 to March 2009 about 4,493,000 Indian Rupees were paid by the Forest Department in compensation for people killed or attacked.

In nature, the leopard's prey is usually barking deer *Muntiacus muntjak* (Zimmermann, 1780) spotted deer *Axis axis* (Erxleben, 1777), langur *Presbytis entellus* (Eschscholtz, 1821) and sometimes peafowl *Pavo cristatus* (Linnaeus, 1758) and other nesting birds during stress periods. Do the increasing attacks on humans and livestock indicate a change in their food habits?

### Conservation implications

The present study aimed to obtain a representative picture of wildlife issues affecting local communities throughout the forest division. The results indicated that villages with reported conflicts mainly lie in low and middle elevated forest ranges like Kotdwar, Laldhang and Lansdowne of Lansdowne forest division. These forest ranges are part of the Rajaji-Corbett corridor, in the case of elephants. The regular heavy traffic on National Highway 119 (Kotdwar - Pauri) and nearby roads to protected areas like Laldhang-Chilla are also a reason of conflict, as the animals' regular movement routes are affected (Johnsingh, 1990). Sightings of leopards crossing highways are also reported by tourists and locals. There should be immediate consideration by the government department on traffic control to strictly enforce the speed limit. Night traffic should be controlled as there is heavy movement of wild animals during the night.

As most of the crop raiding and resultant man-elephant conflicts take place during the harvesting of Rabi and Kharif crops, special efforts must be made to monitor areas previously identified as sensitive during these months. With an expanding population in the lower forest ranges, construction of industrial zones and infrastructure development nearer to these protected areas increase the competition for resources. Thus it is necessary to safeguard the corridors, movement routes and buffer zones, and to ensure that local communities obtain substantial and tangible benefits from wildlife conservation.

Better communication between the Forest Department and local people on conflict and conservation issues should be encouraged. The administration needs to involve the affected people and other stakeholders actively in their conservation and management programmes to control the problem effectively. Forest officials need to be trained and equipped with wireless communication sets, binoculars, etc. for better patrolling of the area to collect and generate data for better understanding of the problem. Deterrent methods to control wildlife should be non-lethal in nature such as electric fencing, firecrackers, trenches, etc. There should be better official management for providing immediate medical and economic compensation to people killed or attacked and for losses of livestock and crops to avoid building a negative attitude toward wildlife and the Forest Department and ensure community participation. A development approach is needed that integrates better design and management of policies because in the absence of long-term and accurate data, the multi-faceted nature of the human-wildlife conflict becomes a matter of personal opinion (Mishra *et al.*, 2003; Nyhus *et al.*, 2003; Graham *et al.*, 2005; Ogra & Badola, 2008; Anthony *et al.*, 2010).

The media plays an important role in publishing news on man-wildlife conflicts, but should consult wildlife professionals for accuracy. Sensationalizing the issue could result in a negative attitude toward wildlife.

The results from this study provide a sketch of the extent and likely development of human-wildlife conflict (HWC) in Lansdowne forest division.

There is immediate need to provide conservation

education and awareness of wildlife behavior that will help local communities to better manage and reduce human-wildlife conflicts.

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## FIRST OBSERVATIONS OF SCALY-BREASTED MUNIA FROM ANDAMAN AND NICOBAR ISLANDS

by C. Sivaperuman, J. Dinesh, G. Gokulakrishnan & K. Venkataraman

The Andaman and Nicobar archipelago comprises 572 islands, extending over 800 km and running north to south between 6°45' N and 13° 30' N and 90°20' E and 93°56' E with an extent of 8,249 km<sup>2</sup>. As a part of major ecological studies on bird communities of South Andaman initiated during the year 2012 sponsored by INS-Utkrosh, the Ministry of Defence and Science Engineering Research Board (SERB), Department of Science and Technology, Ministry of Science & Technology, Government of India, the authors have been surveying the area frequently. During these surveys, we recorded four individuals of adult male and female Scaly-breasted Munia (*Lonchura punctulata punctulata*) in the Port Blair airport premises (11° 37' N; 92° 43.08' E) in June 2013 along with House Sparrow (*Passer domesticus* Linnaeus) and Common Myna (*Acridotheres tristis* Linnaeus). The species was sighted again in June 2013; August 2013 and September 2013, along with House Sparrows in the same vicinity. The observed bird species had chocolate brown color upper parts with faint pale shaft streaks. The upper tail color was olive yellow. The underparts were whitish with bold black scaling on the breast and edges. The bill and legs were black.

The sighted species differs from the other two subspecies, namely *Lonchura punctulata subundulata* and *Lonchura punctulata topela*, which are distributed in Bhutan, Bangladesh, northeast India (Assam), west and southern Myanmar, Thailand, southeast China, Taiwan, Laos, Cambodia and Vietnam. According to Ali and Ripley (1983) and Robson (2008), this species is resident in the Indian subcontinent, southeast Tibet, southern China, Taiwan, Sundas, Philippines, Sulawesi and was introduced to the Mascarene Islands, Seychelles, Australia, Caroline Islands and Hawaii. The Scaly-breasted Munia has 11 subspecies across their range which differ slightly in size and color (Collar, 2010). A review of



literature revealed that Ali and Ripley (1983), Tikader (1984) and Grimmett *et al.* (2011) have not reported this species from the Andaman and Nicobar Islands. The present sighting is the first report of Scaly-breasted Munia from South Andaman Islands.

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# FOREST NEWS

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## CELEBRATING THE IMPORTANCE OF FORESTS!



Prepared by Wirya Khim, FAO RAP

The United Nations General Assembly has proclaimed 21 March to be celebrated as the International Day of Forests each year. The International Day of Forests was established to raise awareness of the importance of forests and trees in ensuring the sustainability of ecosystems, providing valuable goods and services, supporting livelihoods, and reducing hunger.

### What did the FAO Regional Office for Asia and the Pacific do to celebrate?

To mark the International Day of Forests, the FAO Regional Office for Asia and the Pacific (RAP) collaborated with RECOFTC – The Center for People and Forests and the United Nations Environment Programme (UNEP) in organizing a forestry debate under the theme of *Forestry in a changing world!*

The event was presided over by Mr Vili Fuavao, Deputy Regional Representative of FAO RAP, Mr Thomas Enters, UN-REDD Programme Coordinator for UNEP and Ms Caroline Liou, Communications Manager for RECOFTC.

Participants in the debate were drawn from two tertiary educational institutes (King Mongkut's University of Technology Thonburi and the Asian Institute of Technology) and two Bangkok high schools (Anglo Singapore International School and Garden International School).

The elder group of students debated the pros and cons of whether 'keeping people out of forests' is the best approach for protecting and conserving forests, while students from the two international secondary schools debated a proposition 'that trees should be preserved, not logged.'



*Student debate teams in action on International Day of Forests*



The debate was attended by 55 participants and resulted in an informative and interesting discussion. The constructive and rebuttal speeches were well-prepared with good fundamental analyses. Each speaker possessed very good speaking skills, which helped to stimulate the discussion to a highly interactive level.

The students, ranging from high school to post-graduate studies (from 13 to 35 years of age), stressed that forests and forestry issues are highly important and that concrete actions must be taken now, today. In addition, they demonstrated excellent knowledge of forests and forestry issues. Both sides (affirmative and negative teams) were able to present the current issues and challenges faced by the forestry sector and how they could be addressed jointly by relevant stakeholders. Each team debated the topics based on different views of how forests could be managed sustainably. These included participatory approaches versus command and control measures.

#### **Key observations from the debates**

- Forestry is not a stand-alone sector; it requires the active involvement and participation of stakeholders at cross-sectoral levels.
- People depend on forests for their survival and well-being; therefore, they must be placed at the centre of sustainable natural resource management.
- Rights of access to forests for local people is a fundamental requirement for sustainable forest management and poverty reduction of forest-dependent communities in the rural areas.
- The equitable sharing of benefits between indigenous and local communities and external entities operating in forests must be ensured.
- Indigenous or traditional forest-related knowledge should be reconciled with scientific knowledge and intellectual property rights.
- There are no viable alternatives to timber for many products. Even when there are alternatives (e.g., plastic), the use of such materials may have a larger environmental footprint than timber.
- Forestry (logging) generates income, contributes to the Gross Domestic Product (GDP) and creates employment for local people.
- Forests could be logged in a sustainable manner through careful planning of logging activities and conservation of biologically and environmentally sensitive areas.
- Trees come not only from natural forests but can also be grown in plantations. Many countries have planted new forests to ensure that we have enough timber for society in the future.
- Rather than categorizing all forms of logging as bad practice, more emphasis should be placed on promoting sustainable forest management, preserving forests with high conservation values, reducing deforestation and tackling illegal logging by strengthening governance and law enforcement.
- Promoting certified timber (timber from sustainably-managed forests) offers opportunities to enhance sustainable forest management, in contrast to banning the use of timber altogether.

#### **Message from the Organizers**

Sustainable forest management requires a carefully coordinated long-term perspective, and it therefore depends not only on the actions of today's adults, but is also in the hands of the younger generations.

According to Hiroyuki Konuma, FAO Assistant Director-General and Regional Representative for Asia and the Pacific, "Awareness must be coupled with concrete action." FAO is calling on member countries to implement sustainable forest management policies without further delay.

## CLIMATE CHANGE AND FOOD SECURITY

*By Simmathiri Appanah and Wirya Khim*

A High-Level Forum was organized by the FAO Regional Office for Asia and the Pacific and hosted by the Ministry of Industry and Agriculture of Mongolia on 12 March 2014 in Ulaanbaatar, Mongolia. A total of 70 participants attended the Forum, which included ministers, vice ministers and senior officials from the Landlocked Developing Countries, Small Islands Developing States and other Asia-Pacific countries. The countries briefed the Forum on their status with regards to food security in the face of climate change. Delegates also discussed issues pertaining to impacts of climate change on food security, which included: evidence for climate change, activities for overcoming the impacts, public perception and awareness raising, national and regional initiatives, adaptation and mitigation measures, and climate-smart agriculture. This was followed by a discussion on the appropriate policies that would be needed for addressing the impacts of climate change on food security among the LLDCs and SIDS. A set of recommendations for follow-up by the countries and regional organizations was issued.

### Background

While climate change threatens most countries in the Asia-Pacific region, some are more vulnerable. The Landlocked Developing Countries (LLDCs) (which, except for Mongolia, also belong to the Least Developed Countries) and Small Island Developing States (SIDS) are worse off compared to others. The irony of the situation is that LLDCs and SIDS are not big emitters of greenhouse gases (GHG), and their contribution to climate change is negligible, yet the people of these countries will suffer considerably.

Changing weather patterns, especially floods and droughts, will bring untold misery to millions of people in LLDCs, while the rising sea level and other climatic changes will threaten the very survival of many SIDS. It is estimated that globally,

some 860 million people in LLDCs and SIDS will be affected, and many among the SIDS may even become environmental refugees. Considering that LLDCs and SIDS are far more vulnerable to climate change impacts, the Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS) undertook a special study on the issue. The study looked into the effects of climate change on LLDCs and SIDS, the environmental and socio-economic implications, and the adaptation strategies under the framework of UNFCCC. As a follow-up to the above global study, FAO/RAP organized a High-Level Forum on “Climate Change and Food Security in the Landlocked Developing Countries and Small Island Developing States in Asia and the Pacific Region”.

### Objectives

The key objectives of the Forum were to:

- Share and promote knowledge and experience on the impact of climate change on food security in the countries;
- Promote successful climate change adaptation and mitigation interventions for ensuring food security in vulnerable areas;
- Identify effective policy options to minimize negative impacts of climate change and enhance food security; and
- Develop concrete recommendations and actions for climate change adaptation and mitigation for food security following sustainable development and blue and green growth pathways.

Based on those objectives, the expected outputs of the Forum were to:

- Exchange information on the status and preparedness of countries in their management of the impact of climate change on food security;

- Identify successful climate change adaptation and mitigation interventions for ensuring food security;
- Identify effective policy options and actions that could be taken to minimize the negative impacts of climate change and enhance food security;
- Make key recommendations to reduce the negative impacts of climate change on food security in LLDCs and SIDS in Asia and the Pacific Region; and
- Produce a report summarizing the presentations and discussions at the Forum, including conclusions and recommendations.

All the countries briefed the Forum on their status with regard to food security in the face of climate change. In addition, the delegates also discussed issues pertaining to the impacts of climate change on food security, which included: evidence of climate change; activities for overcoming the impacts of climate change; public perception and awareness raising; national and regional initiatives, adaptation and mitigation measures; and climate-smart agriculture.

The Dialogue was followed up with a discussion on the appropriate policies that would be needed to address the impacts of climate change on food security among the LLDCs and SIDS.

After the discussions, the delegates deliberated on a set of recommendations for follow-up by the countries and regional organizations. The closing speech by Dr. José Graziano da Silva, Director-General of FAO, was read by Mr. H. Konuma (ADG, FAO). The Director-General pointed out that FAO possesses the technical expertise to support climate change adaptation in agro-ecosystems, forests, inland waters and coastal and marine ecosystems, and would respond to the needs of the LLDCs and SIDS to ensure their food security.

### Summary of conclusions

The following summarizes the conclusions and recommendations of the Forum:

- Climate change is real and its impacts on the LLDCs and SIDS are severe.
- Food security is one of the most challenging issues currently faced by LLDCs and SIDS, which is further exacerbated by the impact of climate change.
- To mitigate the impact of climate change on food security, there is an urgent need for countries to create an enabling environment with appropriate policies, laws, infrastructure and finance, and incentive-led technologies for adoption by farmers.
- Concrete country actions must be implemented on community-based disaster risk management approaches which are coupled with awareness raising at all levels.
- Strategies to support food security at various levels are required; these could be done through demonstrations of climate-smart agriculture practices and community-based agriculture systems.
- There is an urgent need to strengthen capacity to monitor the progress in agricultural productivity and provide timely assistance to farmers to reduce losses.
- There is a need to strengthen regional collaboration and coordination to build capacity and transfer climate-smart agriculture technology from Asian countries to the Pacific Island Countries (PICs).
- Regional actions to strengthen the capacity of national governments and communities are required.
- Enforcement of forestry- and fisheries-related regulations to minimize illegal logging and illegal fishing is urgently needed.
- A regional policy framework for strengthening the fisheries sector is needed.
- A resilient and adaptive fishery management system needs to be developed.
- The lack of financial and human resources poses difficulties for countries to implement the policies efficiently.
- There is a need to improve institutional capacity.
- Support is requested from the international donor community for strengthening climate change adaptation and mitigation and their synergies.
- A collective act to improve information sharing and networking and to identify joint international development mechanisms is called for.

- A multi-sectoral approach is required to develop an integrated approach to increase resilience and adaptive capacity.
- FAO is requested to act as a catalyst to increase information sharing for SIDs.

### Recommendations

- Special emphasis should be placed on blue growth development in the Pacific Region, and resilient and adaptive fishery management systems should be developed.
- Cooperation between Small Island States must be strengthened in their advocacy of regional interests at international forums on climate change and agriculture.
- Funding commitment from the donor community and UN agencies, including FAO, should be explicitly committed, allocated, and expeditiously disbursed in alignment with strategic national plans.
- Support for capacity building on climate change adaptation and mitigation as well as food security should be enhanced.
- Research capacity in livestock production and development, forestry, and animal health should be increased.
- Sustainable management of natural resources on a landscape basis, including watersheds, rivers, forests, grasslands and rangelands, should be promoted.
- Climate-smart agriculture is increasingly gaining recognition as an innovative approach to address the challenges of climate change and food security. It is recommended that FAO lead international efforts in promoting the adoption of climate-smart agriculture among these countries with a well-defined plan of action.
- Climate monitoring and forecasting and early warning systems as well as disaster risk reduction mechanisms should be developed and strengthened, including in the Himalayan region.
- Investment in agriculture research, including studies on stress tolerant varieties, should be increased.
- The number of members representing the Southwest Pacific region in the FAO Council should be increased to better reflect the voice of the region and the countries concerned.
- Quality water resource management and the promotion of water conservation technology should be strengthened.

## ***FAO SUPPORTS MONGOLIA TO CARRY OUT NATIONAL LAND USE ASSESSMENT THROUGH UN-REDD***

*By Joel Scriven, Forestry Officer, UN-REDD Programme*

The Government of Mongolia recently completed its first accurate national land use assessment, using free software and data, with the support of the Food and Agriculture Organization of the United Nations (FAO) through the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD Programme).

Mongolia became a partner country of the UN-REDD Programme in 2011 and in 2012 FAO/UN-REDD began its support on the development of their national forest monitoring system for

REDD+. REDD+ is a set of five forestry activities that developing countries are encouraged to implement under the United Nations Framework Convention on Climate Change (UNFCCC).

Among the lines of support delivered to Mongolia by FAO/UN-REDD is support to the design and implementation of a new national forest inventory (NFI) methodology. The traditional objective of an NFI is to gather information from a country's territory on the condition of their forests and commercial parameters such as the volume of timber stocks.

The objective of Mongolia's new NFI methodology is to gather information that will not only support forest management planning and policy making, but also collect information on forest carbon stocks and forest carbon stock changes, to allow Mongolia to assess the levels of greenhouse gas (GHG) emissions and sequestration resulting from forestry activities over time. In this way, the information gathered through Mongolia's NFI will be input directly into their national GHG inventory and reported to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), as part of their National Communication on climate change.

As part of the design phase, the government decided in 2013 that it will adopt a two-phased approach to the implementation of the NFI. The first phase would be based on an analysis of land use through remote sensing data. This would allow NFI decision makers to see the location and type of forest present in the country, as well as undertake a preliminary assessment of human impacts on forests and determine how field teams will reach forest measurement plots. The second phase will be based on ground-based measurements of forest plots.

The first phase of the NFI was completed between June 2013 and March 2014 by 20 national remote sensing and geographical information systems (GIS) experts of the Mongolian Government (the Environmental Information Centre (EIC) and the Forest Research and Development Centre), resulting in the first accurate assessment of land use across Mongolia.

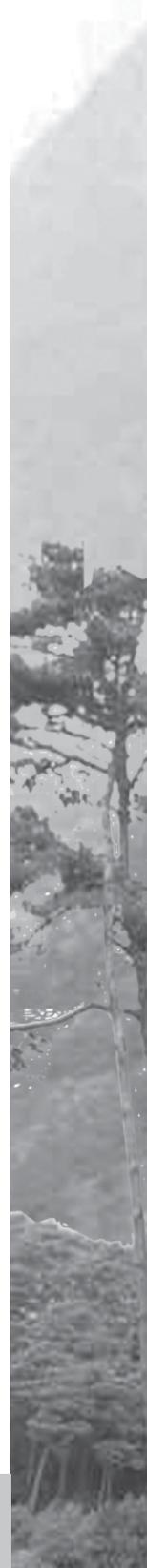
A first training workshop was delivered by FAO/UN-REDD to national experts in June 2013, with a focus on the specialist land use assessment software developed by FAO, Open Foris Collect Earth. This software application does not require a use license and is free of charge. Open Foris Collect Earth is a Java-based application that opens within Google Earth and provides a user-friendly interface for a sampling-based approach to land use assessment based on visual interpretation of satellite remote sensing data. This software application also offers a geo-spatial link to Google Earth Engine that provides access to the entire Landsat data archive, and also links to Microsoft-

Nokia Bing Maps that provides access to very high resolution satellite data. In this way, a statistically accurate national land use assessment can be carried out using software and data that are free of charge.

Following the first training, FAO/UN-REDD worked with the Mongolian operators to tailor the software to Mongolia's national circumstances, for example by determining which forest, crop and grassland types to use in the assessment. A second, follow-up training workshop was then delivered by FAO/UN-REDD in February 2014, during which support was delivered to finalize the national assessment, manage the data and begin statistical analysis of the data.

The national land use assessment was carried out following a sampling design based on systematic grids (using the Geographic Lat-Long projection with WGS-84 as datum). A  $0.1^\circ \times 0.1^\circ$  grid was used for high-forest provinces (such as Selenge, To'v, Uvs, Xentii and Zavan); with a lower sampling intensity ( $0.2^\circ \times 0.2^\circ$ ) used for provinces with lower forest cover (such as O'mnogovi, Su'xbaatar and Xovd). For assessing areas of saxaul forest cover a stratified approach was adopted, using a systematic grid with  $0.1^\circ \times 0.1^\circ$  spacing only for the areas where this type of forest is found. The national assessment was carried out at two time intervals: 2001 (as this is the first year for which full Landsat 7 data coverage is available for Mongolia) and 2013, to allow an assessment of land use change over time.

This national land use assessment determined that forest land covers 15,434,530 hectares of Mongolia's territory, with grassland being the dominant land use – covering 127,434,040 hectares, wetlands covering 4,309,407 hectares, cropland covering 1,667,867 hectares, settlement covering 468,806 hectares and other land – such as sand and bare rock – covering 7,185,351 hectares. The assessment shows that only 1.43 percent of the territory has changed land use over the past 13 years. The only notable changes that were recorded were the expansion of settlement area – which has doubled in size since 2001 – and the expansion of cropland, in particular into grassland areas.



While the figure of 15,434,530 hectares of forest cover includes more than 2 million hectares of saxaul forests/shrublands and almost one million hectares of forest with less than 10 percent crown cover, it can be concluded that the extent of forest land in Mongolia is greater than what has been reported in previous years and through other assessments. For example, through FAO's Global Forest Resources Assessment, Mongolia reported a net annual loss of 81,900 hectares of forest from

the year 2000 (11,717,000 hectares of forest) to 2010 (10,898,000 hectares).

FAO/UN-REDD will continue their support to the development and implementation of Mongolia's NFI through 2014, including through support to undertake statistical analysis of the data and compile the national GHG inventory report for submission to the UNFCCC Secretariat.

## ***STUDY OF THE POTENTIAL IMPACTS OF FOREST PRODUCT LEGALITY REGULATIONS AND REDD+ ON FOREST PRODUCTION AND TRADE IN THE ASIA-PACIFIC REGION***

*Contributed by Chris Brown, FAO Forestry Consultant*

A study of the potential impacts of forest product legality regulations and REDD+ on forest products production and trade in the Asia-Pacific region has been completed. The project reviewed trends in forest resources, production and trade in the Asia-Pacific region with a focus on countries affected by forest product legality regulations (the EU Timber Regulation and amendments to the US Lacey Act) and REDD+ initiatives. A modeling approach was used to quantitatively assess their potential impacts on production and trade in the Asia-Pacific region.

The analysis confirmed expectations that REDD+ is likely to have significant impacts on log supplies from Asia-Pacific forests, but minimal effects on

processed wood products. Given the assumptions used in the model, Asia-Pacific countries with significant production shortfalls due to REDD+ were able to access log supplies from other sources, reducing the impacts on processed wood products. Impacts of forest products legality restrictions on trade flows were found to be minimal and resulted in diversion of a proportion of Asia's secondary processed wood products from the EU and USA to other markets. The study has been published in two parts (Working Papers APFSOS II/WP/2014/37 and APFSOS II/WP/2014/38) as contributions to the knowledge assembled in the Asia-Pacific Forestry Sector Outlook Study. Copies of the papers are available at <http://www.fao.org/asiapacific/forestry-outlook/en/>

## ***SUMMARIES OF PARTNER EVENTS AT THE 25<sup>th</sup> APFC SESSION***

### **FOREST RESTORATION AT LANDSCAPE LEVEL IN ASIA-PACIFIC**

Twenty participants convened on 3 November 2013 in Rotorua, New Zealand, to discuss the current shift towards managing forests for multiple values and ecosystem services. Central to this shift is the focus on forest restoration at the landscape level (FLR). This focus emphasizes the need to move aggressively beyond the limited view of timber production as the principal goal of forest management. In this context, workshop presentations and discussions dealt with initiatives aimed at addressing rural poverty, increasing biodiversity, ensuring stable supplies of water, and providing other environmental services. Additionally, the participants noted the relevance of sustainable forest management (SFM) and FLR to climate change and carbon sequestration.

Three senior resource persons offered presentations highlighting key aspects of FRL planning and implementation, along with experiences gained, lessons learned, options for moving forward and issues to consider.

In the first presentation: “*A review of forest rehabilitation in the Asia-Pacific region – lessons from the past,*” Dr. Unna Chockkalingam, Executive Director, Forest Carbon Asia, summarized policies that have led to negative impacts on forests and forest-based communities, biodiversity and the environment in general. Citing (among others) examples from teak plantation development in Myanmar, and tree-planting directives in Vietnam, Dr. Chockkalingam identified factors that should be considered now and in the future, in order to avoid problems, conflicts and repetition of past failures.

Dr. David Lamb, University of Queensland, offered the second presentation: *Shifting from forest rehabilitation to forest and landscape level restoration: why, how and what?*

Underscoring the needs and opportunities inherent in an FLR-oriented strategy, Dr. Lamb highlighted the results of analysis and research that looked into the potentially-positive outputs of changes in restoration approaches. He also explained how certain factors could either contribute to the attainment of restoration objectives or (on the other hand) make it more difficult for those objectives to be achieved. In respect of environmental services that can be produced through efficient forest management, Dr. Lamb pointed out the importance of “scale” in thinking, planning and implementation, noting that isolated patches of forest would not adequately provide the environmental services envisioned in a carefully-designed FLR approach.

In the third presentation: *Forest and Landscape Level Restoration: We need more than techniques*”, Dr. Don Gilmour, RECOFTC, recounted how community forestry in Nepal evolved, over almost two decades, from a project-level set of activities into a national movement. Significant gains have resulted from this condition, in terms of expanded forest cover, reduction in soil erosion and alleviation of rural poverty.

Dr. Gilmour pointed out however that, as in many other areas of human endeavor, success can breed envy and problems. For instance, forestry department officers are currently seeking a change in policies that would require Nepalese farmers to surrender to the government a major portion of income earned from timber harvested on forests they restored over many years. Dr. Gilmour also described two contrasting situations in Indonesia. Whereas tree-planting is an integral part of traditional farming systems in West Java, the opposite case prevails in part of Northern Sumatra where insecure tenure on some clan-owned lands is complex, unclear and contested.

Open forum type discussions were conducted following the presentations. These discussions

were stimulated by the following questions posed by Dr. Andrew Ingles, The Nature Conservancy:

- What types of collaboration and what sorts of mechanisms are needed to bring about effective FLR planning and implementation?
- Are there practical ideas and an appetite for collaboration?
- How can FLR investments be secured in a noisy, competitive environment?
- Do target audiences and the general public know enough about FLR to enable the concept to grow into a social movement?
- Do we have a sufficient understanding of the role of markets in FLR?
- Are land managers sufficiently represented in policy decisions at multiple levels of policy development?

Participants contributed enthusiastically to the discussions and developed a list of options for

#### **ASIA-PACIFIC FOREST INVASIVE SPECIES NETWORK (APFISN) WORKSHOP ON TOOLS FOR ECOLOGICAL AND ECONOMIC IMPACT ASSESSMENT OF INVASIVE ALIEN SPECIES IN FOREST ECOSYSTEMS**

The APFISN Workshop was organized on 4 November 2013 at the Energy Resources Centre, Rotorua, New Zealand. The opening remarks were made by Patrick Durst, Senior Forestry Officer, FAO; Gary Man, USDA; and Kenichi Shono, Forest Resources Officer, FAO.

The first session focused on Import Risk Assessment Techniques. An overview of the U.S. approach was presented by Gary Man and the New Zealand approach was presented by Melanie Newfield. The presentations focused on multi-level tracking systems to assess the import risk. It highlighted the need for real time information flow across countries so as to enable risk assessment associated with imports. The presentations were followed by discussions on how to adapt the risk assessment techniques for other countries in the Asia-Pacific region.

The second session focused on the International Plant Protection Convention (IPPC) system e-

collaboration. They reflected on the current status of FLR and requirements for success. Participants were unanimous in agreement on the crucial importance of tenure security as a foundation for successful FLR. There was also common agreement on the need for strategic spatial planning and multi-stakeholder consultation. Pooling experiences and insights, the participants discussed *what* people are doing and *why* in the context of FLR to improve livelihoods and biodiversity. They identified key actors, and suggested opportunities for sharing knowledge, including the creation of new communication platforms and materials, along with options for enlisting media support to increase awareness of FLR among decision-makers, political leaders and the general public.

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learning. An overview of the IPPC system was presented by Shiroma Satyapala, New Zealand followed by comments and contributions from the participants. There was an exercise in applying IPPC techniques which generated good discussion and an array of new information from participants that was shared among them, paving the way for new solutions and management options.

The third session was on Evaluation of Emerging Risks. An overview of economic impact assessment techniques was presented by Chris Baddeley and an overview of ecological impacts was presented by Eckehard Brockerhoff. The presentations highlighted that there are more studies on economic impacts than on ecological impacts. Of those fewer studies on ecological impacts, most are from the U.S.A. Most of the ecological impact studies focused on species impacts (92 percent) while there are only few studies on genetic (2 percent) and ecosystem (6 percent) impacts. It was also reported that many of the ecosystem impacts are poorly known. New Zealand's approach to evaluating emerging risks to biosecurity was presented by Melanie Newfield. The participants were divided into four groups for an exercise in using emerging risks techniques led by Melanie Newfield. The session had a report back period, which showed that the participants had been exposed to a variety of new methods

which would go a long way in planning invasive species management in APFISN member countries.

Country reports from the participating countries were presented in the fourth session. The countries which presented country reports included Bangladesh, Cambodia, Fiji, Indonesia, Malaysia, Maldives, Myanmar, Philippines, Sri Lanka and Vietnam.

*Mimosa*, *Lantana* and *Cleome* are the most serious emerging problems in Bangladesh.

Cambodia reported their activities regarding the ongoing Global Environment Facility project, wherein *Mimosa pigra*, *Mimosa diplotricha* and *Chromolaena odorata* are being considered for rapid management. A pest and disease survey is ongoing and the database preparation has started.

Fiji has a large number of reported invasives but there is need for empirical impact assessments. The Fiji invasive species task force has been set up and there exists a database on woody plant invasive species list. Fiji requested technical support in managing invasive species, a consultant for species identification and capacity building activities.

*Acacia nilotica* and *Meremia peltata* were reported as the most important invasives in Indonesia. The country reported its need for best practices in forestry to ward off invasives and sharing of success stories in invasion management.

No new invasive species assessments have been conducted in Malaysia; however, there exists a check list of fungi and fact sheets on important invasive species.

Maldives reported that a comprehensive assessment is yet to be done for invasives in the country and requested capacity building support from APFISN to accomplish this.

The work in Myanmar using the water hyacinth for preparation of biochar through hydrothermal carbonization was explained. *Mimosa diplotricha* was reported as the most pressing invasive problem in Myanmar.

Philippines reported the interesting case of Mahogany becoming a major invasive species and the efforts to contribute to the Ecosystem Research and Development Bureau (ERDB) invasive species database.

Sri Lanka has updated its invasive plant list and the current scenario is that *Miconia*, *Lantana* and *Prosopis* are emerging as new problems.

It was reported that a total of 957 non-native species have been identified in Vietnam which include plants, insects and fungi. *Mimosa pigra* has been identified as the most serious emerging problem.

The concluding session was addressed by Gary Man, who highlighted the need for closer work with small groups of countries on similar problems. He advised the participants to come up with suggestions on this. Dr TV Sajeew announced that a Google-group of member countries will be established for faster communication and invited the participants to contribute to the *APFISN Newsletter-Invasives*.

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### **THIRD FORESTRY COLLEGE DEANS MEETING IN THE ASIA-PACIFIC REGION**

On 4 November 2013, the Third Forestry College Deans Meeting in the Asia-Pacific Region was held in the Rotorua Energy Events Center, New Zealand, gathering 14 deans and chancellors from 13 regional economies. Facing the emerging challenges of forestry and education development, the deans and professors this time addressed the meeting theme of “*Evolving methods of curriculum delivery in post-secondary forest education*” and reached in principle a concrete action plan for advancing the Forestry College Deans’ Meeting Mechanism in the Asia-Pacific Region (the Mechanism). As the third gathering of deans under the Mechanism, this meeting was organized by the Asia-Pacific Network for Sustainable Forest Management (APFNet), co-organized by FAO, Beijing Forestry University of

China, University of British Columbia of Canada, and supported by University Putra Malaysia, Melbourne University of Australia and University of Philippines - Los Banos, and it was one of the pre-session events of the 25<sup>th</sup> session of the Asia-Pacific Forestry Commission of FAO.

In his Opening Speech, Mr. Qu Guilin, Executive Director of APFNet, said that pragmatic actions have been implemented under the Mechanism, which reflect the “action-oriented” principles that APFNet always follows. Now facing an enabling environment, the Mechanism will be able to move further forward, with APFNet’s continuous support and potential support from other entities and the synergy of all the forestry colleges. Ms. Mette Loyche Wilkie, Deputy Director, Forest Assessment, Management and Conservation Division of FAO, introduced FAO’s commitment in promoting forestry education and said FAO would continue to support APFNet’s efforts in this aspect.

The meeting was divided into four sessions; the first two were aimed at giving the deans and other participants a better understanding of the new trends of forestry education. In the third session, the first project under the Mechanism, “Innovative Sustainable Forest Management Education in the Asia-Pacific Region” was officially launched via signing the project agreement between APFNet and Beijing Forestry University, the Coordination Office for the Mechanism. The project has a total fund of USD770,000 and covers 11 forestry schools in the region. It aims to develop six classic

on-line forestry courses to be incorporated into the curriculum of regional forestry colleges and open to students. An online forum for interaction between faculty and students will be set up, and international workshops will be convened to extend the experiences to help promote the innovation and reform of the forestry education in the Asia-Pacific region.

Keynote presentations were presented on “Advanced forestry education: new methodology” along with case studies on innovative sustainable forest management education.

Holding the meeting as a partner event of the APFC session took advantage of the many delegates from forestry agencies of different economies who came to attend the APFC meeting and also attended the forestry deans’ meeting and participated in the discussion.

The Forestry College Deans’ Meeting Mechanism in the Asia-Pacific Region was proposed by APFNet, Beijing Forestry University and University of British Columbia in the first meeting held in July 2010, and was strongly supported by APFNet. Its second meeting was held during the second Asia-Pacific Forestry Week in Beijing in November 2011, when the Mechanism was officially set up to include 11 forestry colleges in the region and a coordination office was established in Beijing Forestry University to promote forestry education development in the Asia-Pacific Region.

## ***A CALL FOR BETTER COMMUNICATION FOR THE FUTURE OF OUR FORESTS***

*Prepared by Wirya Khim, FAO RAP*

*What happens to our forests today and in the future will essentially depend on how effectively we communicate with one another to bring about positive change in order to achieve sustainable forest management.*

### **Why communication is important?**

“Communication” in general is the most crucial part of the society. Paul Watzlawick in 1969 stated that, “*One cannot not communicate!*”

## Communication challenges in the forestry sector

Challenges faced in the forestry sector are not limited to deforestation, forest degradation or the increasing attention given to other sectors such as climate change, water, bioenergy, fisheries and livelihoods. Finding the best and most effective ways of communicating with key actors and stakeholders is also a major challenge.

Individuals have different perceptions, needs and priorities. Just as there is no simple approach for effective forest management and sharing forest resources or benefits equally, there is no single method or tool for effective communication in forestry.

### Responding to the challenge

Communication was a key element of the 2011 International Year of Forests and there is a growing recognition of the need for a more strategic approach to strengthen forest-related communications. The 24th session of the Asia-Pacific Forestry Commission, convened in November 2011, in Beijing, highlighted the pressing need for improvement and recommended stepped-up efforts to strengthen forestry communication in the region.

FAO responded to this recommendation by organizing a regional workshop on “Strengthening Forestry Communication in Asia and the Pacific,” 17-19 September 2013, in Hanoi, Vietnam. The workshop was co-organized by FAO and the Forestry Administration of Viet Nam, and co-sponsored by the UNECE- Forest Communicators Network, with financial support from FAO and the Governments of Austria and Finland.

Twenty-six participants attended the workshop, half of which were women. Participants reflected the perspectives of government agencies and NGOs from 16 countries, namely Bangladesh, Bhutan, Cambodia, China, Fiji, India, Indonesia, Malaysia, Nepal, Laos, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Thailand and Viet Nam.

The workshop was designed to: (i) share best practices and tools to implement effective communication campaigns, programs and forestry projects in the region; (ii) promote learning through participation and interaction and generate new contacts and alliances; and (iii) exchange knowledge and experiences and explore the possibility of creating a regional network of communicators working on forest issues.

Using presentations, plenary sessions, group and panel discussions, and field visits, the workshop focused on forest communication challenges and practices in the Asia-Pacific region, communication principles, strategic communications, social media and working with traditional media. Case studies provided real-world experience and insights on participatory communications and communicating forestry with social media.

Participants improved their understanding and sharpened their skills for effective communication. Communication issues and challenges were identified and new contacts were established. Lessons from the European Forest Communicators Network and other regional networks in East and Southern Africa, and Latin America were widely shared. This gave participants the opportunity to learn and better understand the importance of the communication networks, their roles and functions, and potential benefits.

### The need for a network to improve forestry communications in the region

The workshop reaffirmed the need for a network in Asia and the Pacific to support improved forestry communications. The network will serve as a regional platform for information and experience sharing, peer learning/capacity building, regional exchange and collective outreach on key themes and messages related to forestry.

The workshop created a 9-person working group to support the network’s formation and growth. This working group consisted of communications officers/specialists/managers from the following organizations:

- RECOFTC – The Center for People and Forests
- LEAF - Lowering Emissions in Asia's Forests (USAID-funded program)
- FAO Regional Office for Asia and the Pacific (FAO-RAP)
- EU-FLEGT Facility
- Non-Timber Forest Products - Exchange Programme (NTFP-EP)
- Secretariat of the Pacific Community (SPC)
- IUCN Viet Nam Office
- Vietnam Forests and Deltas Program, Winrock
- RECOFTC Vietnam

The working group was tasked with elaborating a proposed mission statement, goals, structure and

operating modalities for the emerging regional network. The group is now working to identify potential network activities, including capacity development/trainings, experience sharing, joint communications products, and development of a forestry game app. Consideration is also given to how the network could be sustained. Suggestions are focused on the value of a structured leadership, joint activities of mutual benefit, and face-to-face meetings – to provide initiative, establish and motivate social networking groups and connect with various other local networks.

## ***ASIA-PACIFIC FORESTRY CHIPS AND CLIPS***

### **2 BILLION NEW TREES TO BE PLANTED IN INDIA**

India's Rural Development Ministry announced a new afforestation plan to plant 2 billion trees along the nation's highways in an effort to tackle youth unemployment. The country's Road Transport, Highways, Shipping and Rural Development Minister Nitin Jairam Gadkari said in a meeting in New Delhi that the new initiative would also help preserve the environment.

"The length of National Highways in the country is one lakh kilometer (about 62,137 miles). I have asked officials to come out with a plan to plant 200 crore (2 billion) trees along these stretches which in turn would create jobs for the unemployed on the one hand and protect the environment on the other," Gadkari stated, according to Indian news agency PTI.

The plan could potentially employ 300,000 youths, Indian outlet NDTV reports.

Youth unemployment has been a large focus of the country's development goals in recent years. According to the United Nations, unemployment

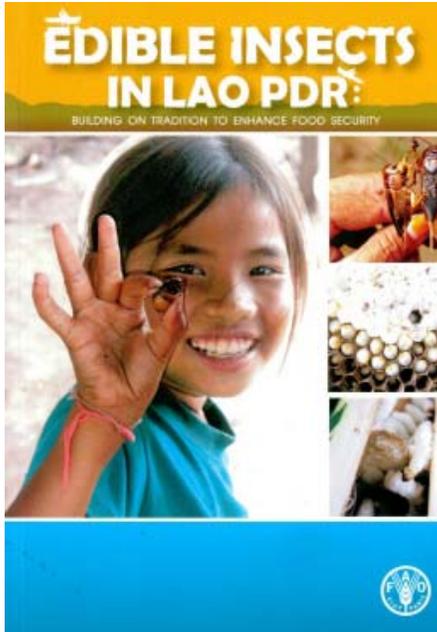
among Indian men and women ages 15 - 24 was 10.2 percent in 2010, the most recent year for which data is available. Indian Staffing Federation Vice President Rituparna Chakraborty, who spoke to the Times of India in January 2014 about unemployment, suggested the government tackle joblessness among young people through a "complete overhaul of our education system closely integrating it with an effective apprenticeship regime."

Gadkari also met with another group of officials on Friday to discuss the idea of bringing the plan to more rural areas as part of the Mahatma Gandhi National Rural Employment Guarantee Act, an Indian labor law and safety net established in 2005 which seeks to guarantee 100 days of paid manual labor for adults facing poverty in rural areas.

"MNREGA funds can be utilized for planting trees along roads in rural areas. It has a lot of promise," a top official attending the meeting said per Gadkari's suggestion, NDTV reports.

– *Huffington Post* 06/14/2014 –

## NEW RAP FORESTRY PUBLICATIONS



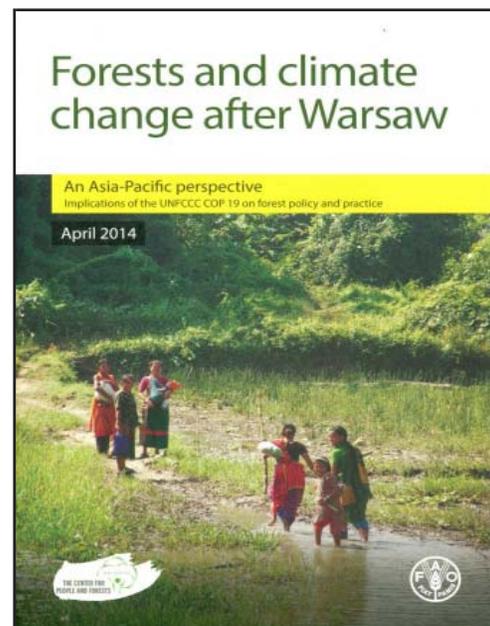
### EDIBLE INSECTS IN LAO PDR: BUILDING ON TRADITION TO ENHANCE FOOD SECURITY

*By Yupa Hanboonsong and Patrick B. Durst*

To meet the challenge of feeding the world's expanding population, greater emphasis will clearly need to be given to increasing yields and overall production of traditional staple crops. But priority will also need to be given to increasing the production and consumption of currently under-utilized and under-appreciated foods.

This publication chronicles the fascinating traditions and modern efforts to enhance the contribution of edible insects to food security and improved nutrition in Lao PDR. It describes the most commonly consumed insects, details about collecting and management practices, introduces the fledging insect farming sector and presents experience related to food safety, processing, handling, marketing and consumption of edible insects in Lao PDR.

The percentage of the population of Lao PDR that regularly consumes insects is among the highest in the world. Recognizing that edible insects provide many health, nutrition, environmental and livelihood benefits, recent efforts have been made to build upon these traditions and increase awareness and appreciation of the benefits of edible insects. FAO is pleased to have supported these efforts and by documenting Lao PDR experiences related to edible insects in this publication, FAO hopes others will benefit and be motivated to identify similar opportunities.



### FORESTS AND CLIMATE CHANGE AFTER WARSAW: AN ASIA-PACIFIC PERSPECTIVE – IMPLICATIONS OF THE UNFCCC COP 19 ON FOREST POLICY AND PRACTICE

The 19<sup>th</sup> Conference of Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) was held in Warsaw, Poland, 11-22 November 2013. The outcomes of COP 19 are expected to have a significant impact on

developments in the field of forests and climate change over the coming year. In view of this, forest sector stakeholders in the Asia-Pacific region require succinct and accurate information on the implications of COP 19 discussions and their significance to forest policy decisions and practice.

In February 2014, RECOFTC – The Center for People and Forests in collaboration with FAO

brought together 11 climate change and forestry experts in Chiang Mai, Thailand. The panel of experts discussed the key outcomes of COP 19 negotiations in Warsaw and identified the potential implications for forestry and climate change sectors in the Asia-Pacific region.

This booklet summarizes their responses to a set of 12 key questions raised at the consultation.

*The best time to plant a tree was 20 years ago. The second best time is now. –Chinese Proverb*

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

8-16 September 2014. **Forest Tenure Training Workshop.** Bangkok, Thailand. Contact: Yurdi Yasmi, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Yurdi.Yasmi@fao.org

20-22 October 2014. **5th UN-REDD Regional Lessons Learned Workshop: Forest monitoring systems and reference levels for REDD+.** Venue to be confirmed. Contact: Ben Vickers, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Ben.Vickers@fao.org

27-29 October 2014. **Asia-Pacific Forestry Commission Executive Committee Meeting.** Bangkok, Thailand. Contact: Patrick Durst, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Patrick.DurstL@fao.org

November 2014. **Regional Workshop on Drivers of Change Affecting forests in Mekong.** Hanoi, Vietnam. Contact: Yurdi Yasmi, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; E-mail: Yurdi.Yasmi@fao.org

12-19 November 2014. **IUCN World Parks Congress 2014.** Sydney, Australia. Contact: Congress Secretariat, Australasia, GPO Box 3270, Sydney NSW 2001, Australia; E-mail: registration@worldparkscongress.org

7-11 September 2015. **XIV World Forestry Congress.** Durban, South Africa. Contact: Tiina Vahanen, Associate Secretary-General of the XIV World Forestry Congress, Forestry Department, FAO, Rome, Italy; E-mail: WFC-XIV-Info@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)
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- The future of forests: Proceedings of an international conference on the outlook for Asia-Pacific forests to 2020 (RAP Publication 2009/03)
- Re-inventing forestry agencies. Experiences of institutional restructuring in Asia and the Pacific (RAP Publication 2008/05)
- Forest faces. Hopes and regrets in Philippine forestry (RAP Publication 2008/04)
- Reaching consensus. Multi-stakeholder processes in forestry: experiences from the Asia-Pacific region (RAP Publication 2007/31)
- Trees and shrubs of Maldives: An illustrated field guide (RAP Publication 2007/12)
- A cut for the poor: Proceedings of the International Conference on Managing Forests for Poverty Reduction Capturing Opportunities in Forest Harvesting and Wood Processing for the Benefit of the Poor (RAP Publication 2007/09)
- Trees and shrubs of the Maldives (RAP Publication 2007/12)
- Developing an Asia-Pacific strategy for forest invasive species: The coconut beetle problem – bridging agriculture and forestry (RAP Publication 2007/02)
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- Advancing assisted natural regeneration (ANR) in Asia and the Pacific (RAP Publication 2003/19) - 2nd edition
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- Trash or treasure? Logging and mill residues in Asia-Pacific (RAP Publication: 2001/16)
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- 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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