

Impacts of Armed Conflict on Mountain Biodiversity: Experiences from Nepal

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Nepal's armed conflict (1996-2006) has created enormous impact on biodiversity, the economy and society. This paper discusses only the impacts on biodiversity. The study was conducted in 2007 by using qualitative methods such as review of related documents, discussions with policy makers, practitioners and local people, and rapid field assessment in ten different districts.

Impacts on mountain biodiversity

The main negative impacts documented from the study were: a loss of unique habitats for wildlife within ecosystems once the vegetation for such specialised habitat were destroyed; loss of medicinal plant resources after the forests were used as battlefields; and severe disruption of conservation activities, leading to intensified unsustainable exploitation as law and order was broken down by the armed conflict.

National parks and wildlife reserves were one of the frequent targets of the insurgents, mainly because of being located in geographically isolated areas. There was engagement of the military in parks and reserves by insurgents. The rebels' interpretation of the park-people conflict was an outcome of restriction and denial of access of poor people to livelihood-based resources by park authorities, whilst there was a perception amongst the rebels that the parks and reserves were recreation centres for the royal family.

Forests, one of the main bases of biodiversity, became battlefields that ultimately led to biodiversity loss. Illegal hunting and trading of wildlife (e.g. five rhinos were killed in 2001 in Bardya National Park and musk deer were slaughtered by poachers in Langtang National Park) was rampant during the period of armed conflict, leading to a reduction of the composition and number of wildlife as well as habitat destruction.

Table 1: Number of attacks on biodiversity-related infrastructures

Year	Frequency of attack	Year	Frequency of attack
1996	10	2002	103
1997	15	2003	56
1998	21	2004	99
1999	25	2005	35
2000	22	2006	7
2001	26		

Source: Compiled from newspapers, reports and other sources

The Nepal Army, originally deployed for the protection of national parks and wildlife resources, was mobilised for counter-insurgency operations. This resulted in a lack of security protection in the parks, leading to increased activities of smugglers, poachers and hunters (Yonzon, 2004; Upreti, 2004).

Poaching of Himalayan black bears for their bile and musk deer for their aromatic musk pods in Manaslu Conservation Area (MCA) sharply increased after the eruption of armed conflict.

Illegal collection of expensive herbs such as *panch auni*, *nirmasi*, *yarshagumba* and *ban-lasun* was frequent.

Explosion of landmines on 22 November 2004 killed five staff at the Parsa Wildlife Reserve. Consequently the Reserve suspended patrolling. Illegal logging and poaching (in particular of the golden monitor lizard, *suna gohoro*, *Varanus flavescens*) became frequent. A total of 89 rhinos were killed between 1997 and 2006 in Chitwan National Park (CNP) alone (Shakya and Chitrakar, 2006:140).

Table 2: Wildlife casualties 1996 -2006

Species	Total Killed 1996-2006		
	Conflict casualties	Natural deaths	Total
Rhino	128	128	256
Tiger	7	33	40
Hog Deer	1	13	14
Wild Buffalo	1	10	11
Red Panda	0	3	3
Monitor Lizard	2	0	2
Musk Deer	5	15	20
Swamp Deer	1	1	2
Cheetal (Chital)	21	25	46
Elephant	4	17	21
Sambar	0	7	7
Leopard	1	27	28
Leopard Cat	0	4	4
Jharal	0	13	13
Barking Deer	0	6	6
Turtle	0	2	2
Python	0	6	6
Wild Boar	0	3	3
Gharial Crocodile	1	3	4
Blackbuck Antelope	0	7	7
Peacock	0	2	2
Bear	0	2	2

Source: Upreti (2007).

Table 2 shows that several important wildlife species were destroyed during the time of armed conflict. The total value of damaged property belonging to the Ministry of Forest and Soil Conservation was estimated to be NRs 354.5 million (Upreti, 2007).

During this time, 35,608 hectares of community forests in 48 places across 38 districts were taken by the army; many of them declared as 'military training areas; irresponsible exploitation of expensive medical herbs such as Yarsagumba (*Cordyceps sinensis*), Chiraito (*Swertia Chiraita*), Jatamasi (*Nardostachys grandiflora*), Kutki (*Picrorhiza scrophulariiflora*), Bikhama (*Aconitum palmatum*), padamchal (*Rheum emodi*), Panchaunle (*Galearis stracheyi*), Sunpati (*Rhododendron anthopogon*), Sughandhawal (*Valerina wallichii*), was rampant once rebel forces imposed taxes on transactions of forest products in their zones of influence (Upreti, 2007; Shakya and Chitrakar 2006).

Out of seven main and 21 sub-cantonments, 75 percent are located in forested areas and many of them are within high priority environmental sites. An impact study of UNDP at PLA (People's Liberation Army) camps highlighted that PLA energy needs were almost exclusively dependant on firewood extraction that caused deforestation in many areas. An estimated firewood requirement for the combatants residing in the 28 cantonments came to approximately 2,100,000 tons of fuel wood each month. The study report stated, "In the case of the Kailali cantonments, PLA cadres are housed in close proximity to a mere 1.5 kilometres of forest cover that facilitates the migration and genetic dispersal of critically-endangered species like the Royal Bengal Tiger. Without key areas like this, scientists estimate that tigers in Nepal will be genetically extinct in just ten years" (Dinerstein et al 2006).

Conclusions

Mountain biodiversity has been negatively affected and even severely threatened by the decade long armed conflict. Therefore, immediate, short and long term restoration plans are urgently needed. Hence, regular conflict risk assessment has to be one of the fundamental components in any future strategy of protection and conservation of biodiversity in Nepal. Such analysis provides a powerful understanding of conflict impacts on biodiversity in conflict and post-conflict situations and assists in devising appropriate response strategies and options.

References

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Conservation of Agrobiodiversity through Traditionally Cultivating 'Barahnaja' in the Garhwal Himalaya, India

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India's Garhwal Himalaya is an agrobiodiversity hotspot. The traditional system of cultivating 'Barahnaja' (literally, '12 seeds') together in cropped land is a centuries-old practice: a cropping pattern involving 12 or more food crops grown in 'synergetic' combinations (Singh and Tulachan, 2002). This is practiced under a 'Sar system' of crop rotation that characterises the cropping pattern together with a vertical distribution of crops - in valley regions, mid-altitudes and highlands - and supports the maintenance of agrobiodiversity. Three quarters of the people in the region depend on this system for their livelihoods. The traditional agricultural systems are the reservoirs of many crops and cultivars, most of which are still little known to mainstream societies and are better adapted than modern agricultural systems to environmental and social conditions (Altieri, 1995; Ramakrishnan and Saxena, 1996). Recently changes in the cropping pattern have taken place as 'Barahnaja' has decreased, particularly in the mid-slopes and low-lying areas.

The traditional Barahnaja system and agro-biodiversity

'Barahnaja' is an advanced system of traditional rain-fed hill farming with sophisticated intercropping. Mandua (finger millet), ramdana/chua (amaranthus), rajma (common kidney beans), ogal (buckwheat), urad (black gram), moong (green gram), naurangi (mix of pulses), gahath (horse gram), bhat (soybean), lobiya (French beans) kheera (cucumber), bhang (cannabis) and other crops are grown together in a mix which is finely balanced to optimise productivity, maintenance of soil fertility, conservation of crop diversity and is geared towards meeting diverse household requirements. These central Himalayan farmers grow about 100 varieties of paddy (rice), 170 varieties of kidney beans, eight varieties of wheat, four varieties of barley and about a dozen varieties of pulses and oil seeds each year (Zardhari, 2000). Farmers spend almost nothing on inputs, since seeds, organic fertiliser and pest control are virtually free. Whenever they see that conditions are suitable, they start planting. Table 1 shows the ecological sub-regions and agrobiodiversity in the Garhwal region. Crops are grown from 300 to 3,600 metres. Wheat, rice, mandua, and jhangora are the common crops in the three ecological zones, with wheat generally having the highest productivity. Various pulses are grown in the intercropping system during the two harvest seasons: early winter after the rainy season (millet); and midsummer before the hot dry season (barley and wheat). Dry and

Ecological sub-region	Altitude (m)	Agro-biodiversity
Lower Dun, Terai	300-600	Wheat, rice, and sugarcane
Upper Dun, Bhabar, Lower Shivaliks	600-1,200	Wheat, rice, mandua, jhangora, chaulai and maize
Middle Garhwal-Kumaon	1,200-1,800	Wheat, rice mandua, jhangora "cheena" (<i>Panicum miliaceum</i>), potato and barley
Upper Garhwal-Kumaon	1,800-2,400	Wheat, barley, potato, chaulai, cheena, phaphra" (<i>Fagopyum tataricum</i>)
Cold Zone	2,400-3,600	SUMMER- wheat, barley, potato, phaphra, chaulai, "kauni", "ogal", kodo" (<i>Fagopyum esculentum</i>), "uva" (<i>Hoyocleum himalayense</i>)

Table 1: Ecological sub-regions and agro-biodiversity. Source: Adapted from Sati (2005)