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Impacts of agriculture on Nepal birds

Carol Inskipp and Hem Sagar Baral

Introduction

According to BirdLife International (2008a) agriculture currently destroys and degrades more wildlife habitat than any other factor worldwide resulting in biodiversity declines across huge areas. Both the spread of agriculture and agricultural intensification, such as losses in crop diversity and increases in uses of pesticides and fertilizers are to blame.

In Europe data from a number of national monitoring schemes of 124 of Europe's common bird species were analysed over the period1980-2006. This analysis showed that 45% of species surveyed had declined across 20 countries, with farmland birds doing particularly badly. Intensification of agriculture was found to be the major cause of declines of Europe's farmland birds (BirdLife International, 2008b).

In Nepal there has been a considerable amount of work done on globally threatened bird species in the last 20 years. In contrast there has been very little monitoring of common bird species or farmland birds. Monitoring of farmland birds in Nepal started in 2006 in the Lumbini farmlands Important Bird Area (Himalayan Nature 2006). With support from the Oriental Bird Club UK, Himalayan Nature has expanded its work on farmlands with permanent transects established in Koshi and Lumbini. It is planned to monitor these transects in early and late 2012 (Sharad Kumar Singh *verbally* to H. S. Baral, December 2011).

Considering the damaging impacts of agriculture on bird populations in Europe and globally, a desk study was carried out to assess the impacts on birds in Nepal in 2010.

Importance of agricultural lands to Nepal birds

The availability of invertebrates, small mammals, amphibians, spilt grain and weed seeds in cultivation provide food for a wide range of Nepal birds. A total of 184 species, 21% of those recorded in the country utilize agricultural habitats for feeding at some time. A smaller number of these species breed in agricultural lands and associated micro-habitats, such as bushes and trees at field edges.

Sarus Crane by Jyotendra Jyu Thakuri

Cultivation forms the chief habitat for a relatively small number of bird species in Nepal. These include the globally threatened Sarus Crane *Grus antigone* which is mainly found in cultivated fields in the terai, where it both forages and breeds. A recent study in Lumbini found that 70% of nests were on paddy field bunds and 30% on marshy wetland bunds (Paudel, 2009a).

In most areas where they occur in Nepal the globally threatened Indian Spotted Eagle *Aquila hastata* and Lesser Adjutant *Leptoptilos javanicus* often nest in trees in cultivated areas. Cultivation is also an important foraging habitat for the latter species.

Other Nepal species (not counting vagrants) which mainly occur in cultivated areas are Black Francolin *Francolinus francolinus*, Grey Francolin *F. pondicerianus,* Common Quail *Coturnix coturnix,* Black-breasted Quail *C. coromandelica,* Indian Pond Heron *Ardeola grayii*, Cattle Egret *Bubulcus ibis*, Red-wattled Lapwing *Vanellus indicus,* Grey-headed Lapwing *V. cinereus,* Red-necked Falcon *Falco chicquera*, Bengal Bushlark *Mirafra assamica,* Ashy-crowned Finch Lark *Eremopterix grisea,* Spotted Dove *Streptopelia chinensis*, Crested Lark *Galerida cristata,* Paddyfield Pipit *Anthus rufulus,* Common Stonechat *Saxicola torquata,* Pied Bushchat *S. caprata,* Zitting Cisticola *Cisticola juncidis,* Common Babbler *Turdoides caudatus,* Large Grey Babbler *T. malcolmi,* Jungle Babbler *T. striatus,* Asian Pied Starling *Sturnus contra,* Baya Weaver *Ploceus philippinus,* Pine Bunting *Emberiza leucocephalos,* Little Bunting *E. pusilla,* Black-headed Bunting *E. melanocephala,* and Crested Bunting *Melophus lathami.*

All the above species are Nepal residents, except for Common Quail, which is a summer visitor, and Grey-headed Lapwing, Pine, Little and Black-headed Buntings which are winter visitors and/or passage migrants.

Very few of these species breed in fields: the ones that do are Common Quail, Red-wattled Lapwing, the two larks, Paddyfield Pipit and Zitting Cisticola. Most of the other species that breed in cultivation nest in habitats at cultivation edges or in strips between the fields.

Flooded paddy fields and paddy stubbles are important feeding habitats for many wetland birds, including the near-threatened Black-headed Ibis *Threskiornis melanocephalus*, also egrets, some storks such as Lesser Adjutant, Asian Openbill *Anastomus oscitans*, Woolly-necked Stork *Ciconia episcopus*, and Black Stork *C. nigra*, Indian Pond Heron, White-breasted Waterhen *Amaurornis phoenicurus*, Ruddy-breasted Crake *Porzana fusca*, snipe *Gallinago* spp, a number of duck and wader species, as well as many species of doves, larks, pipits, wagtails, munias, finches and buntings. Some species feed on standing crops of paddy and other cereals, such as Rose-ringed Parakeet *Psittacula krameri*, Baya Weaver, finches and buntings.

Cultivated fields in hill and mountain areas provide valuable feeding areas for some pigeons and doves, including Oriental Turtle Dove *Streptopelia orientalis* and Snow Pigeon *Columba leuconota,* as well as some pipits and larks. Hill and mountain grasslands are utilized as feeding areas by a small number of species, including Himalayan Monal *Lophophorus impejanus*, Red-billed Chough *Pyrrhocorax pyrrhocorax*, Yellow-billed Chough *P. graculus*, thrushes, pipits, larks and rosefinches.

Although the chief habitats of the globally threatened Bengal Florican *Houbaropsis bengalensis,* and Lesser Florican *Sypheotides indica* (now a very rare visitor to Nepal) are lowland grasslands, during the short periods when these habitats are unavailable due to annual cutting and burning, they have sometimes been recorded in nearby cultivation.

For numerous species the farmland areas that are valuable are the uncultivated field corners and strips between fields. These areas are often vegetated with rough grass and other herbaceous plants that form good feeding and nesting habitats for Black and Grey Francolins, buttonquails *Turnix* spp., larks, pipits and finches. Bushes are often present and these can support a wide range of species, such as chats, shrikes and warblers. Groves and isolated trees in farmland habitats are useful nesting and roosting sites for many species including White-rumped Vulture *Gyps bengalensis*, Red-necked Falcon, Spotted Owlet *Athene brama,* doves *Streptopelia* spp, and mynas *Acridotheres* spp.

Field size may be important in providing feeding and nesting opportunities. For example, the farmed landscape of Lumbini still consists of small cultivated fields bordered by grass bunds that have a large area of valuable 'edge effect' vegetation. The bunds also provide cover, as well as invertebrates and seeds for birds, and a safe area for overwintering invertebrates (Hanlon and Giri, 2007).

Some species spend parts of their life cycle in a natural habitat but rely on nearby farmland for food, water, shelter or breeding habitat. For example, Lesser Adjutant regularly breeds in groves, but nearby flooded paddy fields are often important food sources. Birds of prey such as Eurasian Sparrowhawk *Accipiter nisus* breed in woods and hunt birds over adjacent fields.

Ecological benefits of birds to agriculture

Many birds are useful to farmers for:

- the dispersal of seeds;
- the control of snakes and harmful pests in crops;
- cleaning up the environment by acting as natural scavengers;
- pollinating crops and plantation trees;
- helping to ensure that farming is sustainable by acting as indicators;
- the health of the ecological system, and
- the pleasure they give with their songs, calls and courtship dances.

Singh (2007).

Bird damage to agriculture

* Flocks of herbivorous birds can eat substantial quantities of seeds and fruits in crops e.g. parakeets *Psittacula* spp. and Baya Weaver.
* Some raptor species prey on chickens e.g. Mountain Hawk Eagle *Spizaetus nipalensis*.
* Foraging birds can trample the soil and spoil the seedbeds of crops.

(Van der Weijen *et al.*, 2010).

Impacts of habitat changes

An assessment by Pandey *et al.* (2009) of 1994-2007 data for rice and maize based cropping systems concluded that growth in crop yields had been very minimal in the terai, hill and mountain regions and that production increases had been achieved mainly through increases in farmland area. Production rises can therefore have been very largely achieved by the extensive replacement of agricultural lands by grasslands, wetlands and forests, which are all vital bird habitats.

As Nepal's human population has increased so have the numbers of homes and other buildings, and these have often been constructed on agricultural land. For example, in the Kathmandu valley large areas of formerly productive fields have been urbanized, especially since the 1970s. In this way urbanization has led to further losses of natural habitats to replace lost agricultural lands.

Farmers are now often forced to cultivate all available land, even farming small patches resulting in the loss of field corners and strips of land at field edges and on river banks, all valuable bird habitats.

Impacts on grassland birds

Large-scale conversion of natural lowland grasslands into cropland has taken place throughout Nepal.

Lowland grasslands are of international importance for their specialist and threatened birds. Out of 35 globally threatened birds recorded in Nepal (BirdLife International 2010), over half (51%, 18 species) utilize lowland grasslands in some way. Today this habitat is much reduced in area and very fragmented. The drastic reduction in lowland grassland area must have greatly reduced populations of birds that are dependent on this habitat.

Almost all lowland grasslands now lie within protected areas (Baral and Inskipp, 2005) but even here they are at risk. Livestock grazing is by far the greatest threat to these grasslands and is illegal. Grass-cutting in summer is also illegal, but grass is highly useful to local people as livestock fodder, and for roof-thatching and basket-weaving. As there is very little tall grass available outside protected areas illegal cutting and grazing continue around all parks and reserves; prevention is a difficult task for park managers. Sukla Phanta Wildlife Reserve is the most important protected area for grassland birds. However, with the exception of the main phanta (grassland), livestock over-grazing, fodder collection and associated human disturbance are degrading all the reserve's grasslands, especially those lying close to human settlements (Baral, 1997; Baral, 2000). The Department of National Parks and Wildlife Conservation permits local people to harvest grass for a limited period annually in protected areas. This is a compromise between conservation needs and the immediate survival needs of people living adjacent to parks and reserves (Baral 2001). Annual grass harvesting has the benefit of impeding succession to woodland, but over-harvesting damages the habitat and creates disturbance.

Today, outside protected areas there are no significant remaining grassland areas that are capable of supporting threatened grassland birds. Almost all these unprotected grasslands are intensively grazed by domestic livestock all year round and face other human pressures, notably overwhelming disturbance (Baral, 2001).

As a result of serious threats to remaining lowland grasslands that arise chiefly from agriculture, 23 grassland-dependent bird species are considered at risk nationally (BCN and DNPWC 2011).

A detailed study of Nepal's lowland grasslands in Chitwan National Park and Sukla Phanta Wildlife Reserve revealed that cutting, livestock grazing and burning have significantly influenced the structure of bird communities by directly affecting grass height (Baral, 2001). Many species only live in tall grasslands (>50 cm), notably the globally threatened Bristled Grassbird *Chaetornis striatus*, Jerdon's Babbler *Chrysomma altirostre*, and Slender-billed Babbler *Turdoides longirostris* and near-threatened Rufous-rumped Grassbird *Graminicola bengalensis*, as well as some *Prinia* spp., *Saxicola* spp., Striated Grassbird *Megalurus palustris,* Yellow-eyed Babbler *Chrysomma sinense* and Chestnut-capped Babbler *Timalia pileata*. The most noticeable effect brought about by livestock grazing is the drastic decrease of grass height. Heavily grazed grasslands are suitable for species like pipits, wagtails, and larks. Although overgrazed grasslands provide habitat for many common bird species, many threatened species are absent. Grazing livestock and herders also often cause significant disturbance to and trampling of ground-nesting birds. Grasslands that are subject to frequent cutting showed drastically reduced species diversity and abundance. However, the globally threatened Swamp Francolin *Francolinus gularis* (chiefly a species of tall grassland), and pigeons and doves benefit temporarily from cutting as they have been frequently noted feeding in clearings close to tall grasslands (Baral 2001).

In the hills and mountains grasslands have been maintained by overgrazing by livestock which has prevented the regeneration of the original forest. Upland grasslands in the subtropical, temperate and subalpine zones are so denuded that the amount of seed and insect food available to birds must be much reduced. Ground-nesting birds are especially likely to be disturbed and nests trampled. In a survey of Wood Snipe *Gallinago nemoricola* in Langtang National Park, herders were found to deliberately graze their pastures intensively in order to maximize quality and productivity of their livestock. These high levels of stocking were considered to be causing unacceptable disturbance to the breeding Wood Snipe and may result in unsustainable losses of nests to trampling (Khatiwada and Chaudhary, 2008 a, b). There have been no other studies on birds in the Himalayas to show the effects of overgrazing of high altitude grasslands. Indeed, in Nepal virtually all these grasslands are highly overgrazed and there are no moderately grazed areas for comparison.

Impacts on wetland birds

Drainage for agriculture is a continuing threat to wetlands in the lowlands. Waterlogged areas and marshy ground are especially vulnerable to paddy field conversion (Bhandari, 2009; Kafle and Savillo, 2009).Unsustainable harvesting of resources is a major threat to lowland wetlands, notably at Koshi, Jagdishpur and the Ghodaghodi Lake area and is leading to the degradation of wetland habitats (Kafle *et al.*, 2007; Kafle *et al.*, 2008; Kafle and Savillo, 2009; Thapa and Dahal, 2009). Other widespread threats are diversion and abstraction of water for irrigation of farmland, (HMGN/MFSC, 2002), for example at Jagdishpur Reservoir (Ramsar Convention Secretariat, 2004).

Water pollution from agricultural chemicals has been identified as a serious threat to lowland wetlands (IUCN, 2004). Agricultural runoff and seepage of fertilizers and pesticides are also major sources of groundwater pollution in the terai. Other sources of agricultural water pollution include veterinary drugs and wastes, and effluents from veterinary drug and vaccine factories that are released into the environment. In addition, effluent from agricultural processing factories, such as sugar, breweries, leather, slaughter houses and bones, release polluting effluent to the environment (Pant, 2007).

Agricultural pollutants, including pesticides, herbicides and fertilizers can lead to severe environmental pollution that often causes habitat change and loss of biodiversity, including the loss of bird species from wetlands (Pant, 2007), see sections Pesticide Use and Fertilizer Use below.

Overgrazing of shorelines and marshes is another major threat, especially at lowland sites. At Koshi Tappu overgrazing and the movement of livestock along the shoreline contribute to soil erosion and high input of nitrogenous nutrients to the wetland, resulting in increased eutrophication of water and excessive growth of certain aquatic vegetation (IUCN Nepal, 2004).

Loss of wetlands caused by conversion to agricultural lands and diversion of water for irrigation must have caused significant declines in wetland birds, especially since the 1950s when the eradication of malaria from the terai sharply encouraged the spread of agriculture. Further, Nepal's wetland bird populations face widespread degradation of wetland habitats caused by an array of threats including many that arise from agriculture.

Lack of food, especially fish chiefly caused by over-fishing by local people was considered a major factor in the decline in numerous wetland bird species (BCN and DNPWC 2011). However, EUS disease, which has caused major fish kills in the Koshi area and is thought to probably result from water contamination by inorganic fertilizer from agricultural run-off, is likely to be another factor (see Fertilizer Use section below).

Increased water turbidity caused by soil erosion resulting from overgrazing, ploughing and work on irrigation channels by farmers may be making it difficult for fish-eating birds to locate their prey. This could be an additional reason for food shortages in fish-eating birds, for example in the lowlands at Koshi Tappu and Koshi Barrage. The Common Merganser *Mergus merganser*, a fish-eating winter visitor to Nepal's rivers, is also likely to be affected.

Wetland birds are particularly at risk. At a national level, as many as 40 wetland species (27% of the total at risk) are considered threatened. The large proportion of 75% of these (29 species) are considered Critically Endangered or Endangered (BCN and DNPWC 2011).

The Annual Midwinter Waterbird counts have highlighted a sharp drop in waterfowl numbers and species at Nepal's most important wetland, Koshi Tappu Wildlife Reserve and the Koshi Barrage area, which is of international importance. The 2010 midwinter waterbird count recorded only a total of 4,259 birds in the whole area (Baral 2010), a very low number compared to more than 50,000 birds estimated in February 1981 by observers who only viewed a limited part of the area from Koshi Barrage (Mills and Preston, 1981; Joliffe *et al.*, 1981). In recent years bird populations and species richness have also declined in Ghodaghodi Lake, Jagdishpur and in Beeshazar (Baral, 2009).

Impacts on forest birds

Continuing forest clearance is now by far the most important option utilized to make way for new agricultural lands (Bajracharya, 1983).

Forests are vitally important resources to provide fodder for the livestock of rural households, particularly in the hills and mountains. Farmers keep animals for manure, draught power and for extra income. Huge amounts of vegetation are consumed by livestock, both by roaming in the forests or where stall fed in villages (Shrestha, 1999). Demand for fodder is probably the greatest pressure on Nepal forests. Overgrazing by livestock, along with trampling contributes greatly to forest degradation (Wallace, 1988), leading to a severely reduced understory and a thinned, drier forest, with a reduced number of mature trees. Overgrazing by livestock is also reducing ringal bamboo in many areas e.g., in Dhorpatan Hunting Reserve, and herders and their dogs are causing disturbance (Subedi, 2008).

Overgrazing compacts the soil, inhibits water penetration and aeration, and more importantly prevents seeds from germinating. The seeds that do manage to grow despite this are then destroyed by grazing (Banarjee, 1995).Ultimately forests are prevented from regenerating.

Overharvesting for fodder prevents trees from flowering, producing seed and regenerating (Wallace, 1988). Overlopping, particularly during the trees' dormant season kills trees after a while (Banarjee, 1995).

Forests provide farmers with leaf litter which is used for livestock bedding during winter, and is an important source of compost used for manure during the following summer. However, in some forests, the floor is swept clean of the litter to such an extent that regeneration of seedlings is prevented, as noted in Phortse, Dudh Kosi valley, Sagarmatha National Park (Inskipp and Inskipp, 1994). During the dry season (May –June) some forests are deliberately burned to stimulate early growth of grass for livestock to graze (Bajracharya, 1983). This practice favours the spread of fire-resistant species, such as pines. Pines are often naturally succeeded by broadleaved trees, but frequent fires prevent this. As forest areas have reduced, the supply of forest fodder available to feed livestock has been declining over the years, resulting in increasing pressure on remaining forests. Ever rising livestock populations are exacerbating the over-exploitation of forests (Shrestha, 1999). Ongoing environmental degradation has resulted and is being made worse by the fragile nature of the mountain environment (Takahatake 2001).

In some areas, especially in the more remote hills, land degradation has been worsened by slash and burn agriculture (Shrestha, 1999). A direct consequence of high population growth has been rapid expansion of agriculture in environmentally sensitive and marginalized steep slopes at the cost of forest (Bhurtel and Ali, 2009; Shrestha, 1994). Terracing and overgrazing on over-steep slopes has lead to the acceleration of the already high natural soil erosion processes. Severe soil losses and landslides are widespread every monsoon season. A 2009 study to assess runoff and soil erosion in the Middle Mountains in Dhading district reported that soil loss from agricultural land (1.3 Mg ha-1 yr-1) was more than four times higher than that from forested areas (0.3 Mg ha-1 yr-1; $p<0.05$) (Tiwari *et al*., 2009). Slopes may become so degraded by erosion that they are reduced to rough grass and rocky habitats, which are only able to support a limited number of bird species.

In 1978 there was a shift in government policy from 'state-controlled' to 'community-managed' forests which has significantly improved forest management. By April 2009, one-third of Nepal's population was participating in the programme, directly managing more than a quarter of Nepal's forest area (Ojha *et al.* 2009). Communities are encouraged to protect forest resources and to plant trees on unproductive land, and being trained in biodiversity monitoring. This approach has proved to be an effective way of conserving forests and biodiversity in some areas, especially where pressures on forests are high (BCN and DNPWC 2011).

Over half (53%, 79 species) of Nepal's nationally threatened birds inhabit forests (BCN and DNPWC 2011). The high proportion of forest birds at risk can be partly attributed to forests comprising the major natural habitat in Nepal and also because forest depletion is considered one of Nepal's major environmental issues (BCN and DNPWC 2011). The replacement of forests by agricultural lands will certainly have reduced forest bird populations, while birds of open country are likely to have increased. The loss or reduction of the forest understorey caused by overgrazing and fodder collection must drastically affect bird species composition. Many species, including pheasants, babblers, warblers, chats and thrushes inhabit this part of the ecosystem.

Removal of foliage must result in forests becoming less suitable for the numerous species which require dense or moist forests. Some birds feed on branches, trunks and boulders that are moss-covered or on epiphytes that can only grow in moist forests (Inskipp, 1989), such as the globally near-threatened Rufous-throated Wren-Babbler *Spelaeornis caudatus*. Some species, including the globally near-threatened Great Hornbill *Buceros bicornis* and other hornbills, and certain large woodpeckers such as the globally threatened Great Slaty Woodpecker *Mulleripicus pulverulentus*, and nationally threatened Spot-bellied Eagle Owl *Bubo nipalensis* depend on mature trees for suitable nest sites.

Some species occur mainly in pure bamboo stands, for example the nationally threatened Golden-breasted Fulvetta *Alcippe chrysotis* and Fulvous Parrotbill *Paradoxornis fulvifrons*. Other species favour forests with a bamboo understorey, such as the globally near-threatened Satyr Tragopan *Tragopan satyra*. All these species must have been affected to some degree by bamboo losses (Inskipp, 1989).

The open forests of pines lacking undergrowth that result from frequent burning of the forest floor only support a low variety of bird species compared to the original forest. Species which prefer open forests, such as some flycatchers, must have benefited from forest thinning and burning. Presumably species which prefer scrub, such as Himalayan Bulbul *Pycnonotus leucogenys*, Grey Bushchat *Saxicola ferrea* and Striated Prinia *Prinia criniger* must have also increased as a result of the spread of secondary forest and shrubberies. However, most species in this category are common and widespread in Nepal, whilst many forest species are declining (Inskipp, 1989). Overall forest depletion can have benefited relatively few species and the populations of most Nepalese forest species are likely to have decreased, but these changes in bird populations have not been monitored in Nepal to date.

Impacts of changes in agricultural practices

Cash Crops

Nowadays many farmers are becoming more impoverished and many cannot grow enough to feed their own families throughout the year using traditional methods. In some parts of the country they are therefore shifting to cash crops.

Nepal's urban populations have been booming in recent years and have been driving agricultural changes, especially the demand for cash crops. Cultivation of these cash crops has been able to develop in farming areas close to national highways, which provide good links to towns and cities where farm produce is marketed. For example farmers in Chitwan are greatly attracted to growing cash crops of vegetables and fruits, instead of paddy and wheat as Chitwan has good road links with Kathmandu where these cash crops sell at relatively high prices. In addition, the management of Chitwan National Park has recently started to encourage local people to replace rice and wheat which are highly favoured by marauding Asian Elephant *Elephas maximus* and Greater One-horned Rhinoceros *Rhinoceros unicornis* by cash crops (TAL Program 2009, WWF Annual Report 2007, 2008).

Increases in cash crop cultivation have been promoted since the 1990s by government policies and funding has been provided by the Asian Development Bank and the World Bank. Cultivation areas and production of some cash crops sharply increased between 1964/65 and 2006/07, for example sugar cane, oil seed and vegetables. Growing vegetable crops is now one of the

Red wattled Lapwing by Jyotendra Jyu Thakuri

most valuable sources of farm income, especially in the hill and mountain regions (Pandey *et al.* 2009).

In areas where rice and wheat cultivation have been replaced by cash crops bird populations are likely to have been seriously impacted. Many species, especially those which often feed in flooded paddy fields and paddy stubbles, must have lost significant areas of habitat. For example this is noticeable in the Koshi area in the south-east terai where paddy fields have been widely replaced by vegetables and sunflowers since the1990s (H. S. Baral and C. Inskipp pers. obs.). A study of Sarus Cranes at Lumbini showed that feeding and roosting grounds were reduced and disturbed due to watermelon farming on riverbanks, and by sugarcane and banana farming in farmland (Paudel, 2009a)**.**

Several studies have shown that pesticide use on cash crops and, especially on vegetables and potatoes is especially high. For example Shrestha and Neupane (2002) found that while rice, maize, and wheat were treated with pesticide one to three times per crop cycle, the cash crops potato, tomato, cabbage, bitter gourd and cucumber were treated up to15 times. This high level of pesticide use may well be causing sharp declines bird populations and diversity. However, no studies have been made to date on the impacts of the shift to cash crops on birds in Nepal.

Pesticide use

The first chemical pesticide introduced into Nepal was DDT, during the 1950s for malaria eradication. Atreya (2007a) pointed out there are no comprehensive records indicating the volumes of pesticides used in agriculture and therefore released to the environment. The use of pesticides in lowland Nepal is significantly higher compared to the mid hills and high mountains. Growing cash crops, as well as agricultural intensification of other crops, have been leading farm workers to increase pesticide use at a rapid rate to boost yields and so meet market demand, while earning more income (Brown and Shrestha, 2000). There is widespread documentation of farmers' lack of awareness of pesticides, including impacts on the environment and the ongoing need for farmers' education and development of safety culture in pesticide use e.g. Shrestha and Neupane (2002), Palikhe (2005) and Nepal Forum for Justice (2006).

During an investigation of threats to Sarus Crane at Lumbini, Paudel (2009 a,b) carried out a survey of local markets and found that a wide range of pesticides was available and a disturbingly large range of insecticides was being used in the area. Out of 71 pesticides available locally, 23 were moderately hazardous and seven were highly hazardous according to World Health Organization standards. High illiteracy levels often led to the printed recommendations for safe use being ignored. Illiterate farmers were reliant on the dealers for advice on how to use the pesticides, so there was a high risk that they were being used inappropriately. Further, a lot of pesticides was being sold outside of the regulated trade in Lumbini (Paudel, 2009a).

Since April 2001, persistent chemical pesticides have been banned for use in agriculture and public health in Nepal. The use of hazardous pesticides, including Persistent Organic Pollutants (POPs) (organic chemicals that are resistant to environmental degradation), has also been phased out. However, Palikhe (2005) reported that, as the country has an open and porous border with India, there is a considerable, but unknown quantity of trade between farmers close to the border. Palikhe (2005) believed that the illegal import of pesticides was of serious concern in Nepal and that it needed to be addressed. The Nepal Forum for Justice (2006) shared the same view and reported that, in spite of the Pesticides Acts and Regulations, different kinds of pesticides were being used haphazardly in the country. According to Nepalese law, it is mandatory for a person or firm to acquire a certificate of registration before the import, export, sale or purchase of pesticides. However, the Nepal Forum for Justice (2006) pointed out that in practice in many parts of the country, the sale of pesticides still took place openly without following these guidelines.

Pesticide problems that have been identified to date in Nepal include pollution caused by improper handling, storage and transport, and also accidents and environmental contamination due tounsound disposal methods. Pest resistance to chemical pesticides is considered of major and increasing concern as well. However, analysis of pesticide residue in crops, food products, soil and water and the environmental effects of pesticides have not been systematically studied and monitored in Nepal (Palikhe, 2005).

Impacts of pesticides on birds and the environment

There are very few published results of the effects of pesticide contamination on the environment in Nepal. Organochlorine pesticides in the range of 34-100 parts per billion were detected in samples of fish and plankton in three lakes: Begnas, Phewa and Rupa in the Pokhara valley, west Nepal (Palikhe, 1999). High pesticide use was noted at most of the places that Sarus Cranes were recorded during a survey of the Lumbini area (Paudel, 2009a).

Groundwaters, surface waters such as ponds and streams, and the air in the vicinity of the pesticides stores are all at risk. Evidence elsewhere in the world has shown that chemical pesticide contamination can travel widely through the environment (National Toxics Network, 2007).

Many chemical pesticides, including organochlorines like DDT, remain in the environment for a very long time, do not readily break down (i.e., they are very 'persistent') and also build up in the environment, including in the bodies of humans and birds (i.e., they are bio-accumulative). Once released into the environment it is extremely difficult, if not impossible, to recover them (National
Toxics Network, 2007).

As well as being direct poisons, some pesticides, e.g., DDT, also mimic hormones and disrupt biological processes in wildlife and humans. In some cases hormone-disrupting chemicals are also very persistent and build up in the environment and body tissue. Their effects can include direct poisoning and reproductive damage (Lyons 1999; Riley et al., 1999).

The diet of certain birds, such as top predators like birds of prey, means they are particularly at risk from pesticide pollution as they store up and concentrate contaminants that they have ingested with their prey in their body fats (BirdLife International *et al.*, 1997). In the UK and the rest of Europe, pesticide use has been shown to cause widespread declines of numerous bird species, many of which were previously common, including birds of prey and finches (BirdLife International *et al*., 1997; Tucker and Heath, 1994).

In addition to direct poisoning and endocrine disruption, pesticides can have indirect effects on birds. These indirect effects are very difficult to demonstrate, but there is a large body of evidence in the U.K.suggesting these effects are key

problems. There are three possible routes by which these indirect effects can arise. Insecticides may deplete or eliminate arthropod food supplies, which are exploited by adult birds and their dependent young during the breeding season and, in so doing, reduce breeding productivity. Herbicides may reduce the abundance of, or eliminate non-crop plants that are hosts for arthropods taken as food by farmland birds during the breeding season and therefore reduce breeding activity. Herbicides may also deplete or eliminate weed species, which provide either green matter or seeds for herbivorous and seed-eating species respectively, thereby reducing survival of those birds that rely on those food supplies (Central Science Laboratory *et al*., 2005).

Although pesticides may be having serious impacts on Nepal birds and there have been indications of bird poisoning by pesticides, no Nepal studies have been published to date. In an overview of the state of Nepal's birds, BCN and DNPWC (2011) list pesticide poisoning as a possible threat to 20 species, mainly birds of prey and large waders, such as storks, including six globally threatened species: Lesser Adjutant, Pallas's Fish Eagle *Haliaeetus leucoryphus*, Indian Spotted Eagle, Greater Spotted Eagle *Aquila clanga*, Imperial Eagle *A. heliaca*, and Sarus Crane. Nationally threatened raptors that may well have been impacted by pesticides include Brahminy Kite *Haliastur indus*. This bird of prey was formerly common in the lowlands over rice fields and marshes (Rand and Fleming, 1957) but declined so sharply that it is considered Critically Endangered nationally (BCN and DNPWC 2011).

During preparations for the midwinter waterbird count in January 2010, several water birds were recorded dead, possibly due to pesticides and poisoning. These included as many as seven Lesser Adjutants (four in Urlabari and three in Chitwan (Badri Chaudhary and Bishnu Mahato pers. comm. to H. S. Baral, February 2010). In addition, at Chitwan, five Black-crowned Night Herons *Nycticorax nycticorax*, and more than 10 Indian Pond Herons were found dead on 26 December 2009 in Chitwan (Bishnu Mahato pers. comm. to H. S. Baral, February 2010). Some common open country species such as Black Drongo *Dicrurus macrocercus* may have declined in recent years as a result of direct poisoning and partially by the diminution of open spaces in the country. Preliminary observations suggest that Indian Cuckoo *Cuculus micropterus*, which is a brood parasite for the drongo has also declined (H. S. Baral pers. obs.). Further studies are needed to show the rate of decline and other factors that are causing decline of these species.

Lesser Adjutant by Jyotendra Jyu Thakuri

Alternatives to pesticides

Nepal's National Agricultural Perspective Plan has emphasized the Integrated Pest Management (IPM) approach to try and reduce pesticide use. Very few individuals are IPM-trained (Atreya, 2007b) and adoption of safety precautions and pesticide hygiene are till minimal, however (Atreya, 2007a).

Since 2004 the Bird Education Society has been carrying out a successful conservation awareness programme in the buffer zone areas around Chitwan National Park. The programme has taught farmers about the environment, introduced them to organic farming, made them aware of the dangers of over-use of pesticides and suggested alternative methods of control. The farmers were introduced to the Effective Microorganism (EM) technology, which relies on the use of natural microorganisms in the soil to fix the essential nitrogen for plant growth, as it is important that the soil should be chemical-free to ensure the survival of these microorganisms. Farmers learned how to use EM technology to produce fertilizers, recycle waste products and control crop pests. They learned the benefits of EM technology in improving soil composition and structure through an increase in humus content and the capacity to sustain high quality food production. The advantages of IPM were also covered in the programme. Field trips to an organic cooperative convinced the farmers that they could successfully produce organic food and sell it at a premium price to a growing organic market (Benstead *et al*., 2005; Chaudhary, 2005).

In 2007 and 2008, Himalayan Nature carried out a successful conservation awareness programme with farmers in Lumbini in Nepal's central lowlands. The programme aimed to create a positive attitude amongst farmers towards birds on their land, to encourage the continuation of traditional farming methods, to reduce use of chemicals, especially their haphazard and excessive use, and to encourage participatory monitoring of birds by farmers (Singh, 2007).

Fertilizer use

Nepal imports all of its chemical fertilizer. Official fertilizer imports have declined every year since 1997 when the fertilizer trade was deregulated by the government. However, when informal imports (that is they were unrecorded imports from across the open border with India) are included, total fertilizer imports can be seen to have increased annually (Thapa 2006).

Impacts of fertilizer use on birds and the environment

Impacts of fertilizer use on bird populations have been little studied so far in Nepal. The over-use of agricultural fertilizers is having a major negative impact on the environment, especially in the lowlands and lower hills. Widespread contamination of agricultural run-off by nitrogen and phosphate nutrients and eutrophication (i.e., enrichment) of lowland wetlands has resulted (IUCN, 2004; Kafle *et al*., 2007, 2008). This contamination sets off a chain of events which is harmful to freshwater life,

including birds. The growth of algae and other aquatic plants is promoted in streams and ditches draining fields and in nearby ponds and lakes. After this aquatic vegetation dies, it is broken down by bacteria, using up vital oxygen in the water in the process. Declining oxygen levels in the water eventually lead to deaths of aquatic invertebrates and fish that form essential food supplies for freshwater birds. In addition, high nitrogen and phosphate nutrients can cause the extensive proliferation of macrophyte growth over the water surface. This results in a shift in the balance of bird species as it changes areas suitable for feeding for different species. Birds such as jacanas that feed using floating vegetation are favoured at the expense of many migratory waterfowl that require open water areas for feeding (IUCN Nepal, 2004). There may also be a decline in food plants for herbivorous and omnivorous waterfowl (MacDonald, 2006).

Nakhrodi Lake in the Ghodaghodi Lake complex is being severely affected, for example. Extensive growth of macrophytes has developed in the lake. After dying back, these plants have contributed to the organic material on the lake bottom, raising it and accelerating seral succession towards dry land. In Nakhrodi, the succession is rapid as the waters are shallow. The lake is now changing into marshland where *Salix* species and the alien *Ipomoea fistulosa* are prominent. Changes in bird populations have been especially marked, with egrets, storks and jacanas replacing waterfowl, for instance (IUCN, Nepal, 2004). Other Ramsar sites where eutrophication from agricultural run-off is a problem are Beeshazar, Jagdishpur and Koshi (Kafle *et al.*, 2007; 2008; Baral, 2008).

Fish-eating birds that chase their prey may be negatively affected by eutrophication as water transparency tends to be reduced. Nutrient enrichment may also alter the size class of fish prey, reducing the abundance of suitable small individuals (MacDonald, 2006). Eutrophic conditions also radically change the bottom-dwelling invertebrate fauna, leading to a loss of some species, such as molluscs. Diving birds that feed on these invertebrates suffer from reduced food supply (MacDonald, 2006).

Use of agricultural chemicals on cultivated land adjacent to the Koshi Tappu area is prevalent. Epizootic Ulcerative Syndrome (EUS) has been reported in the area since 1983, where it has caused high mortality of native fish resources. EUS is a disease caused by the fungus *Aphanomyces invadans* in the internal tissue of fish. It is suspected that the source of contamination of EUS is the excessive use of inorganic fertilizers in the adjacent farmlands and their mixing in the lake system. In Koshi Tappu many of the wetlands have changed from mesotrophic to eutrophic due to the accumulation of nutrients from both natural and human activities (the latter including from agriculture, as well as domestic sewage (IUCN 2004; Kafle *et al.*, 2008).

Use of Diclofenac

Poisoning by diclofenac, a drug used for livestock ailments that led to drastic declines in vulture populations in Nepal and conservation efforts to restore vulture populations have been well documented (e.g. Oaks *et al.* 2004; Shultz *et al.* 2004, DNPWC *et al.* 2009; BCN and DNPWC 2011). White-rumped Vulture (formerly the most common Nepal vulture up to 1000 m) and the once fairly common and widespread Slender-billed Vulture *G. tenuirostris* are now listed as nationally Critically Endangered. White-rumped Vulture is showing signs of recovery in a few places in response to conservation measures. However there is no evidence of any recovery in Slender-billed Vulture. Other Nepal vultures have also declined, possibly also due to diclofenac use and are on the nationally threatened list: Egyptian Vulture *Neophron percnopterus*, Red-headed Vulture *Sarcogyps calvus*, Cinereous Vulture *Aegypius monachus*, Himalayan Griffon *Gyps himalayensis* and Lammergeier *Gypaetus barbatus* (BCN and DNPWC 2011).

The veterinary production of diclofenac was banned in Nepal in 2006 and the Vulture Conservation Action Plan for Nepal (2009-2013) (DNPWC *et al.* 2009) has helped to prioritise and streamline conservation activities. These activities include the promotion of safe alternative drugs such as meloxicam, setting up of Vulture Safe Zones (which are diclofenac-free), carrying out intensive advocacy campaigns, surveys of vulture populations, nesting colonies, and breeding success, and surveys of veterinary institutions to monitor the use of Non Steroidal Anti-inflammatory Drugs (NSAIDs) (BCN and DNPWC 2011).

High Yielding Varieties (HYVs)

Recently there has been a shift to the use of HYVs of rice. However, access to these HYVs is usually limited and the varieties that are available often require the application of significant commercial fertilizers. This becomes a huge burden upon the poorer rice farmers who lack the finances to manage such inputs. Many farmers in Nepal therefore grow only traditional varieties of rice (Television Trust for Environment, 2004). The spread of HYVs and associated technologies has been very limited and concentrated in pockets of favourable irrigated areas (Joshi and Pandey 2005).

However, it is possible that the use of HYVs will become more widespread in the future. The increased nitrogen input which is needed to support HYVs reduces the diversity of plants and associated invertebrates which are important food sources for farmland birds. Excessive use of nitrogen also enhances plant pests, triggering high pesticide use, further harming farmland birds (Van der Weijen *et al.*, 2010).

System of Rice Intensification (SRI)

SRI is a new method of rice growing that has been shown to more than double rice yields in trials in Nepal. It was first trialled in Nepal in 2002 and has only been used in relatively small areas to date, although its popularity is growing. SRI requires damp soils, but fields do not need to be flooded, so it is less water-demanding and no chemical pesticides or fertilizers are needed. (Uprety, 2004; SRI Group, 2009).

If use of SRI becomes widespread the replacement of flooded fields by damp soils will be detrimental to many wetland species, such as ducks that forage in shallow waters. However, a large number of bird species, including some large wading birds such as Lesser Adjutant, other stork species, Black-headed Ibis, and numerous waders should find the damp soils good feeding habitat. The absence of use of chemical pesticides and fertilizers in SRI will certainly benefit birds. No studies have so far been made comparing bird populations and diversity in fields under SRI or those using HYVs and traditional methods.

Use of machinery

In some of the important districts that have rich farmlife, including Rupandehi, Kapilvastu, Nawalparasi and Chitwan, machines are now being used for harvesting (combine harvesters) and also for sowing seeds without tillage. Combine harvesters have the advantage to farmers of reducing grain wastage, saving time and also cost effectiveness. Another factor is that Nepal farms have been facing a labour shortage for a number of years since the Maoist insurgency period as most young people have left the country in search of work.. This has also prompted many

farmers to take the option of using machinery.

Possible impacts of such machinery at work are that the fields will be enlarged so reducing the number of earth bunds which are good habitat for farmland birds. Using machinery will also encourage farmers to cultivate relatively unproductive land which was previously left fallow. As combine harvesters will be more efficient, there is likely to be less left over grain for farmland birds compared to land which is traditionally farmed.

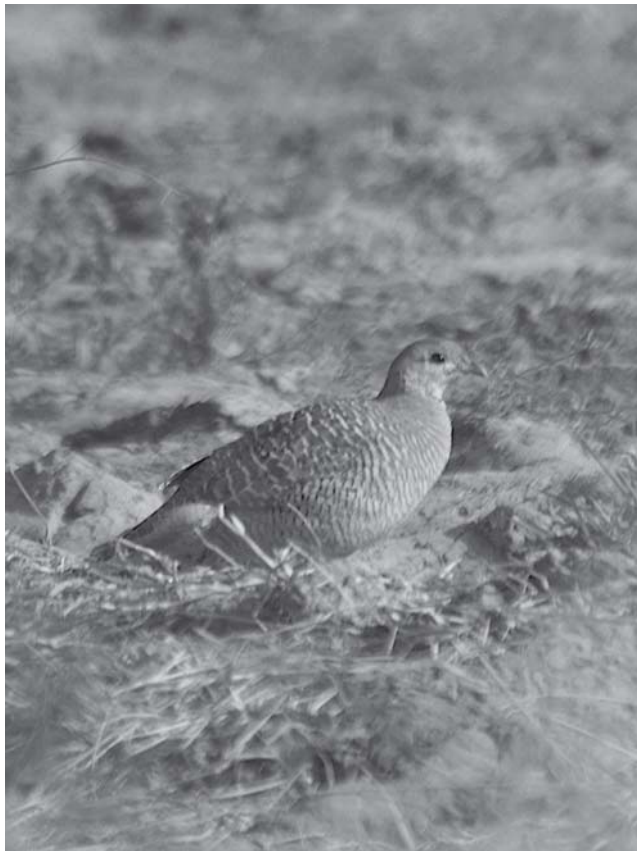
Conclusion

The spread of agriculture and changes in agricultural practices are the major root causes of loss and damage to natural habitats – grasslands, wetlands and forests and their bird species in Nepal. Overgrazing by livestock and collection of fodder are the most important threats leading to depletion of forests and presenting major problems to lowland grasslands. Livestock overgrazing is also responsible for damage wetland shorelines and marshes, and to the diversity of upland grasslands. Pollution from a wide range of agricultural sources makes a major contribution to pollution of wetlands. The use of diclofenac as a veterinary medication on cattle is believed to be the major cause for the population decline of all vulture species in Nepal. Pesticides could be a significant threat to many other species, especially birds of prey and large wading birds, while the over-use of fertilizers leads to enrichment of water which is harmful to freshwater life, including birds.

Recommendations

Government measures to promote and expand implementation of the System of Rice Intensification (SRI).

Government farming subsidies Provision of subsidies to maintain traditional farming crops such as millet and barley, to keep land fallow for a period and to leave some field margins and corners uncultivated.



Grey Francolin by Jyotendra Jyu Thakuri

Government measures to promote organic agriculture (which is currently small-scale in Nepal).

Implementation of further Effective Microorganism (EM) awareness programmes for farmers These programmes would be especially useful in the buffer zones of protected areas.

Field surveys There is an urgent need in Nepal to significantly expand the monitoring of bird populations and distribution in agricultural lands to determine the impacts of current agricultural practices. Bird species diversity and bird populations in traditionally managed farms need to be determined at a range of altitudes from the terai up to the middle hills. These data from traditional farms can be compared with data on bird species diversity and populations gathered from farms growing cash crops and also those with rice-vegetable cropping systems at similar altitudes. Equally useful would be surveys of the impacts of pesticides, the use of HYVs and SRIs and more fieldwork on fertilizer use.

Provision of nest boxes Where there is adequate protection for other nesting birds such as bushes, providing nest boxes in farmland for owls, such as Spotted Owlet and Jungle Owlet *Glaucidium radiatum* will help to control mice and rat pests. Nest boxes in agroforestry areas and orchards for tits *Parus* spp. will help to control insect pests.

Outreach Awareness-raising, education and support for farmers to apply best practice as carried out in farmlands of Lumbini by Himalayan Nature and in the buffer zone around Chitwan National Park by the Bird Education Society.

Van der Wejden *et al.* (2010) made the following additional recommendations to support farmland birds across the world, all of which would be valuable if implemented in Nepal:

Best Practice Identify and further develop best practice for sustainable bird-friendly farming.

Innovation Develop sustainable farming systems that are highly productive in terms of food as well as ecosystem services, and contain important microhabitats and niches for birds. Explore the actual and potential benefits of birds to farming too.

Ecosystem services Assess and reward farmers supporting services such as soil conservation, water retention, carbon storage and biodiversity, including birdlife.

Partnerships Develop cooperation between all stakeholders including conservationists, farmers, retailers, consumers and government authorities.

This article is a summary of a much more detailed account: Inskipp, C. and Baral, H. S. (2011) Potential impacts of agriculture on Nepal bird. *Our Nature (2010)* **8:270-312. http://www.nepjol.info/index.php/ON**

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Carol Inskipp, 1 Herneside, Welney, Wisbech, Cambs PE14 9SB, UK carol.inskipp@btinternet.com
Hem Sagar Baral, Himalayan Nature, PO Box 10918, Lazimpat, Kathmandu. hem.baral@gmail.com

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BirdLife International is a global conservation federation with a worldwide network of Partner organizations, Representatives and committed individuals.

BirdLife International seeks to conserve all bird species on earth and their habitats and, through this, it works for the world's biological diversity. It recognizes that the problems affecting birds, their habitats and our global environment are linked inseparably with social, economic and cultural factors and that these can only be resolved if human societies function in an ecologically sustainable manner and if the needs, welfare and aspirations of people form a part of all conservation action.

Birds provide BirdLife International with a uniquely valuable focus: they are sensitive indicators of biological richness and environmental trends and fulfil many key ecological functions; they contribute greatly to our understanding of natural processes; they are an important economic resource; and they have inspired and delighted people of many cultures for centuries, which makes them excellent ambassadors for the promotion of conservation awareness and international collaboration.

BirdLife International pursues a programme of:

- Scientific research and analysis to identify and monitor worldwide the most threatened bird species and the most critical sites for the conservation of avian diversity;
- Advocacy and policy development to promote the conservation of birds and biodiversity through sustainability in the use of all natural resources;
- Field action and country conservation programmes, ranging from community-based land-use and management projects to species recovery programmes benefiting both wildlife and humans;
- Network and capacity building to expand and strengthen the global partnership of conservation organizations and to promote worldwide interest in the conservation of birds and the wider environment.

News

Membership

Mr Deepak Shrestha working as Finance Manager in SBH Trading Pvt. Ltd. joined BCN as a Life Member. He is a keen birdwatcher and regularly participate BCN's birdwatching events. He also strongly supports our bird conservation initiatives.

Mr Ram Mani Sapkota joined BCN as a Life Member. He loves birds and is very much dedicated on bird conservation activities.

Ms Sunita Gurung working as a trekking guide in 3 Sister's Trekking Adventure Pvt. Ltd. has joined BCN as a Life Member. She is a very good bird watcher and strong supporter of BCN.

Mr Hem Bahadur Gurung joined BCN as a Life Member. He is the Director in Himal Consult As. He strongly supports nature conservation.

Mr Anil Prajapati joined BCN as a Life Member. With forestry background, he is a dedicated birdwatcher and a good supporter of BCN.

Mrs Froeydis Kraloey joined as a Friends of BCN. She is currently working as Environment Advisor in Norwegian Ornithological Society, BirdLife partner in Norway.

Mr Kjetil Solbankken joined as a Friends of BCN. He is the Director of Norwegian Ornithological Society and also a very good birder.

Baishnavi Services Pvt. Ltd. joined BCN as a Corporate Member. This travel company has been very supportive in various programme organised by BCN.

Urban Bird and Wildlife Conservation Education in Kathmandu Valley

Environmental education for urban bird and wildlife conservation was carried in various schools and communities of Kathmandu Valley. This has been conducted through classroom sessions and also field visits to the Bagmati Nature Park, Jwagal. This education programme was kindly supported by the Taiwan Forestry Bureau.

BCN Promotion at International Elephant Race

A stall of Bird conservation Nepal was placed on 8th International Elephant Race 2011 which was held in Sauraha, Chitwan from 26 -28 December. Informative leaflets, brochure and posters were distributed during the event. Also our publications, badges, t-shirts, birdwatching jackets etc were on display and for sale. The program was organised by the Regional Hotel Association Nepal,Chitwan.

Vulture Awareness and Sensitization Programme

Vulture awareness and sensitization programme was conducted in seven districts; Palpa, Nawalparasi, Dang, Kailali, Kanchanpur,Arghakanchi and Kapilvastu. The aim of the program was to enhance the capacity of local community in Vulture conservation work and the target audience was Community Forest User Groups (CFUGs). The programme helped to enhance the knowledge of CFUGs on overall history and recent updates of vulture conservation, ecology of vultures, nest monitoring, Non-steroidal and Anti-Inflamatory Drugs (NSAIDs) monitoring, role of community forest in vulture conservation and planning on vulture conservation from local level.

New Colony Aviary Construction at VCBC, Kasara

Construction of additional new colony aviary has been initiated in the VCBC, Kasara to provide good space and facility for vultures to breed. The existing colony aviary is now housing 60 White rumped Vultures. The UK government's Darwin initiative fund has supported the new colony aviary construction.

A plaque naming Jennifer Headly who supported the construction of the first colony aviary has also been placed.

Eco-tourism Promotion Training in Dang

Eco-tourism promotion training was conducted on 13 and 14 October 2011, at Bijauri, Dang. The aim of the training was to aware the community on principles of eco-tourism, its importance and income generation through eco-tourism. Altogether 45 locals who are closely involved in vulture conservation participated in the training.

Vulture Nesting Colony and NSAID Monitoring

Vulture nesting colony and NSAID monitoring is being conducted in various important districts. New colonies of White-backed Vulture were found in Rupandehi and Kapilvastu districts. 36 Occupied nests of White-backed Vulture were recorded in Rampur Valley where it was only 21 occupied nests in 2010/11 breeding season.

Information Centre Set Up at Vulture Safe Feeding Site, Ghachowk, Kaski

BCN supported Vulture Conservation Management Committee, Ghachowk, Kaski has signed an MoU with Shree Suklagandaki Higher Secondary School for providing a room to establish visitor information centre and their office for 10 years. The room has been furnished and information materials are placed with support from Para Hawking Pvt. Ltd.

Api Nampa Conservation Area (ANCA) Bird Survey

BCN jointly with DNPWC is conducting a bird survey of newly designated Api Nampa Conservation Area. This detailed ornithological survey will help to generate knowledge on bird diversity and bird rich areas within ANCA for the better biodiversity conservation and its management.

First field work was carried out along the two major river belts i.e. Mahakali and Chameliya from 15 to 24 December 2011. Altogether 17 VDCs (Latinath, Guljar, Khandeshwori, Ghusa, Sitola, Sipti, Khar, Khalanga, Chhapari, Bramhadev, Dhari, Piparchauri, Huti, Dhaulakot, Sunsera, Rapla and Byaas) were surveyed covering major habitat types.

Orientation Meeting at Godawari

An orientation meeting entitled "Promotion of environment and birdwatching tourism at Phulchowki Mountain Forest" was organized on 12 November 2011 at Godawari. The meeting was organised to make aware about importance of Phulchowki Mountain Forest among the stakeholders and to discuss on managing the current security issue for visitors.

Expert Consultation Meeting on Darwin Ecosystem Services Project

Expert consultation meeting to do rapid assessment of ecosystem services in Important Bird Areas of Nepal was

organised on 3 November 2011. of six Important Bird Areas (IBAs): Sagarmatha National Park, Jagdishpur Reservior, Ghodaghodi Lake, Makalu Barun Conservation Area, Annapurna Conservation Area, Mai Valley Forest of Nepal was organised on. The meeting was very useful in collecting information on land cover types, ecosystem services and benefits as well as the possible alternative state of various IBA sites. Representatives from various organisations who had working experience in respective IBAs actively participated in the meeting and made valuable contribution.

The meeting also discussed on main contents that needs to be covered in the National report of the Darwin project.

Strategic Planning Workshop

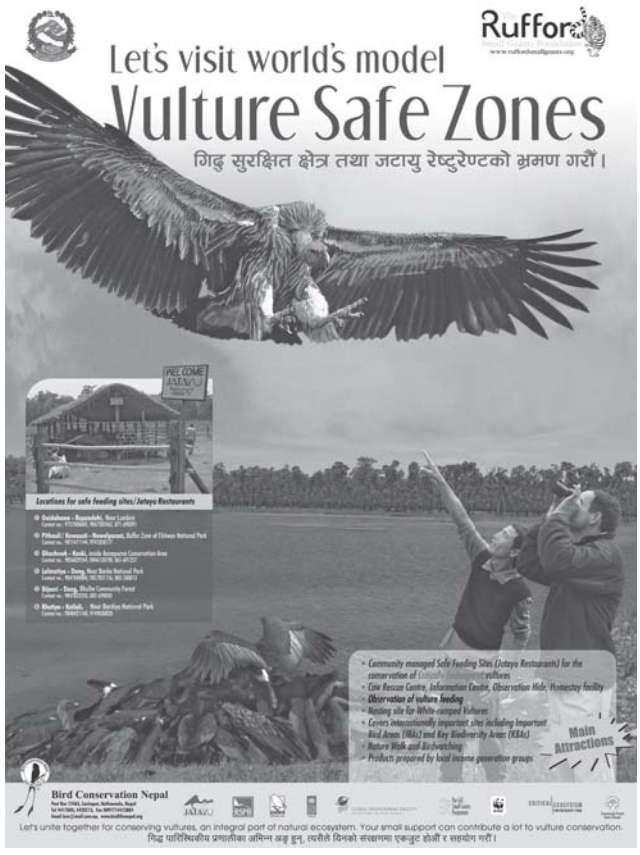
BCN Strategic Planning Workshop was organised on 5 November 2011 at Hotel Shangrila to prepare new Strategic Plan 2012-2016. Professionals from conservation partners, BCN staff, Advisors, EC members, representative from BirdLife International and RSPB contributed in the workshop. The workshop was facilitated by Prof. Chiranjibi Upadhaya.

The workshop was very useful in giving a new vision, mission and goal along with 4 main strategies Organisational capacity enhancement, Saving species, Saving sites and habitats and working with people to BCN.

New Posters

Tourism promotion poster for Six Jatayu Restaurants of Nepal has been printed. The objective of this poster is to promote tourism in Vulture Safe Zones of Nepal. Major attractions of the restaurants have been mentioned and designed in attractive way.

Similarly, a small size Ramayan Posters has been printed. This poster is believed to disseminate the importance of Vulture in Hindu Religion as a supporter of truth and justice.



SAVE Board Meeting at Pinjore

Representative from BCN, NTNC and DNPWC participated in the SAVE board meeting 18 November 2011 in Pinjore, Haryana. Presentations on the Vulture conservation breeding centre and the vulture safe zone work from Nepal was made in the programme. Plans for strengthening vulture conservation work in the region with strong collaboration were discussed in the meeting.

BCN Representation in UNFCCC, Durban

Dr. Hum Gurung, Chief Executive Officer delivered a presentation on the Impacts of Climate Change on the Birds and other forms of Biodiversity in Asia at the UNFCCC CoP 17 Side Event which was organised by the BirdLife Africa on 1 December 2011.

Similarly, BirdLife International workshop was held on 3 December 2011 at Paradise Nature Reserve to review the progress of BirdLife International's climate change and other projects. Dr Gurung also delivered a talk programme on the ongoing Ecosystem Services Project which is supported by Darwin Initiative and implemented in Nepal since 2010 in partnership with BirdLife International.

Staff Training

Vulture Field Biologist, Mr. Khadananda Paudel participated in "EDGE Conservation Tools and Training Course" organized by Zoological Society of London (ZSL) which was held from 31 October – 28 November 2011, at National Trust for Nature (NTNC) Biodiversity Conservation Centre in Chitwan. The course provided intensive training in techniques for designing and implementing successful conservation projects and had a large practical component, including completion of a mini research project utilizing the tools and techniques learnt during the course.

The newsletter is produced quarterly for members of Bird Conservation Nepal. The aim of the newsletter is to inform BCN members on the recent development of ornithology in Nepal and any other relevant news on birds. It is circulated to all members free of cost. The individual annual membership is NRs. 300 for any SAARC nationals and equivalent Nepali rupees of US$ 15.00 for others to join as Friends of BCN.

Those who would like to donate to or be a member of BCN can do so by a direct bank transfer, to the bank details below, or via cheque. Cheques should be made payable to Bird Conservation Nepal and sent to the address below.

Sunrise Bank Limited, Gairidhara
A/C No: 002 00200026CL
Account Holder: **Bird Conservation Nepal**
SWIFT CODE: SRBLNPKA

नेपाल पंछी संरक्षण संघ

Bird Conservation Nepal

Established in 1982, Bird Conservation Nepal (BCN) is the leading organisation in Nepal, focussing on conservation of birds, their habitats and sites. It seeks to promote interest in birds among the general public, encourage research on birds, identify major threats to birds' continued survival. As a result, BCN is the foremost scientific authority providing accurate information on birds and their habitats throughout Nepal. We provide scientific data and expertise on birds for the Government of Nepal (GoN) through the Department of National Parks and Wildlife Conservation (DNPWC) and work closely in birds and biodiversity conservation throughout the country.

BCN is a membership-based organisation with a founding President, patrons, life members, ordinary members, friends of BCN and active supporters. Our membership provides strength to the society and is drawn from people of all walks of life from students, professionals and conservationists. Our members act collectively to set the organisation's strategic agenda.

We are committed to showing the value of birds and their special relationship with people. As such, we strongly advocate the need for peoples' participation as future stewards to attain long-term conservation goal.

As the Nepalese partner of BirdLife International, a network of more than 110 organisations around the world, BCN also works on a worldwide agenda to conserve the world's birds and their habitats.

For further information please contact:

Bird Conservation Nepal
Post Box 12465, Lazimpat, Kathmandu, Nepal
Tel 4417805, 4420213, Fax 0097714413884
Email bcn@mail.com.np
www.birdlifenepal.org

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