

Ornithological Survey of Upper Mustang

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“In our view, birds show the perennial beauty of creation and together with other fauna, and their landscape, they make up the natural heritage of a nation. Universally, birds also embody the aesthetic principle in color.”

-- Late Majesty King Birendra Bir Bikram Shah Dev

Executive Summary

There are two major habitat zones in Upper Mustang namely the Tibetan Steppe and Alpine meadows. Several sites were visited across the Upper Mustang area for bird sampling. Bird records were taken from dawn till dusk. Transect is the major trail and the herding track of the natives. These transect routes were drawn with the help of GPS. Altogether 96 bird species were observed during the field survey period of 24 days. In an average 22.9 bird species were observed in a day. Highest in a day was 32 species in the Samar and lowest is 11 species at Itiphule. Highest number of bird species observed at Samar at 3700m could be attributed to the Birch forest along with shrub, streams and cultivated fields. According to foraging-habit group majority were arboreal (69.8%), these birds requires some type of perch for feeding. Similarly, observation according to forage guild, majority were insectivores (58.3%), followed by granivores that eats seeds, nuts and berries (20.8%). Carnivores consists 12.5% and only 8.3% were omnivores. Of the bird observed 63.5% were of rare category i.e., the sighting is less than .24rf. It indicates that the higher number of bird communities in the region need ample conservation efforts to increase their number. And only one species is considered as common i.e. Himalayan Griffon. There is a steady increase of new bird species sighting for first five days. Majority of the birds observed during the survey period were breeding resident (61.5%) followed by summer visitor (32.3%) for breeding. There shall be great seasonal differences in the annual bird species composition in Upper Mustang. Upper Mustang is a significant place for nesting vultures. Vulture (specially Himalayan Griffons) benefits from the sky burial of human corps practiced by the native Buddhists community. Vultures were found utilizing abandoned caves of Ghemi and Chosyar for nesting. The annotated bird checklist suggests that nearly 49% of the birds of Upper Mustang are breeding residents followed by summer visitors (close to 36%) for breeding. The restricted-range avifauna of conservation significance found in Mustang are Tibetan Snowcock (*Tetraogallus tibetanus*), Tibetan Partridge (*Perdix hodgsoniae*), Little Owl (*Athene noctua*), newly reported Tibetan Sandgrouse (*Syrrhaptes tibetanus*), Desert Wheatear (*Oenanthe deserti deserti*), Horned Lark (*Eremophila alpestris*), Hume's Short-toed Lark (*Calandrella acutirostris*), Plain-backed Snowfinch (*Montifringilla blanfordi*), Tibetan Snowfinch (*Montifringilla adamsi*) and Brandt's Mountain Finch (*Leucosticte brandti*). The restricted range bird species attracts bird watching tourism. The mega-avifauna that would attract the visitors are the Lammergeier with 9ft wingspan, the soaring Himalayan Griffons, and the acrobats of Raven and Golden Eagle. There are eight CITES listed species occurring in Upper Mustang; one in Appendix I, four in Appendix II and three in Appendix III. The diverse microhabitat and microclimate available in Upper Mustang provide a haven for trans-himalayan bird conservation.

Acronym used

ACAP	Annapurna Conservation Area Project
ADB	Asian Development Bank
BCDP	Biodiversity Conservation Database Project
BLI	Birdlife International
BPP	Biodiversity Profiles Project
CITES	Convention on International Trade Of Endangered Species
DNPWC	Department Of National Parks And Wildlife Conservation
GEF	Global Environment Facility
GPS	Global Positioning System
HMG	His Majesty's Government
KMTNC	King Mahendra Trust For Nature Conservation
MOFSC	Ministry of Forests and Soil Conservation
NPWC	National Parks And Wildlife Conservation
NRCA	Natural Resource Conservation Assistant
NRDB	National Red Data Book
PAR	Participatory Action Research
SPNP	Shey-Phoksundo National Park
UMBCP	Upper Mustang Biodiversity Conservation Project
UNDP	United National Development Program
WHS	World Heritage Site

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Ornithological Survey of Upper Mustang

1. Introduction

Upper Mustang with an area of 2567 sq. km covers the northern half of Mustang District (Ale. eds. 2002). The people of Upper Mustang practice a combination of livestock farming, agriculture and trade. Their life style resembles to that of the medieval Tibetan farmers, business entrepreneurs, nomadic and semi nomadic pastoralists. The marginal land between the Himalaya and Tibetan plateau of Upper Mustang support a unique Trans-Himalayan ecosystem and biodiversity. It is a habitation for nesting and a migratory passage to diverse birds species. It is believed that until few hundred years ago rainfall was adequate in the region to grow tree and shrubs. The large wooden pillars of monastery built centuries ago in LoManthang suggest the existence of conifer forest in pockets of Upper Mustang. Currently remnant forest exists in some locations. Beside the locals, the Khampa rebels from Tibetan frontier harvested timber in greater volume to construct their camps and for fuel in the 60 and 70's. Local concedes that they are also responsible for the slaughter of many game birds, large ungulates and carnivores (chiefly Wild Yak, Blue Sheep and Snow Leopard). Occasional incursions by Chinese border patrol on Nepalese territory is reported by locals. The Wild Yak seems to have extirpated but the recent sighting of Nayan (Argali), Kiang (Wild Ass) and Tibetan Gazelles encourages hope for the revival of endangered large mammals of the region. The locals concede the occurrence of globally threatened Black-necked Cranes (locally known as *tung tung*) in the region, but it requires confirmation.

The Upper Mustang Biodiversity Conservation Project (UMBCP) is undertaken by King Mahendra Trust for Nature Conservation funded through UNDP/GEF to restore its ecology and economy, thereby preserving a unique example of high altitude biodiversity of the Trans-Himalayan region. It is under consideration for nomination as a World Heritage Site of Natural and Cultural Value.

1.1 Justification

Mustang is the least studied area in terms of ornithology. The extension of Tibetan plateau is the landmark to study the bird representatives of the European realms and unique Tibetan species. Because of its restricted status and the harsh weather condition not many scientists have visited this area. Even during the given opportunity the stay is limited. The culture of Buddhist community allows the animals of this area to thrive in peaceful harmony. The Upper Mustang Biodiversity Conservation Project (UMBCP) on the auspices of KMTNC/ACAP gave impetus to preserve nature and culture of Mustang.

The reconnaissance team has recorded 63 bird species of which eight species were nesting (Shah, 2001). Similarly the team led by Shah (2002) was able to confirm the sighting of Tibetan Sandgrouse for the first time in Nepal from Damodar Kund, UMBCP (Kantipur, Bhadra 27, 2059). Hari Sharan Nepali (Kazi) was able to describe three new Snowfinches (White-rumped, Rufous-necked, and Plain-backed) along with other 94 species from Upper Mustang in 1977. The annotated checklist is based upon the findings of Kazi 1977 and '78, Shah 2001 and Suwal, 2002.

1.2 Study period

The study was carried out from 14th August to 7th September 2002. The late summer season was chosen to confirm the breeding birds of the area.

1.3 Objective of the survey

To create a database of bird found in Upper Mustang

To identify the keystone bird species of global significance

To identify the limiting factors, habitat requirement and seasonal movement of birds

To identify the threats to globally threatened bird species.

To develop a conservation strategy viable in Upper Mustang

To find out the hot spots for bird conservation in Upper Mustang

To develop a community bird monitoring guidelines

To promote bird watching tourism in Upper Mustang

Map 1

Upper Mustang Bird Survey Route 2002

Autonomous Region of Tibet/China



Source:UMBCP 2002

1.4 Study Area

Mustang District lies in the Dhaulagiri Zone of Western Development Region. Manang district lies in the east, Dolpa in the west and Myagdi in the South of Mustang. The northern area is bordered with Tibet, the autonomous region of China. It is one of the remote districts of Nepal.

Upper Mustang lies behind the Annapurna and Dhaulagiri Himalayan range and is described as the Trans-Himalayan Physiographic region. It represents unique transition zone between the Tibetan Plateau and the Himalayan Range. The Himalayan range deprives the area from the monsoon rain bearing clouds of the south and blocks the chilling winds coming from Tibet. Thus the area is arid, windy and cold. The area between Jomsom and Tsaile (altitude 2800m – 3000m) can be described as the wind tunnel; it experiences the winds measuring average 30 - 35 knots every day. The wind subsides above the river gorges (4000 meters and above). The area above 4000m can be described as the alpine meadows with plenty of moisture (fog, sleet, drizzles, rain and snow) brought by the weak monsoon clouds that came through the Kali Gandaki Gorge.

Kali Gandaki River is the major drainage system of this area. Geologically the area is once described as the seabed of Tethys. The evidence of the Tethys Sea is demonstrated by the presence of ammonites. Himalayan Mountain is formed due to the collision of the Indian and Tibetan Plate. Kali Gandaki River made its way south by eroding the rising Himalayan range. The river has formed the world's deepest gorge between the two mighty Himalayan Ranges the Annapurna 8019m and the Dhaulagiri 8167m. Other important peak of the area includes Bhrikuti Himal, Mustang Himal etc.

The landscape of Mustang is often steep, river valleys, gorges, alpine meadows, rocky and snow-covered mountain. There are also gentle slope to plains and arable terraces.

1.5 Methodology

- Several sites were visited across the Upper Mustang area for bird sampling. Bird records were taken from dawn till dusk. Transect is the major trail and the herding tracks of the natives. These transect routes were drawn with the help of GPS. These transect if followed periodically could make a base for monitoring the key stone bird communities.
- Nesting location of birds of prey is confirmed by GPS. The nesting status will be a key feature for monitoring the birds in the future.
- Nikon 10x40 Binoculars and a 15x 20 Bushnell telescope were used to identify the birds.
- Bird identification reference is made with the help of Grimmett et. al., 2000. Birds of Nepal, Helm Field Guides

1.6 Limitations of the study

Time budget is the main constraint to cover the entire area. Adverse weather condition such as hail and rain has hampered the bird observation at times during the field survey. The swollen river and steep terrain and high altitude hampered reaching some destinations.

Map 2

Landuse map of Upper Mustang



Source : UMBCP 2002

LEGEND

□ VDC boundary

Landuse categories

Agriculture land (31.34 sq. km.)

□ Grazing land (1,22098 sq.km.)

□ Shrub land (22.10 sq.km.)

■ Forest (0.48 sq.km.)

□ Barren land (1,284.62 sq.km)

■ Waterbodies (8.04 sq.km)

1.7 Bird habitats of Upper Mustang

Wildlife populations are governed by availability of food, cover and habitat conditions. Habitat conditions also indicate healthiness of an ecosystem and presence or absence of particular wildlife species (Shah, 2001).

There are two major habitat zones in Upper Mustang namely the Tibetan Steppe and Alpine meadows. Although details of habitat quality can be assessed through the use of Habitat Suitability Index Models, Life Form approach and Guilding approach, a general overview of habitat in terms of vegetation type, land use and geo-topographical features can also help in general predictions (KMTNC/BCDP, 1994). Thus, based on the habitat characteristics of the area provided by KMTNC/BCDP (1994) and findings of present survey, the available bird habitats of the area are as follows.

<i>Betula utilis</i> forest at Samar

1.7.1 *Betula utilis* Forest Habitat

A small patch of this type of forest exists above the Ghyakar and Samar village at about 3800m. This is the only broad-leafed forest occurring at Upper Mustang though the area of coverage is less than a .5 sq. km. Hence it is a significant forest ecosystem for bird and overall biodiversity conservation. It is in a degraded stage, and need immediate conservation measure. Similarly shrubland (Juniper growth) coverage found around Samar covers only 22 sq. km (Ale ed 2002).

Sacred grove of
Populus ciliata at
Tsarang

1.7.2 *Populus ciliata* Strands Habitat

This is found in irregular patches usually in moist area along the riverbeds. Two of such patches have been observed along Quomona Khola above the Ghemi village (Shah, 2001). Several patches of this type of trees are grown at the edges of cultivation and streams near the settlements. Local also set aside sacred groves of this species in each and every village. Several sacred groves are used by Black Kites for nesting and roosting.

Tibetan plateau
bordering Nepal

1.7.3 Dry Alpine Scrub/bush Habitat

North and northwest of Dhaulagiri and Annapurna the country is almost treeless with a climate and flora of Tibetan Steppe Character. Characteristic species include White-browed Tit Warbler *Leptopoeile sophiae* and Fire-fronted Serin *Serinus pusillus* and, in summer, Desert Wheatear *Oenanthe deserti* and Blue Rock Thrush *Monticola solitarius* (Grimmett et. al. 2000).

This is the most unique habitat predominates from 2900m-4000m of the Upper Mustang. The representative species are *Juniperus indica*, *Hippophae tibetana*, *Rhododendron lepidotum*, *Lonicera obovata*, *Ephedra gerardiana*, *Spiraea arcuata*, *Cotoneaster spp.*, *Caragana spp.*, *Berberis spp etc* (KMTNC/BCDP 1994). Tree species like *Pinus wallichiana* and *Populus ciliata* are found within this habitat in negligible number. In some parts *Hippophae tibetana* is found in scattered form mostly from 3700m around the cultivated areas and up to the 4100m to the Tibetan border side.

1.7.4 Alpine meadows

Alpine meadows lie between the tree line and the region of permanent snow. All high-altitude pastures with gentle slopes to flat lands consist of alpine meadows. The habitat is highly favored by wild ungulates and domestic livestock. This habitat is characterized by moist soil and air and high biomass production. It may be covered under the snow during winter.

This is the dominant habitat of the area, which occurs usually above 4000m. Alpine scrub, including rhododendron and juniper, grows as high as 4870m in places. Notably, the internationally threatened Wood Snipe *Gallinago nemoricola*, breeds in alpine meadow with scattered bushes and streams. Other breeding species include Tibetan Snowcock *Tetraogallus tibetanus*, Robin Accentor *Prunella rubeculoides* and Grandala *Grandala coelicolor* that occur as high as 5500m (Grimmett et. al. 2000).

Riverbed at Arka

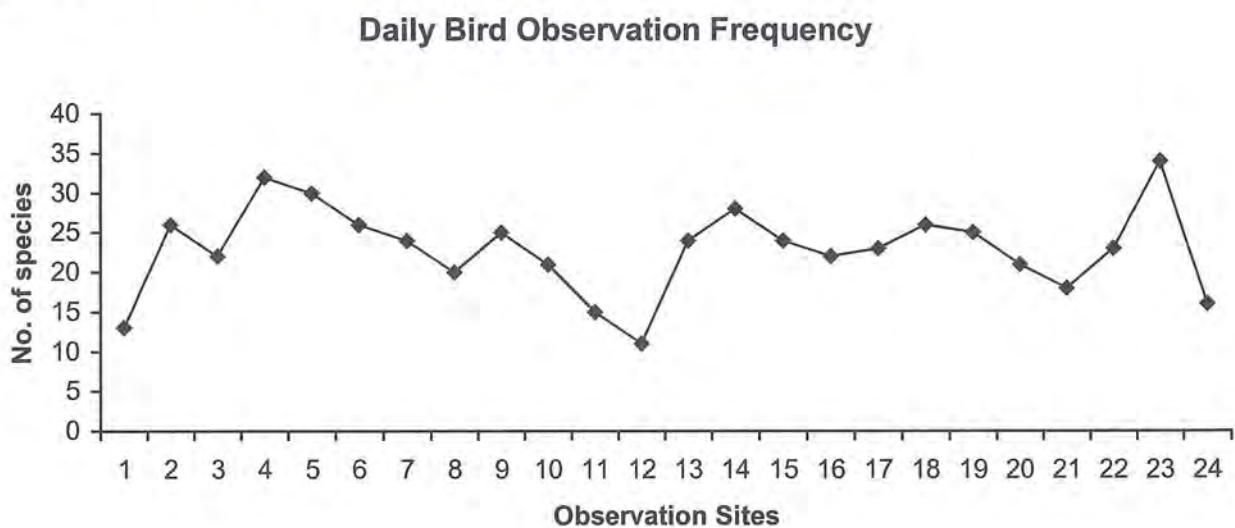
1.7.5 Other Habitats

Cultivation (wheat, buck-wheat, barley, corn, potato, pea farms), human settlements, aquatic bodies (rivers and ponds), boulders, cliffs and caves are other habitats occurring in the area. Although most of these habitats are largely attributed to human use and rugged geo-topographical features, their existence has significant value for the wildlife of the area (KMTNC/BCDP 1994).

2. Result and discussions

Altogether 96 bird species were observed during the field survey period of 24 days. In an average 22.9 bird species were observed in a day (Figure 1). Highest bird species observed in a day was 32 species in the Samar and lowest is 11 species at Itiphule. Higher number of species at Samar at 3700m could be attributed to the Birch forest along with shrub, streams and cultivated fields. Unanticipated rain and hail at Itiphule (4800m) have hampered bird observation. Highlands represents nearly 50% of the bird species occurring in Nepal. It is low compared to the bird species richness found in Terai (77%) and the Midhills (82%) (BPP 1995). The reason for less number of bird species could be due to the harsh weather condition, less vegetation and heavy grazing pressure in Upper Mustang. Some of the common bird species observed in large flocks are Red-billed Chough (250+ in a single flock near LoManthang), Yellow-billed Chough (200+ in a single flock) and over 110 Himalayan Griffon at a horse carcass above Chungjung.

Figure 1 Daily Bird Observation Frequency



According to foraging-habit group majority were arboreal (69.8%), these birds requires some type of perch for feeding. The others are birds of prey (11.5%), which are hunters and carrion eaters; aerial birds (9.4%) that hunt insects in the air, waders (6.2%) and followed by terrestrial or game birds (3.1%). The above figure suggests that majority of the birds requires some type of perch for feeding. Birds of prey utilize multiple habitats including the air and other vantage e.g., Golden Eagles. Aerial birds (swifts, martins and swallows) exploit the air for hunting insects with their wide open sticky jaws. The terrestrial birds exploit the vast scrub habitat available for them.

Similarly, observation according to forage guild, majority were insectivores (58.3%), followed by granivores that eats seeds, nuts and berries (20.8%). Carnivores consists 12.5% (of which one is piscivore) and just 8.3% were omnivores. The above figures suggest that many birds that are found in Upper Mustang are beneficial to the crop protection by consuming the harmful insects and worms. The birds of prey guard the farms from pest birds, rodents and insects.

Black Kite near the Tibet border

2.1 Relative frequency of bird observation

Relative frequency (rf) of bird observation status is derived as the species observed per day (no of observation divided by total no of days), unrelated to its number or population. Of the bird observed 63.5% were of rare category i.e., the sighting is less than 0.24rf. It indicates that the higher number of bird communities in the region need ample conservation efforts to increase their presence. It is followed by uncommon (16.7%) and further behind by occasional and fairly common species with 9.4% each (Appendix V). And only one species is considered as common i.e. Himalayan Griffon (rf =.9) (Table 1) .

Table 1 Bird observation status.

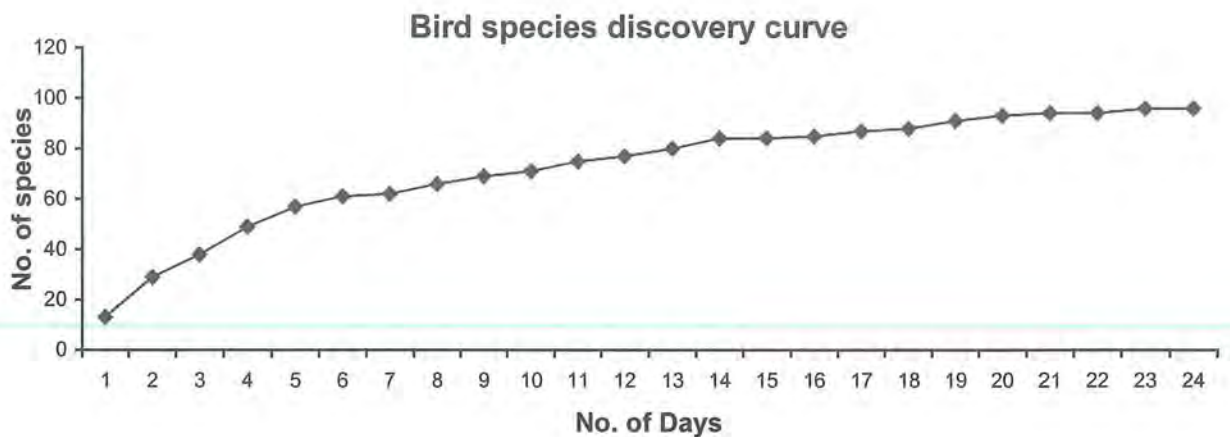
Observation status (relative frequency in parenthesis) and Representative species	Number of species (percentage in parenthesis)
<i>Rare (.01 - .24)</i> Tibetan Snowcock, Little Owl, Booted Eagle and Ibisbill.	61 (63.5%)
<i>Uncommon (.25 - .45)</i> Hume's Groundpecker, Wallcreeper, Fire-fronted Serin and Golden Eagle	16 (16.7%)
<i>Occasional (.46 - .65)</i> Hill Pigeon, Common Kestrel, Rock Bunting, Hume's Short-toed Lark	9 (9.4%)
<i>Fairly Common (.66 - .9)</i> Oriental Turtle Dove, Black Kite, Lammergeier, Eurasian Crag Martin, Gray-backed Shrike, Red-billed Chough	9 (9.4%)
<i>Common (.9+)</i> Himalayan Griffon	1 (1%)
Total	96 (100%)

Raven over the cliff

2.2 Species Discovery Curve

Bird observation was started from Jomsom. It is a buffer area between the official demarcations (Chuksang) of Upper Mustang, but it shares similar habitat and climatic conditions. The frequency of adding new species to a list declines with time (Bibby et. al. 1998). There is a steady increase of new bird species sighting for first five days. It could be attributed to the diverse altitude and habitat condition such as the Birch-Juniper forest, scrubs, streams and cliffs occurring between Tsaile and Bheni. After that the figure is steady between 2 – 4 new species per day, it could be due to the similarity in habitat structure such as dry alpine scrub and similarity in altitude (Figure 2). Further north sparse vegetation cover is aggravated by less rainfall, high and dry winds and heavy grazing pressure could have revealed less bird species. Virtually every square meter of the region is used for grazing. There is no provision of protected islands, an area set aside to regenerate grass, seeds or for rotational grazing that benefit birds and other wildlife. There is a constant and heavy grazing pressure starting from the lower reaches of UMBCP, 3000m to 5500m and above.

Figure 2 Bird Species discovery curve

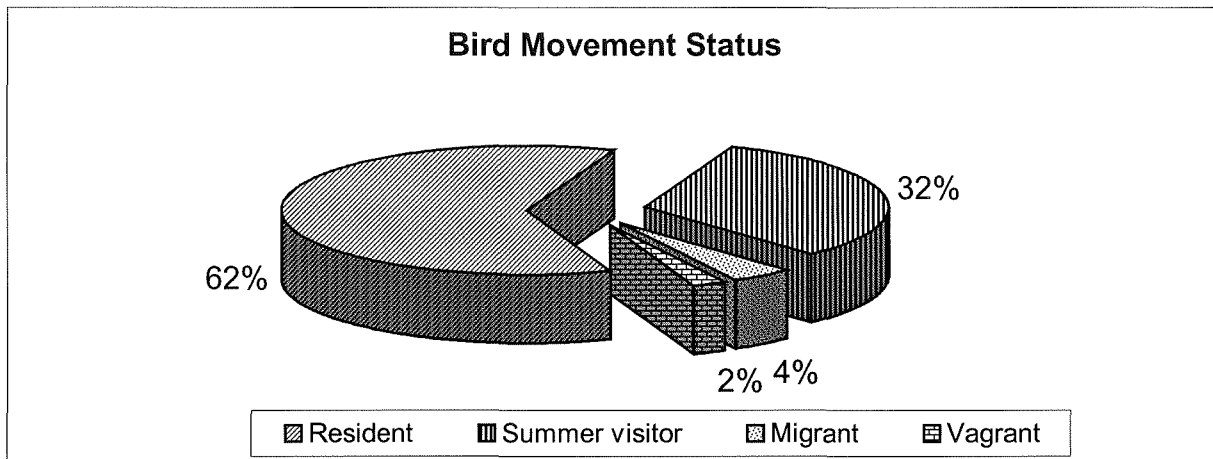


Hoopoes are common in farm and meadows

2.3 Bird movement status

Majority of the birds observed during the survey period were breeding resident (61.5%) followed by summer visitor (32.3%) for breeding. There were only four species observed as passage migrants and two vagrant species (Figure 3). It signifies that the fall migration is still at an early stage. The vagrant species were Scaly-breasted Munia at Samjung and a House Crow at Chuksang. The high mountains of Nepal serve as a breeding habitat for many altitudinal migrants. It saves energy and time of a bird from long migration journeys. The Himalayan range is the transition zone between the oriental and the European realms. Diverse climatic zones of Nepal available within a short stretch contributed to the higher bird diversity in a small area. Upper Mustang does not support many bird species all the year round due to its harsh climate during winter months and rugged terrain.

Figure 3 Bird Movement Status



There shall be great seasonal differences in the annual bird species composition in Upper Mustang. Mid of September onwards the fall (Autumn) migration starts and passage migrants use this place as a corridor or as a stop over and a resting place. Study on the fall and spring migration would reveal more bird movement dynamics of the region. Kali Gandaki valley is an important pathway during autumn and spring migration.

Many Himalayan resident are altitudinal migrants, the level to which they descend in winter frequently depend upon weather conditions. For instance, the Red-billed Chough *Pyrrhocorax pyrrhocorax*, which has been found as high as 7950m, and usually remains above 2440m in winter, has been noted as low as 1450m in cold weather. Some sedentary residents are Chukar and Tibetan Snow Cocks, while others undertake irregular movements, either locally or more widely in the region, depending on food supply (Grimmett et. al 2000).

Many species winter further south in the subcontinent, including Common Hoopoe *Upupa epops*. The winter quarters of some of these summer visitors are poorly known, for example Fork-tailed Swift *Apus pacificus*. Other species move southeastwards, perhaps as far as Malaysia and Indonesia: Common Swift *Apus apus* winter in Africa (Grimmett et. al 2000). A dead Common Swift was found at Samjung.

Nepal attracts about 150 winter visitors, originating mainly in northern and central Asia, and some of these are also passage migrants. These include ducks, waders, birds of prey, gulls, terns, thrushes, bush warblers, *Acrocephalus*, *Locustella* and *Phylloscopus* Warblers, Pipits, wagtails, finches and buntings (Grimmett et. al 2000). Kali Gandaki valley is an important bottleneck for many of these migratory species.

Increasing evidence suggests that some birds breeding in the Palearctic, mainly non-passerines, migrate directly across the Himalayas to winter in the subcontinent. Birds have been seen flying over the highest regions of these ranges; for example a flock of Bar-headed Gees *Aner indicus* was recorded flying as high as 9375m over Sagarmatha. Other birds follow the main valleys, such as those of the Kali Gandaki, Dudh Koshi and Arun Valley. Birds of Prey, especially *Aquila* eagles have also been found to use the Himalayas as migratory route (Grimmett et. al 2000). Approximately 30,000 Demoiselle Cranes fly over this valley during the fall migration (pers. obsv. 1992 and 1995). Migrating cranes spend night along the banks of Kali Gandaki below Tsaile to Kagbeni. They occasionally settle in the buckwheat farms to feed. Occasionally rain and storm hamper their long journey towards South.

Thousands of cranes mainly Demoiselle Cranes and about 40 other bird species, including nearly 20 raptors, have been recorded (Inskipp, 1989). Kali Gandaki valley in central Nepal emerges as a very distinct breaking point in bird distributions. It also lies in the center of the 2577 kilometer Himalayan Arc, a narrow region of considerable species change (Flemming et. al 1976).

Nest of Himalayan
Griffon at Chungsi

2.4 Breeding birds of Upper Mustang

Several breeding birds species' nests were observed during the survey. The nesting habitat is varied such as the cliff ledges of Himalayan Griffon to the burrows of Hume's Ground Pecker. Upper Mustang is a significant place for nesting vultures. Vulture (specially Himalayan Griffons) benefits from the sky burial of human corps practiced by the native Buddhists community. The natives believe that the soaring vultures convey the soul to the heaven. Vultures were found utilizing abandoned caves of Ghemi and Chosyar for nesting.

The caves and cliff ledges of Chungsi Gompa, Ghemi, Gharphu, Chosyar are important nesting locations of Himalayan Griffon. Several pairs with juveniles were observed during the study period. The sacred groves of Tsarang, Tsaile, LoManthang, Chhosyar, Nenyol and several other villages are regular nesting sites of Black Kites. The Cliffs of Ghemi, Comfort valley (between Tsarang and Lomanthang), cliffs at Itiphule and Chosyar are important nesting place of the Rock Pigeon and Hill Pigeons as indicated by the number of fledglings seen in the nests. Red-billed Choughs are seen nesting in the burrows of Ghyakar cliffs. Several Eurasian Crag Martins were seen in the Ghemi cave along side the Griffons nests. Similarly a pair of Blue Whistling Thrush nested on the cliffs of Ghemi River. A tunnel nest of Hume's Groundpecker was observed on the way to Itiphule at 4500m. Number of Hume's Ground Pecker was seen with fledglings. The rocky cliff at Dhiplung is a nesting location of Little Owl. Shah (2001) reported a pair of Ruddy Shelduck nesting on the pond of Arka near Chosyar Khola and Damodar Kunda. But the broods are reportedly became victim of non-native schoolteachers. The ruins of palace compounds in Thingar, and Arma/Lomanthang shelters the nests of Russet Sparrows.

Locals reported that Lammergeier nests on the cliff of Dhakmar, and cliff of Kaligandaki Gorge north of Tsaille. Locals also concede that Golden Eagle nests on the cliffs below Ghilling. These information needs corroboration. Locals suggested vulture nests on the cliff ledges and caves during winter.

Number of bird species was observed with fledglings and juveniles along the survey route. Tibetan Snowcocks with over 18 chicks were observed at Bhenra. Similarly Chukars were observed with over 10 chicks at several occasions in various locations. The number of Chukar partridges observed is an encouraging observation that indicates potentiality for commercial harvest.

Gray-backed Shrike is one of the common bird species seen in the cultivation and scrubs with their fledglings. They contribute to the control of insects in the farm. White-throated Dipper and Brown Dippers inhabited the streams of Upper Mustang. Blue Rock Thrush is a common breeding summer visitors of Upper Mustang. An albino Blue Rock Thrush was observed near LoManthang. Several pairs of Black Redstart, White-throated Redstart, White-winged Redstart and Common Stonechat were observed with their offspring especially between Samar and Ghemi. Further up pairs of Desert Wheatear, Hume's Short-toed Lark and Oriental Skylark were observed with number of fledglings. Several flocks of Horned Lark with juvenile were observed in the alpine meadows of Chujung and near the Tibet border. The settlement of Upper Mustang commonly harbors Eurasian Tree Sparrow. The breeding species of scrub habitat are Robin Accentor and Brown Accentor. Several Brandt's Mountain Finches were seen with fledglings on the alpine meadows of Chujung. Fire-fronted Serin and their offspring were observed along the streams. Other bird species observed with their fledglings were European Goldfinch at LoManthang, Dark-breasted Rosefinch and Rock Buntings along the trail.

2.5 Overall bird status

The annotated bird checklist (Appendix VI) suggests that nearly 49% of the birds of Upper Mustang are breeding residents followed by summer visitors (close to 36%) for breeding (Table 2). The figure also suggests that Upper Mustang is an important place for nesting activity for the summer visitors.

Table 2 Movement status of bird occurring in Upper Mustang in a year round

Movement Status	No. of Species	%
BR- Breeding resident	65	48.5
SV- Summer visitor	48	36
PV- Passage visitor	7	5
IR- Individual records	14	10.5
Total	134	100

2.6 Restricted range species

The restricted-range avifauna of conservation significance found in Mustang are Tibetan Snowcock (*Tetraogallus tibetanus*), Tibetan Partridge (*Perdix hodgsoniae*), Little Owl (*Athene noctua*), newly reported Tibetan Sandgrouse (*Syrrhaptes tibetanus*), Desert Wheatear (*Oenanthe deserti deserti*), Horned Lark (*Eremophila alpestris*), Hume's Short-toed Lark (*Calandrella acutirostris*), Plain-backed Snowfinch (*Montifringilla blanfordi*), Tibetan Snowfinch (*Montifringilla adamsi*) and Brandt's Mountain Finch (*Leucosticte brandti*) (Chatterjee et. al. 2002). They show altitudinal movement and form a flagship community of Trans-himalayan physiographic zone.

Ibisbill at
LoManthang

2.7 Globally threatened bird species occurring in UMBCP

Several species that are regionally and nationally threatened birds of prey, game birds and waders occur in this region (Appendix VIII). A total of 26 bird species recorded in Nepal were identified as globally threatened and 17 species near threatened by Birdlife International in 2002 (BLI 2002). The globally threatened species White rumped Vulture was recorded as a vagrant species.

It will be worthwhile to explore the habitat between Sangda and Samar to confirm the existence of many other species. The locals confirmed occurrence of Black-necked Cranes a few kilometers north of the border in Tibet. Absence of large shallow lakes and marsh area in Upper Mustang could not support viable population of Black-necked Cranes in this area. They may occur as a vagrant species.

Ibisbill, Golden Eagle, Lammergeier, Tibetan Snowcock are some of the nationally important species of the region confirmed occurring in the area. Further year round research may reveal the occurrence of many other species from the area.

Nepal is a signatory to the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). The objectives of CITES is to protect certain endangered species from over exploitation by means of a system of import /export permits. It includes animals and plants dead or alive, and any recognizable parts or derivatives thereof. It also covers endangered species, trade to tightly control and trade to be regulated. This requires permit for species stating that export /import will not be detrimental to the survival of the species. Nepal accessed to the party in 1975, HMG/MoFSC/Department of National Parks and Wildlife Conservation oversee the CITES convention in Nepal (BPP, 1995).

This convention, which aims to establish worldwide control over trade in endangered wildlife, has listed species within three appendices:

- Appendix I include all species threatened with extinction, which are, or may be, affected by trade.
- Appendix II includes those species, which, although not necessarily threatened with extinction now, may become so if the trade of these species is not subject to strict regulation. This category includes 'look alike ` species, whose exploitation is in need of control because of similarity in appearance to Appendix I species.
- Appendix III includes those species which any party had identified as being subject to regulation within its jurisdiction for the purpose of preventing or restricting exploitation, needing the co-operation of other parties in the control of trade.

There are eight CITES listed species occurring in Upper Mustang; one in Appendix I, four in Appendix II and three Appendix III (Table 3) (Chapagain and Dhakal, 2002). The degree of bird trade were not accessed during the study period, however some of the endangered game birds suffer from anthropogenic activity such as hunting and trapping. The Demoiselle Crane suffers while roosting along the riverbanks and feeding in the standing crops field during migration. Black-necked Crane though may be a vagrant are sacred bird to the Buddhist community of Upper Mustang. Occasionally a head of a birds of prey or the Golden Eagle is kept on the entrance of the house to drive away the evil spirit, their commercial exploitation could not be ascertained.

Table 3 CITES listed bird species found in Upper Mustang

Common name	Scientific name	Status	CITES
TIBETAN SNOWCOCK	<i>Tetraogallus tibetanus</i>	BR- Breeding resident	I
DEMOISELLE CRANE	<i>Grus virgo</i>	PV- Passage visitor	II
COMMON BUZZARD	<i>Buteo buteo</i>	SV- Summer visitor	II
UPLAND BUZZARD	<i>Buteo hemilasius</i>	SV- Summer visitor	II
GOLDEN EAGLE	<i>Aquila chrysaetos</i>	BR- Breeding resident	II
NORTHERN SHOVELER	<i>Anas clypeata</i>	PV- Passage visitor	III
NORTHERN PINTAIL	<i>Anas acuta</i>	PV- Passage visitor	III
GARGANEY	<i>Anas querquedula</i>	PV- Passage visitor	III
ROCK PIGEON	<i>Columba livia</i>	BR- Breeding resident	III

Source: Chapagain and Dhakal 2002

The threat category applied by National Red Data Book (BPP, 1995) range from Extinct to Susceptible. The NRDB threat category includes:

EXN Extinct: A taxon is Extinct when there is no reasonable doubt that its last individual has died in the country.

C Critical: A taxon is critical when it is facing an extremely high probability of extinction in the wild in the immediate future

E Endangered: A taxon is endangered when it is not critical but is facing a very high risk of extinction in the wild in the near future

V Vulnerable: A taxon is vulnerable when it is not critical or endangered but is facing high risk of extinction in the medium term or if the animal is rare

S Susceptible: A taxon is Susceptible when it does not qualify for any of the above categories above, but is of concern because its range areas is restricted (typically less than 100 sq. km) and/or it is found at only few locations, which render it prone to the effects of human activities.

Nine bird species are protected by NPWC 1973 Act (Appendix VII); additional 88 species merit legal protection (BPP 1995) that includes stork (6 species), birds of prey (37 species), Pheasants (2 species), Cranes (2 species) and owls (16 species). A further six species that merit legal protection occur in Upper Mustang (Table 4).

Table 4 List of NRDB species meriting legal protection (BPP 1995) occurring in Upper Mustang.

Common name	Scientific name	Status	NRDB threat category
LITTLE OWL	<i>Athene noctua</i>	BR	S
DEMOISELLE CRANE	<i>Grus virgo</i>	PV	S
IBISBILL	<i>Ibidorhyncha struthersii</i>	SV	S
COMMON BUZZARD	<i>Buteo buteo</i>	SV	S
UPLAND BUZZARD	<i>Buteo hemilasius</i>	SV	S
GOLDEN EAGLE	<i>Aquila chrysaetos</i>	BR	S

Source: BPP 1995

2.8 Community bird monitoring program

There is a scanty information on the occurrence of bird from Upper Mustang. The available information is mostly between March till September. There is a great information gap during the fall migration and wintering birds. The locals could provide year round bird data if they are adequately trained in this field. Participatory Action Research (PAR) as defined in the Richard and McVeigh (2000) is suggested to make the bird monitoring guidelines in Upper Mustang. This

would need training and interaction to share the know-how and the goals of bird monitoring. The locals should shed lights on the wisdom on ethno-ornithology and local knowledge. It may include the effect of birds in crop damage and control of insects in the farmland and ethno-ornithology. The area being free of pesticide and chemical fertilizers, gives a perception of one of the rare and clean environment area of Nepal. ACAP should promote it as an organic farmland and discourage application of pesticides and chemical fertilizers that may jeopardize the clean environment of Upper Mustang. The recommended sites for bird monitoring is listed below (Table 5).

Table 5 Recommended sites bird monitoring

Site	Habitat	Altitude
Chuksang – Tsaile	River banks, shrubs, cliffs	3000 – 3200
Samar - Bhena	Birch and Juniper forest/shrubs	3500 – 4500
Syangmochen – Chungsi	Canyon and shrubs	3300 – 4000
Ghemi	cliffs and cultivation	3300 – 3800
Chosyar – Korala Pass	Shrub	3700 – 3900
LoManthang - Thinkar	Cultivation, streams	3700 – 3900
Itiphule - Chujung	Alpine meadow	4800 – 5500
Ghermi - Panga	Alpine meadows	4500 – 5000

Protocols for bird monitoring in Upper Mustang

- Prerequisite: The observer should be familiar with the songs, calls and visual identification of all the bird species likely to be seen or the keystone species to monitor.
- Equipment: Binocular (between 7x35 – 10 x 40), Global Positioning System, timer
- Mode of transport: Walk on foot to record the birds, Two-member team, an observer and a recorder, is recommended. Note all the species or the keystone species seen and heard.
- Counting: Use the best estimation for counting. Avoid repetition. Do not coax the birds and do not use lures (tape record, whistling etc to attract the bird). Note all the birds seen within 500m from transect.
- Reconnaissance: Start and end point should be known prior to departure. Use GPS and landmarks to follow the route.
- The route should be 5 km long with five points in each transect. Each point at 1-km interval. Spend ten minutes per point to record all the birds heard and seen within 500meter radius, note habitat and general status
- Time of the year: Month of July is recommended for data collection on breeding birds. During this time there shall be only the resident and the summer breeding migrants. Month of January is recommended to monitor the breeding lammergeiers and griffons. October and November is recommended to monitor the migratory species.
- Time of day: The data collection should start preferably half an hour before sunrise and end within four hours after sunrise. After that the bird activity declines.
- Allow afternoon hours to count soaring lammergeiers and griffons in the thermals. Count the number of griffons in the kill.
- Acceptable weather: Good visibility and fine weather condition is accepted. Avoid rainy and windy days for bird recording.
- Reference book for bird identification and name: Grimmett et. al. 2000. Birds of Nepal, Helm Field Guides; and for data collection Bibby et. al 1998 Expedition Field Techniques Bird Surveys, Royal Geographic Society, London.
- Use dark pencil to record the data. It is waterproof. Send your data to UMBCP/KMTNC for further analysis.

The annual data will help to indicate trends of changes in the bird community that include:

- Trend of changes in the total number of species
- Trend of changes in the pattern of presence and absence of species.
- Trend of changes in the total count of birds
- Trend of changes in the forage-habit group composition
- Trend of changes in the bird community according to the diet category
- Trend of changes in count of the globally endangered and keystone species.
- Trend of changes in the relative frequency of observation of the species

The bird monitoring should also include basic ecological sciences such as the simple list, species discovery curve, Encounter rate, Timed Species-Count and Mist netting. Species from a site, nesting locations, clutch size, number of fledglings, and total count of birds in breeding and non-breeding season will prove beneficial. Changes in annual counts number is an index to determine birds doing well or not. This would allow identifying the causative factor for their population increase or decrease in due time and area studied. Some of the common, rare, economically viable, and species that would help to indicate the habitat and environmental changes are listed below (Table 6).

Table 6 Recommended keystone resident and breeding bird species for community bird monitoring

Species	Significance
Tibetan Snowcock	Rare game bird of the alpine meadows
Chukar	Potential for commercial harvest and as a prey species for Golden Eagle
Common Hoopoe	Summer visitor for breeding, indicator of healthy farm and meadows
Ibisbill	a rare species, indicator of healthy and protected streams
Black Kite	a common scavenger of the area that benefits from sacred groves
Lammergeier	Have widest wingspan (9ft) among Nepalese birds, indicator species
Himalayan Griffon	Benefits from sky burial practice and an indicator species
Golden Eagle	Indicates rich area of prey species e.g., game birds and small mammals
Common Raven	An indicator species and a sacred bird to the local
White-throated Dipper	Indicator of the healthy and protected streams
Wallcreeper	A rare and beautiful bird of the cliff and steep slopes

2.9 Hot spots for bird conservation

The diverse microhabitat and microclimate available in Upper Mustang provide a haven for bird conservation. It ranges from the Birch forest of Samar at 3800m to the alpine meadows of Chujung and Panga. The stream of LoManthang is important to conserve the rare Ibisbill.

Site name: Samar - Syangmochen Altitude 3800m – 4000m

No of species observed: 32

Significant habitat: *Betula utilis* and *Populus ciliata* Strands and Juniper Forest Habitat

A small patch of this forest that covers less than .5 sq. km exists above the Ghyakar and Samar village at about 3800m. This is the only broad-leaved forest occurring at Upper Mustang. Hence it is a significant forest ecosystem for bird and overall biodiversity conservation. It is in a degraded stage, and need immediate conservation measure. Local also set aside sacred groves of *Populus ciliata* species in each and every village. Several sacred groves are used for nesting by Black Kites.

Significant species: About 32 bird species were observed in Samar and between Samar and Syangmochen. This is the highest number of species in a day during this survey. The important species includes White-browed Tit Warbler, Tibetan Partridge, Lammergeier, White-winged

Grosbeak, Variegated Laughing Thrush etc. The breeding species includes White-throated, Black, White-winged Redstarts and Common Stone Chats.

Site name Chungsi Altitude 3300m – 4000m

No of species observed: 26

Significant habitat: Dry Alpine Scrub/bush Habitat

The representative species are *Juniperus indica*, *Hippophae tibetana*, *Rhododendron lepidotum*, *Lonicera obovata*, *Ephedra gerardiana*, *Spiraea arcuata*, *Cotoneaster spp.*, *Caragana spp.*, *Berberis spp* etc (KMTNC/BCDP 1994). Tree species like *Pinus wallichiana* and *Populus ciliata* are found within this habitat in negligible number. In some parts *Hippophae tibetana* is found in scattered form mostly from 3700m around the cultivated areas and up to the .

Significant species: The canyons and caves between Syangmochen - Chungsi provides nesting sites for Himalayan Griffon, Common Buzzard and feeding sites for the Wall Creepers. This is also a good place for Chukors. Characteristic species include White Browed Tit Warbler, Fire-fronted Serin, Desert Wheatear *Oenanthe deserti* and Blue Rock Thrush.

Site name: Ghermi – Panga Altitude 4500m – 5500m

No of species observed: 25

Significant habitat: Alpine meadows

This is the dominant habitat of the area, which occurs usually above 4000m. Alpine scrub, including rhododendron and juniper, grows as high as 4870m in places.

Significant species: The alpine meadows and the rocky cliffs of Ghermi Panga helps to conserve Tibetan Snowcock, Tibetan Partridge, Golden Eagle, Brandt's Mountain Finch.

Site name: Itiphule - Chujung Altitude 4300- 5000

No of species observed: 25

Significant habitat: Alpine meadows and cliffs

Significant species: The alpine meadows and the rocky cliffs of this site helps to conserve Little Owl, Tibetan Snowcock, Tibetan Partridge, Golden Eagle, Brandt's Mountain Finch, White-throated Redstart. There are nesting Hill Pigeons on the cliffs of Itiphule.

The microhabitats that are important for bird conservation are the caves, cliffs and streams. The nesting griffons have utilized the caves of Ghemi, Chhosyar and Chungsi. These nesting locations are very important for the conservation of Himalayan Griffons, Lammergeier and other birds of prey. Locals should be encouraged to safe guard and monitor these nesting sites (Table 7). The caves play an important role by providing nesting sites for other smaller birds too e.g., Hill Pigeons, Crag Martins, Nepal House Martins etc.

2.10 Opportunities for bird watching tourism in Upper Mustang

The upper Mustang area being a transition zone between High Himalayan range and the Tibetan plateau exhibits the representative species of both the regions. The representative habitat of arid scrub, birch/Juniper forest, canyons, cliffs and the alpine meadow support bird watching tourism. During summer it is possible to record close to seventy species in a week tour of this place. The mega-avifauna that would attract the visitors are the Lammergeier with 9ft wingspan, the soaring Himalayan Griffons, and the acrobats of Raven and Golden Eagle. The game birds include Tibetan Snowcock, Chukar and Tibetan Partridge found in the scrub habitat and alpine meadows. This includes White-browed tit-warbler. The songbirds include the varieties of redstarts, bushchats and finches. Similarly Mustang is an important pathway during the fall migration. The transcontinental species use this corridor as a safe passage to cross the Himalaya. Notable species include the Demoiselle Crane migrating south from this corridor. The productive route for birding is between Tsail-Samar- Bhen- Syangmochen – (Chungsi) and LoMangtang. Beside amateur's and professional birders, photographers may be attracted to the regions. This is a potential ornithological field station to study the trans-himalayan resident and migratory birds. UMBCP could gain ornithological information from these specialized visitors.

2.11 Anthropogenic threats for bird conservation

2.11.1 Loss of vegetation cover

Between 3000m to 4500m the natives burn dung of Lulu (a native variety of wide jawed cow), dzupa (hybrid of yak) substituted by wood and sticks from the farm and shrubs. Natives that dwell in the alpine meadow over 4500m usually burn yak dung. The local of Neyual were found gathering roots of caragana and other bushes at Chujung, a day ride on a horseback. There is an acute shortage of fuel in this region. Animal dung is used either in the farm or as fuel. This region of cold desert will suffer greatly if these practices are not checked by alternative supply such as planting fuel wood trees, shrub and grasses in sufficient volume. Additional incentive should be provided to the locals to utilize solar cooker, water heater etc. Micro hydro-electricity has reached to many villages in Upper Mustang, it may encourage some populace from their total dependency on the wood and bush of the nature.

2.11.2 Poaching of birds

Poaching is a serious problem in most Highland PAS despite the presence of the army. It should be noted that ACAP and MBNP have no army protection force. Poaching of wildlife is a recurrent issue in all Highlands protected areas. The worst depredation occurred in the 1960s and 1970s when the Tibetan Khampa guerillas with automatic weapons killed numerous wild animals in the Trans-Himalayan region (Dolpo, Mustang and Manang). In the Shey-Phoksundo and Sagarmatha National Park area, the ethnic groups who live outside the protected areas at lower elevations carry out most poaching. Although some poaching is carried out for protein consumption or for medical and religious purpose, most is based upon organized efforts to provide high value animal products for export. Prieme and Oksnebjerg (1994) reported organized poaching by hunters paid through Tibetan middlemen in Shey-Phoksundo National Park (SPNP) (BPP 1995). This should not be overlooked in Upper Mustang. The Customs officer deputed in Nyamdo have not reported in his duty station for the last few years. This provides enough evidence of merchandise passing through the border post unchecked. Shah (2001) reported several live traps intended for birds in Upper Mustang. Cornering of wildlife especially Blue Sheep and Woolly Hare during heavy winter snowfall is a common practice. Chukar Partridge, Blue Sheep, Himalayan Marmot and Woolly Hare may have the potentiality for sustainable harvest. It may provide revenue for local development if managed wisely. However general impression in the study area suggests low poaching pressure attributed to Buddhist tradition for reverence of life and motivation carried out by ACAP staffs. Incidences of incursions by Chinese border patrol for poaching was also reported by locals.

High number of livestock threatened the carrying capacity of the pasture land.

2.11.3 Unsustainable Livestock husbandry

The biodiversity of the Highland suffers greatly from unsustainable livestock husbandry. High numbers of often-poor condition and low-yielding cattle and goats cause great damage to the flora and fauna of Highlands's forests both inside and outside of the PAS. The scale of grazing is detrimental to the conservation objectives of the protected areas preventing regeneration of primary plant species and competing with indigenous animals for pasture (BPP 1995). There is no restriction on the possession of livestock volume and grazing. The grazing area is designated under the traditional land tenure system. Heavy grazing pressure not only loose the vegetation that is utmost important for wildlife and domestic ungulates, it has also a great impact on the erosion of topsoil. The feeding habit of goat that consumes the whole plant and the effort of hoof had detrimental effect on topsoil erosion. It is the most precious item to grow vegetation that supports the natives' livelihood and the wildlife. This issue is most serious between the altitude of 3000 m and 4500 m.

2.11.4 Threat of Disease transfer and poisoning

Decline in vultures have been noticed in the last decade in South East Asia, Indian Sub-continent and finally in Nepal. Since 1997 the decline in White-rumped Vultures in parts of northern India and lowland Nepal have occurred at an alarming rate that can only be described as catastrophic, becoming locally extinct in places (Risebrough1999). Prakash (1999) reported the loss of active nest of White-rumped Vultures from Bharatpur, India with a total of 353 in 1987/88 to none in 1999. Various factor including poisoning by pesticides, lack of food and disease have been suggested as cause of death of vultures. A single poisoned carcass intended to kill a predator e.g. Snow Leopard or Gray Wolf would diminish a local vulture population in Upper Mustang. Similarly there is a possibility of transfer of disease to the vultures of Upper Mustang that is killing White-rumped and Slender-billed Vulture in the lowlands. They share carcass in the winter grounds of Terai plains. According of D. B Chaudhary's personal observation on 12th Nov. 2002

at Nawalparasi, there were 19 White-rumped Vulture, 2 Red-headed Vulture, 1 Eurasian Griffon, 5 Egyptian Vulture, 5 Slender Billed Vulture, 2 Himalayan Griffon and 3 Cinereous Vulture feeding on the water buffalo calf carcass. It clearly states that sharing the same carcass increases possibly of transmitting disease, ectoparasites and poison (if they are intended to kill the problem predators). It is encouraging to know that Upper Mustang is relatively a pesticide free zone of Nepal. The road from Tibet, China may provide easy access to bring pesticides to Upper Mustang. It would have negative impact on the insect population and threats of contamination to the insectivore and carnivore bird species. There is also a threat that it may be used to kill the predator (Snow Leopard, Gray Wolf, Golden Eagle etc.) of domestic livestock, which may eventually kill the carrion feeders (Griffons, Vultures, and Lammergeiers, etc.) of the entire locality. Local livestock depredation should be dealt wisely; otherwise the poor people simply use the banned toxic poison to avenge the death of their livelihood support system. This situation should not be underestimated. Nepal is one of the countries not to have banned the use of the banned pesticides, such as the toxic organochlorines (ADB 1987). Use of toxic pesticides in other parts of the world and the country would have negative effect on the migratory species be it of Upper Mustang or the Siberia. All the government bodies whether it is central or local, should have understanding on this issue. The final deposition of the toxic pesticides is the tertiary consumers including human.

2.12 Climatic factors for limiting bird distribution

Upper Mustang is suffering from decline in precipitation leading to the general drying up of the Tibetan Plateau, a world wide phenomenon that is visible in the Sahara and the deserts of America and Asia (Ale, Ed, 2002). The mean annual precipitation of LoManthang is only 18.4cm, the alpine meadows higher than 4500m receives relatively higher precipitation. There is a great water deficiency throughout the twelve months of the year as stated in Jomsom Meteorological station. There is no evidence of soil water recharge in this area except for scarce rain. The maximum annual precipitation was recorded upto 29.6cm and the minimum is 15.5cm (Jackson 1994). The effect of Himalaya as a monsoon barrier is clearly shown by the contrast figure of rainfall from LoManthang to Lumle within an aerial distance of just 100 km. For example the mean annual precipitation at Lumle is over 5000mm while at LoManthang is just 184mm (Jackson, 1994). It is more than ten times less than the amount of precipitation at Lumle. The water level of lakes and rivers has been receding and forest is fast disappearing. The natural and increasing drought is made worsen by centuries of over-harvesting, over-grazing and over intensive use of the poor soil in the viable options of livelihood, until recently an isolated region. The drying up process has been aggravated by the high velocity winds that carry moisture and topsoil and parch the land (Ale, ed. 2002). The wind speed of the region may reach gale force at time; the average may be around 20 knots. The absolute maximum temperature of the area ranges up to 25.4 degree Centigrade and decreases to absolute minimum temperature of -26.1 degree during harsh winter. The mean number of days per year with minimum temperature of 0 degree or less is 187 and the alpine meadows may remain under snow for long period (Jackson, 1994). Boulder and rocky outcrops provide little support for vegetation in much of the landscape. The cumulative effect of this harsh wave of climatic condition is accountable for less bird species in the region compared to southward.

3. Recommendation

3.1 Habitat based

- Wind barrier such as the stone and mud walls constructed on the initiation by ACAP in the cultivation, as a barrier for the livestock is a good example. It should be replicated (in order to stop wind erosion, retain top soil and soil moisture, trap top soil, preserve seeds and save the plants from wind chills) in different sites especially the abandoned fields to develop a protected habitat that provides forage and cover for the birds. The protected islands produce seed of grasses and forbs and later provide fodder for the livestock. A community user group should manage these areas under the supervision of ACAP.
- Tree, grass and forbs plantation in the abandoned farmlands and marginal land is suggested to restore the native habitat, that provides food and shelter for the birds as well as for the livestock and fuel and building materials for the locals. It will also help to control the soil erosion.
- Maximize water-harvesting system by creating channel, pond and spreading water of streams to moisten the soil and grow vegetation as it is practiced in the farmlands. The wet surface would help to retain the topsoil and encourages growing vegetation. Control grazing in the hot spots for bird conservation e.g. Samar, Chujung, Ghermi etc., pockets to provide nesting site for birds
- Set aside the recommended hot spots as a protected area for bird conservation. Regulate grazing, fuel wood, twig and brush collection to provide safe area during nesting season.

3.2 Species based

- Conduct detail Ornithological research in Upper Mustang in different seasons as there is scanty information available. And monitor annually the population trend of keystone bird species.
- Develop endangered bird species action plan to revive the number of endangered and threatened species by protecting its habitat, conduct research and practice captive breeding and reintroduction of endangered species. Endangered species plan include census of the species, protection of their habitat, if required captive breeding and re-introduction to the wild and increase their population to a target number.
- Bird farming (Chukar species) is recommended to increase income generation by selling live birds and eggs. It can also supplement protein supply. Jomsom and Kagbeni would be a good place to raise these birds, as it is closer to the tourist market. Chukar is listed as a game species in the NPWC Act 1973. There is a provision to collect live or hunt this species with a valid license from the concerned authority in a designated place. It is not a threatened species and is not listed in CITES. The farming of this species is widespread in Europe and USA.

3.3 People based

- Conduct Bird Education Camps and bird festival to generate awareness among the natives to drive towards bird conservation
- Produce bird education booklets and bird identification flash guide of Upper Mustang with local names to lift the traditional knowledge.
- Train local youths to monitor the birds and to promote bird watching tourism

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APPENDICES

Appendix I Itinerary and Site Reference Number

Site no.	Date	Destination	Remark
	12/8	Kathmandu-Pokhara	
	13/8	Pokhara	Administrative and trip preparation
1	14/8	Pokhara, Jomsom Kagbeni	River bank
2	15/8	Kagbeni - Tangbe - Chuksang	River bank, Pasture land, Settlement area
3	16/8	Chuksang – Tsaile – Samar	River bank, Bush vegetation etc
4	17/8	Samar	Cultivation, Birch/Conifer forest
5	18/8	Samar – Syangmochen (Bhena and Yamdo)	Degraded conifer forest area, Hill stream, pasture land, Eurasian Crag Martin nest were seen, good place for nesting passerines
6	19/8	Syangmochen – Chungsi – Tamagaun – Jhaite	Cliff area, shrub area, several Griffon nests on the cliffs at Chungsi. One blue sheep seen over the cliff
7	20/8	Jhaite – Ghemi	Pasture land, Jackal seen
8	21/8	Ghemi village	Cultivated land, River, cliff area, Nest of griffon inside the abandoned caves at Ghemi, (Rain)
9	22/8	Ghemi – Tsarang	Arid Pasture land, cultivated field
10	23/8	Tsarang - LoManthang	Arid Pasture land
	24/8	LoManthang	Settlement and cultivation
11	25/8	LoManthang – Itiphule (by horse)	Pasture land, creeks, Alpine habitat
12	26/8	Itiphule	Alpine habitat, (Rain)
13	27/8	Itiphule – Dhiplung (Chujung Area) (by horse)	Alpine habitat, cliff area near Dhiplung
14	28/8	Dhiplung – Lomanthang via Samjung (by horse)	Stream, Alpine, settlement, cultivation habitat
15	29/8	LoManthang	Settlement, Cultivation, stream and boulders
16	30/8	LoManthang – Thingar	Mixed type of habitat (river, cultivation, pasture, plantation site)
17	31/8	Thingar – Chungjung	River, cultivation, and arid pasture
18	1/9	Chungjung – Lomanthang via Chhosyar (by horse)	Settlement, river, moraine
19	2/9	LoManthang – Ghermi (Panga area) and back (by horse)	Cultivation, pasture land
20	3/9	LoManthang – Tibet border and back (by horse)	Settlement, river, arid pasture.
21	4/9	LoManthang – Tsarang	Main trails, river, arid pasture. Owl nest?
22	5/9	Tsarang – Syangmochen	Mix habitat
23	6/9	Syangmochen – Tsaile	Mix habitat
24	7/9	Tsaile to Kagbeni	Mix habitat
	8/9	Kagbeni to Jomsom	
	9/9	Jomsom – Pokhara - Kathmandu	

Appendix II GPS location of Upper Mustang, 2002

Location	Altitude (Meter)	Latitude (East)			Longitude (North)			Remarks
		Deg.	Min.	Sec.	Deg.	Min.	Sec.	
Kagbeni River side	2854	83	47	.038	28	50	.234	
Chuksang, Narsingh Khola	2961	83	49	15.1	28	54	55.1	
Tsaile Water pond	3340	83	48	44.8	28	56	09.1	
Way to Ghyakar	3477	83	48	29.9	28	56	30.1	
Samar pass	3580	83	48	05.2	28	57	02.3	
Samar village	3606	83	48	05.4	28	57	36.1	
Bhena Pass	3854	83	48	33.3	28	58	24.7	
Bhena	3850	83	48	39.6	28	58	46.5	Tibetan Partridge
Syangmochen Pass	4002	83	49	32.3	28	59	04.3	
Chungsi Gompa	4000	83	49	28.7	28	58	29.0	
Village	3859	83	50	28.6	28	59	25.7	
Ghemi	3625	83	52	01.6	29	04	11.4	Nest of Griffon
Tsarang pass	3890	83	53	48.2	29	04	00.5	
Tsarang Gompa	3587	83	56	02.1	29	05	24.3	
Samjung pass	4041	83	59	21.4	29	11	56.3	
Itiphule	4789	84	07	18.9	29	13	57.6	
Chujung, Dhiplung	4750	84	07	19.1	29	13	57.5	
Chujung pasture	5033	84	08	28.8	29	12	31.3	
Chujung Cliff area	4782	84	07	50.5	29	12	55	Nest of Little owlet
Samjung	3978	84	01	13.2	29	13	10.5	
Thingar	-	83	56	21.5	29	12	28.6	
Thingar pasture	4174	83	55	28.7	29	12	49.8	
Ghermi	4350	83	53	52.7	29	10	14.3	
Panga	4587	83	53	08.3	29	10	13.6	
Panga, Pasture	4638	83	53	08.9	29	09	31.1	

Appendix III Habitat Description

Habitat of Upper Mustang as described by Dobremez 1972

Steppic formations

North-West Nepalese biogeographic region

Code	Ecosystems
8001	High altitude cushion plant formations
8002	<i>Caragana versicolor</i> , <i>Lonicera spinosa</i> steppe
8003	<i>Caragana gerardiana</i> , <i>Lonicera spinosa</i> , <i>Xerophile</i> steppe
8004	<i>Caragana brevispina</i> , <i>Artemisisa</i> steppe
8005	<i>Caragana pygmaea</i> . <i>Lonicera spinosa xerophile</i> steppe
8006	<i>Myricaraia hypohae</i> – <i>Salix riverain</i> thickets
8007	<i>Sophora moorcroftiana</i> , <i>Oxytropis mollis</i> steppe

Appendix IV Movement status of bird observed

S. No.	Common Name	Eco-group	Forage Guild	Movement Status
1	Tibetan Snowcock	TE	OM	R
2	Chukar	TE	OM	R
3	Tibetan Partridge	TE	OM	R
4	Common Hoopoe	AB	IN	S
5	Common Kingfisher	AB	CA	R
6	Eurasian Cuckoo	AB	IN	S
7	Common Swift	AE	IN	S
8	House Swift	AE	IN	S
9	Fork-tailed Swift	AE	IN	S
10	Little Owl	BP	CA	R
11	Rock Pigeon	AB	GR	R
12	Hill Pigeon	AB	GR	R
13	Snow Pigeon	AB	GR	R
14	Oriental Turtle Dove	AB	GR	S
15	Spotted Dove	AB	GR	S
16	Pintail Snipe	WD	IN	S
17	Green Sandpiper	WD	IN	P
18	Common Sandpiper	WD	IN	P
19	Ibisbill	WD	IN	S
20	Black Kite	BP	CA	R
21	Lammergeier	BP	CA	R
22	Himalayan Griffon	BP	CA	R
23	Eurasian Griffon	BP	CA	R
24	Eurasian Sparrow-hawk	BP	CA	R
25	Common Buzzard	BP	CA	S
26	Golden Eagle	BP	CA	R
27	Booted Eagle	BP	CA	R
28	Common Kestrel	BP	CA	R
29	Eurasian Hobby	BP	CA	R
30	Long-tailed Shrike	AB	IN	R
31	Grey-backed Shrike	AB	IN	S
32	Hume's Groundpecker	AB	IN	R
33	Red-billed Chough	AB	OM	R
34	Yellow-billed Chough	AB	OM	R
35	House Crow	AB	OM	VAGRANT
36	Large-billed Crow	AB	OM	R
37	Common Raven	AB	OM	R
38	White-throated Dipper	WD	IN	R
39	Brown Dipper	WD	IN	R
40	Blue Rock Thrush	AB	IN	S
41	Blue Whistling Thrush	AB	IN	R
42	Black Redstart	AB	IN	S
43	White-throated Redstart	AB	IN	S
44	White-winged Redstart	AB	IN	S
45	Blue-fronted Redstart	AB	IN	S
46	White-capped Water Redstart	AB	IN	R
47	Plumbeous Water Redstart	AB	IN	R
48	White-bellied Redstart	AB	IN	S
49	Common Stonechat	AB	IN	S
50	Desert Wheatear	AB	IN	R
51	Isabelline Wheatear	AB	IN	R
52	Wallcreeper	AB	IN	S
53	Rufous-vented Tit	AB	IN	R
54	Coal Tit	AB	IN	R
55	Winter Wren	AB	IN	S
56	Plain Martin	AE	IN	P

S. No.	Common Name	Eco-group	Forage Guild	Movement Status
57	Eurasian Crag Martin	AE	IN	R
58	Barn Swallow	AE	IN	P
59	Northern House Martin	AE	IN	S
60	Asian House Martin	AE	IN	R
61	Nepal House Martin	AE	IN	R
62	White-browed Tit Warbler	AB	IN	R
63	Tickell's Leaf Warbler	AB	IN	S
64	Buff-barred Warbler	AB	IN	S
65	Greenish Warbler	AB	IN	S
66	Striated Laughingthrush	AB	IN	R
67	Variiegated Laughingthrush	AB	IN	R
68	Hume's Short-toed Lark	AB	IN	S
69	Oriental Skylark	AB	IN	S
70	Horned Lark	AB	IN	R
71	Russet Sparrow	AB	GR	R
72	Eurasian Tree Sparrow	AB	GR	R
73	Tibetan Snowfinch	AB	GR	R
74	White Wagtail	AB	IN	S
75	Grey Wagtail	AB	IN	S
76	Paddyfield Pipit	AB	IN	S
77	Blyth's Pipit	AB	IN	S
78	Olive-backed Pipit	AB	IN	R
79	Rosy Pipit	AB	IN	S
80	Alpine Accentor	AB	IN	R
81	Robin Accentor	AB	IN	R
82	Rufous-breasted Accentor	AB	IN	R
83	Brown Accentor	AB	IN	R
84	Plain Mountain Finch	AB	GR	R
85	Brandt's Mountain Finch	AB	GR	R
86	Scaly-breasted Munia	AB	GR	VAGRANT
87	Fire-fronted Serin	AB	IN	R
88	European Goldfinch	AB	GR	R
89	Dark-breasted Rosefinch	AB	GR	R
90	Common Rosefinch	AB	GR	R
91	Beautiful Rosefinch	AB	GR	R
92	Dark-rumped Rosefinch	AB	GR	R
93	Streaked Rosefinch	AB	GR	R
94	Great Rosefinch	AB	GR	R
95	White-winged Grosbeak	AB	GR	R
96	Rock Bunting	AB	GR	R

Legend: AB – Arboreal, AE – Aerial, WD – Waders, BP – Birds of Prey, TE- Terrestrial
GR- grains, seeds and berries, CA- Carnivores, OM-Omnivores, IN-Insectivores
R= Resident, P- Passage migrant, S- Summer visitor for breeding

Appendix V Relative frequency of bird sightings

S. No.	Common Name	Total no. of observation	Status	Relative frequency
1.	Tibetan Snowcock	1	Rare	0.04
2.	Common Kingfisher	1	Rare	0.04
3.	House Swift	1	Rare	0.04
4.	Fork-tailed Swift	1	Rare	0.04
5.	Little Owl	1	Rare	0.04
6.	Spotted Dove	1	Rare	0.04
7.	Ibisbill	1	Rare	0.04
8.	Booted Eagle	1	Rare	0.04
9.	Eurasian Hobby	1	Rare	0.04
10.	Long-tailed Shrike	1	Rare	0.04
11.	House Crow	1	Rare	0.04
12.	Plumbeous Water Redstart	1	Rare	0.04
13.	Isabelline Wheatear	1	Rare	0.04
14.	Rufous-vented Tit	1	Rare	0.04
15.	Coal Tit	1	Rare	0.04
16.	Winter Wren	1	Rare	0.04
17.	Plain Martin	1	Rare	0.04
18.	Northern House Martin	1	Rare	0.04
19.	Buff-barred Warbler	1	Rare	0.04
20.	Tibetan Snowfinch	1	Rare	0.04
21.	Alpine Accentor	1	Rare	0.04
22.	Scaly-breasted Munia	1	Rare	0.04
23.	Beautiful Rosefinch	1	Rare	0.04
24.	Dark-rumped Rosefinch	1	Rare	0.04
25.	Great Rosefinch	1	Rare	0.04
26.	Common Swift	2	Rare	0.08
27.	Green Sandpiper	2	Rare	0.08
28.	Eurasian Sparrow-hawk	2	Rare	0.08
29.	Common Buzzard	2	Rare	0.08
30.	Brown Dipper	2	Rare	0.08
31.	White-bellied Redstart	2	Rare	0.08
32.	Barn Swallow	2	Rare	0.08
33.	Striated Laughingthrush	2	Rare	0.08
34.	Variiegated Laughingthrush	2	Rare	0.08
35.	Blyth's Pipit	2	Rare	0.08
36.	Olive-backed Pipit	2	Rare	0.08
37.	Rufous-breasted Accentor	2	Rare	0.08
38.	Brown Accentor	2	Rare	0.08
39.	Plain Mountain Finch	2	Rare	0.08
40.	Common Sandpiper	3	Rare	0.13
41.	Yellow-billed Chough	3	Rare	0.13
42.	White-throated Dipper	3	Rare	0.13
43.	White-winged Redstart	3	Rare	0.13
44.	Paddyfield Pipit	3	Rare	0.13
45.	Rosy Pipit	3	Rare	0.13
46.	Brandt's Mountain Finch	3	Rare	0.13
47.	Dark-breasted Rosefinch	3	Rare	0.13
48.	Streaked Rosefinch	3	Rare	0.13
49.	White-winged Grosbeak	3	Rare	0.13
50.	Snow Pigeon	4	Rare	0.17
51.	Pintail Snipe	4	Rare	0.17
52.	Eurasian Griffon	4	Rare	0.17
53.	White-throated Redstart	4	Rare	0.17
54.	Blue-fronted Redstart	4	Rare	0.17

S. No.	Common Name	Total no. of observation	Status	Relative frequency
55.	White-capped Water Redstart	4	Rare	0.17
56.	Asian House Martin	4	Rare	0.17
57.	White-browed tit Warbler	4	Rare	0.17
58.	Greenish Warbler	4	Rare	0.17
59.	Horned Lark	4	Rare	0.17
60.	Robin Accentor	4	Rare	0.17
61.	Tibetan Partridge	5	Rare	0.21
62.	Hume's Groundpecker	6	Uncommon	0.25
63.	Common Raven	6	Uncommon	0.25
64.	Desert Wheatear	6	Uncommon	0.25
65.	Oriental Skylark	6	Uncommon	0.25
66.	Fire-fronted Serin	6	Uncommon	0.25
67.	European Goldfinch	6	Uncommon	0.25
68.	Eurasian Cuckoo	7	Uncommon	0.29
69.	Blue Whistling Thrush	7	Uncommon	0.29
70.	Wallcreeper	7	Uncommon	0.29
71.	Nepal House Martin	7	Uncommon	0.29
72.	Russet Sparrow	7	Uncommon	0.29
73.	Tickell's Leaf Warbler	8	Uncommon	0.33
74.	Chukar	9	Uncommon	0.38
75.	Golden Eagle	10	Uncommon	0.42
76.	Blue Rock Thrush	10	Uncommon	0.42
77.	Eurasian Tree Sparrow	10	Uncommon	0.42
78.	Hill Pigeon	11	Occasional	0.46
79.	Common Kestrel	12	Occasional	0.50
80.	Large-billed Crow	12	Occasional	0.50
81.	Grey Wagtail	12	Occasional	0.50
82.	Common Rosefinch	12	Occasional	0.50
83.	Hume's Short-toed Lark	13	Occasional	0.54
84.	Rock Bunting	13	Occasional	0.54
85.	Common Stonechat	14	Occasional	0.58
86.	Rock Pigeon	15	Occasional	0.63
87.	Oriental Turtle Dove	16	Fairly Common	0.67
88.	Black Kite	17	Fairly Common	0.71
89.	Black Redstart	17	Fairly Common	0.71
90.	White Wagtail	17	Fairly Common	0.71
91.	Common Hoopoe	18	Fairly Common	0.75
92.	Lammergeier	19	Fairly Common	0.79
93.	Eurasian Crag Martin	19	Fairly Common	0.79
94.	Grey-backed Shrike	20	Fairly Common	0.83
95.	Red-billed Chough	20	Fairly Common	0.83
96.	Himalayan Griffon	22	Common	0.92
	Total	549		

Appendix VI

Upper Mustang Annotated Bird Checklist 2003

Common name	Scientific name	Kazi 77	Kazi 78	Shah '01	Suwal '02	Status	BLI	CITES
TIBETAN SNOWCOCK	<i>Tetraogallus tibetanus</i>	✓	✓	✓	✓	BR		I
CHUKAR	<i>Alectoris chukar</i>	✓	✓	✓	✓	BR		
TIBETAN PARTRIDGE	<i>Perdix hodgsoniae</i>	✓		✓	✓	BR		
RUDDY SHELDUCK	<i>Tadorna ferruginea</i>	✓		✓		SV		
GADWALL	<i>Anas strepera</i>	✓				PV		
NORTHERN PINTAIL	<i>Anas acuta</i>	✓				PV		III
GARGANEY	<i>Anas querquedula</i>	✓				PV		III
SCALY-BELLIED WOODPECKER	<i>Picus squamatus</i>	✓				BR		
COMMON HOOPOE	<i>Upupa epops</i>			✓	✓	SV		
COMMON KINGFISHER	<i>Alcedo atthis</i>				✓	IR		
WHITE-THROATED KINGFISHER	<i>Halcyon smyrnensis</i>	✓				IR		
EURASIAN CUCKOO	<i>Cuculus canorus</i>			✓	✓	SV		
COMMON SWIFT	<i>Apus apus</i>	✓		✓	✓	SV		
FORK-TAILED SWIFT	<i>Apus pacificus</i>				✓	SV		
HOUSE SWIFT	<i>Apus affinis</i>				✓	SV		
TAWNY OWL	<i>Strix aluco</i>	✓				BR		
LITTLE OWL	<i>Athene noctua</i>		✓		✓	BR		
ROCK PIGEON	<i>Columba livia</i>	✓	✓	✓	✓	BR		III
HILL PIGEON	<i>Columba rupestris</i>	✓	✓	✓	✓	BR		
SNOW PIGEON	<i>Columba leuconota</i>	✓	✓	✓	✓	BR		
ORIENTAL TURTLE DOVE	<i>Streptopelia orientalis</i>	✓	✓	✓	✓	SV		
SPOTTED DOVE	<i>Streptopelia chinensis.</i>				✓	SV		
DEMOISELLE CRANE	<i>Anthropoides virgo</i>					PV		II
TIBETAN SANDGROUSE	<i>Syrrhaptes paradoxus</i>			✓		IR		
PINTAIL SNIPE	<i>Gallinago stenura</i>				✓	SV		
GREEN SANDPIPER	<i>Tringa ochropus</i>	✓			✓	PV		
COMMON SANDPIPER	<i>Actitis hypoleucos</i>				✓	PV		
IBISBILL	<i>Ibidorhyncha struthersii</i>	✓			✓	SV		
BLACK KITE	<i>Milvus migrans</i>	✓	✓	✓	✓	BR		
LAMMERGEIER	<i>Gypaetus barbatus</i>	✓	✓	✓	✓	BR		
WHITE-RUMPED VULTURE	<i>Gyps bengalensis</i>	✓				IR	CRTCL	
HIMALAYAN GRIFFON	<i>Gyps himalayensis</i>	✓	✓	✓	✓	BR		
EURASIAN GRIFFON	<i>Gyps fulvus</i>			✓	✓	BR		
HEN HARRIER	<i>Circus cyaneus</i>			✓		PV		
NORTHERN GOSHAWK	<i>Accipiter gentilis</i>	✓				BR		
EURASIAN SPARROW- HAWK	<i>Accipiter nisus</i>				✓	BR		
COMMON BUZZARD	<i>Buteo buteo</i>				✓	SV		II
UPLAND BUZZARD	<i>Buteo hemilasius</i>		✓			SV		II
BLACK EAGLE	<i>Ictinaetus malayensis</i>	✓				BR		
GOLDEN EAGLE	<i>Aquila chrysaetos</i>	✓	✓		✓	BR		II
BOOTED EAGLE	<i>Hieraetus pennatus</i>				✓	BR		
COMMON KESTREL	<i>Falco tinnunculus</i>	✓	✓	✓	✓	BR		

Common name	Scientific name	Kazi 77	Kazi 78	Shah '01	Suwal '02	Status	BLI	CITES
MERLIN	<i>Falco columbarius</i>	✓				IR		
EURASIAN HOBBY	<i>Falco subbuteo</i>	✓			✓	BR		
INDIAN POND HERON	<i>Ardeola grayii</i>	✓				IR		
LONG-TAILED SHRIKE	<i>Lanius schach</i>				✓	SV		
GREY-BACKED SHRIKE	<i>Lanius tephronotus</i>	✓	✓	✓	✓	SV		
YELLOW-BILLED BLUE MAGPIE	<i>Urocissa flavirostris</i>	✓	✓			BR		
HUME'S GROUNDPECKER	<i>Pseudopodoces humilis</i>	✓			✓	BR		
RED-BILLED CHOUGH	<i>Pyrrhonorax pyrrhonorax</i>	✓	✓	✓	✓	BR		
YELLOW-BILLED CHOUGH	<i>Pyrrhonorax graculus</i>	✓	✓	✓	✓	BR		
HOUSE CROW	<i>Corvus splendens</i>				✓	BR		
LARGE-BILLED CROW	<i>Corvus macrorhynchos</i>	✓		✓	✓	BR		
COMMON RAVEN	<i>Corvus corax</i>	✓	✓	✓	✓	BR		
WHITE-THROATED DIPPER	<i>Cinclus cinclus</i>		✓	✓	✓	BR		
BROWN DIPPER	<i>Cinclus pallasii</i>				✓	BR		
BLUE ROCK THRUSH	<i>Monticola solitarius</i>	✓	✓	✓	✓	SV		
BLUE WHISTLING THRUSH	<i>Myophonus caeruleus</i>	✓	✓	✓	✓	BR		
RUSTY-TAILED FLYCATCHER	<i>Muscicapa ruficauda</i>			✓		SV		
SLATY-BLUE FLYCATCHER	<i>Ficedula tricolor</i>			✓		SV		
WHITE-TAILED RUBYTHROAT	<i>Luscinia pectoralis</i>		✓			SV		
BLUE-CAPPED REDSTART	<i>Phoenicurus coeruleocephalus</i>	✓	✓			SV		
BLACK REDSTART	<i>Phoenicurus ochruros</i>	✓		✓	✓	SV		
WHITE-THROATED REDSTART	<i>Phoenicurus schisticeps</i>	✓		✓	✓	BR		
WHITE-WINGED REDSTART	<i>Phoenicurus erythrogaster</i>	✓			✓	BR		
BLUE-FRONTED REDSTART	<i>Phoenicurus frontalis</i>	✓	✓	✓	✓	SV		
WHITE-CAPPED WATER REDSTART	<i>Chaimarrornis leucocephalus</i>	✓	✓	✓	✓	SV		
PLUMBEOUS WATER REDSTART	<i>Rhyacornis fuliginosus</i>	✓	✓		✓	SV		
WHITE-BELLIED REDSTART	<i>Hodgsonius phaenicuroides</i>				✓	SV		
GRANDALA	<i>Grandala coelicolor</i>		✓			BR		
LITTLE FORKTAIL	<i>Enicurus scouleri</i>	✓				BR		
COMMON STONECHAT	<i>Saxicola torquata</i>	✓		✓	✓	SV		
DESERT WHEATEAR	<i>Oenanthe deserti</i>	✓	✓	✓	✓	SV		
ISABELLINE WHEATEAR	<i>Oenanthe isabellina</i>				✓	BR		
BRAHMINY STARLING	<i>Sturnus pagodarum</i>	✓		✓		IR		
WALLCREEPER	<i>Tichodroma muraria</i>	✓		✓	✓	SV		
WINTER WREN	<i>Troglodytes troglodytes</i>	✓			✓	BR		
RUFOUS-VENTED TIT	<i>Parus rubidiventris</i>	✓			✓	BR		
COAL TIT	<i>Parus ater</i>	✓	✓		✓	BR		
SAND MARTIN	<i>Riparia riparia</i>	✓				SV		

Common name	Scientific name	Kazi 77	Kazi 78	Shah '01	Suwal '02	Status	BLI	CITES
PLAIN MARTIN	<i>Riparia paludicola</i>	✓	✓	✓	✓	SV		
EURASIAN CRAG MARTIN	<i>Hirundo rupestris</i>	✓	✓	✓	✓	BR		
BARN SWALLOW	<i>Hirundo rustica</i>		✓		✓	SV		
NORTHERN HOUSE MARTIN	<i>Delichon urbica</i>	✓			✓	SV		
ASIAN HOUSE MARTIN	<i>Delichon dasypus</i>			✓	✓	BR		
NEPAL HOUSE MARTIN	<i>Delichon nipalensis</i>		✓	✓	✓	BR		
GOLDCREST	<i>Regulus regulus</i>	✓				BR		
GREY-SIDED BUSH WARBLER	<i>Cettia brunnifrons</i>	✓				SV		
WHITE-BROWED TIT WARBLER	<i>Leptopoeile sophiae</i>	✓	✓		✓	BR		
TICKELL'S LEAF WARBLER	<i>Phylloscopus affinis</i>	✓	✓	✓	✓	SV		
BUFF-BARRED WARBLER	<i>Phylloscopus pulcher</i>	✓			✓	SV		
YELLOW-BROWED WARBLER	<i>Phylloscopus inornatus</i>		✓			IR		
GREENISH WARBLER	<i>Phylloscopus trochiloides</i>		✓	✓	✓	SV		
STRIATED LAUGHINGTHRUSH	<i>Garrulax striatus</i>				✓	BR		
VARIEGATED LAUGHINGTHRUSH	<i>Garrulax variegatus</i>	✓	✓		✓	BR		
CHESTNUT-CROWNED LAUGHINGTHRUSH	<i>Garrulax erythrocephalus</i>	✓				BR		
SCALY-BREASTED WREN BABBLER	<i>Pnoepyga albiventer</i>	✓				SV		
HUME'S SHORT-TOED LARK	<i>Calandrella acutirostris</i>	✓		✓	✓	SV		
ORIENTAL SKYLARK	<i>Alauda gulgula</i>	✓		✓	✓	SV		
HORNED LARK	<i>Eremophila alpestris</i>	✓	✓	✓	✓	BR		
RUSSET SPARROW	<i>Passer rutilans</i>			✓	✓	BR		
EURASIAN TREE SPARROW	<i>Passer montanus</i>	✓	✓	✓	✓	BR		
TIBETAN SNOWFINCH	<i>Montifringilla adamsi</i>	✓	✓	✓	✓	BR		
WHITE-RUMPED SNOWFINCH	<i>Pyrgilauda taczanowskii</i>	✓		✓		IR		
RUFOUS-NECKED SNOWFINCH	<i>Pyrgilauda ruficollis</i>	✓				IR		
PLAIN-BACKED SNOWFINCH	<i>Pyrgilauda blanfordi</i>	✓				IR		
WHITE WAGTAIL	<i>Motacilla alba</i>	✓		✓	✓	SV		
GREY WAGTAIL	<i>Motacilla cinerea</i>	✓	✓	✓	✓	SV		
PADDYFIELD PIPIT	<i>Anthus rufulus</i>				✓	SV		
BLYTH'S PIPIT	<i>Anthus godlewskii</i>				✓	SV		
OLIVE-BACKED PIPIT	<i>Anthus hodgsoni</i>	✓	✓	✓	✓	SV		
ROSY PIPIT	<i>Anthus roseatus</i>	✓			✓	SV		
ALPINE ACCENTOR	<i>Prunella collaris</i>				✓	BR		
ALTAI ACCENTOR	<i>Prunella himalayana</i>	✓				BR		
ROBIN ACCENTOR	<i>Prunella rubeculoides</i>	✓		✓	✓	BR		
RUFOUS-BREASTED	<i>Prunella strophciata</i>	✓	✓		✓	BR		

Common name	Scientific name	Kazi 77	Kazi 78	Shah '01	Suwal '02	Status	BLI	CITES
ACCENTOR								
BROWN ACCENTOR	<i>Prunella fulvescens</i>	✓		✓	✓	BR		
SCALY-BREASTED MUNIA	<i>Lonchura punctulata</i>				✓	SV		
CHAFFINCH	<i>Fringilla coelebs</i>	✓				IR		
FIRE-FRONTED SERIN	<i>Serinus pusillus</i>	✓	✓	✓	✓	BR		
TIBETAN SISKIN	<i>Carduelis thibetana</i>	✓				IR		
EUROPEAN GOLDFINCH	<i>Carduelis carduelis</i>	✓	✓	✓	✓	BR		
TWITE	<i>Carduelis flavirostris</i>	✓				BR		
PLAIN MOUNTAIN FINCH	<i>Leucosticte nemoricola</i>				✓	BR		
BRANDT'S MOUNTAIN FINCH	<i>Leucosticte brandti</i>	✓		✓	✓	BR		
DARK-BREASTED ROSEFINCH	<i>Carpodacus nipalensis</i>	✓			✓	SV		
COMMON ROSEFINCH	<i>Carpodacus erythrinus</i>	✓	✓	✓	✓	SV		
BEAUTIFUL ROSEFINCH	<i>Carpodacus pulcherrimus</i>	✓		✓	✓	SV		
DARK-RUMPED ROSEFINCH	<i>Carpodacus edwardsii</i>				✓	IR		
STREAKED ROSEFINCH	<i>Carpodacus rubicilloides</i>	✓	✓	✓	✓	BR		
GREAT ROSEFINCH	<i>Carpodacus rubicilla</i>	✓	✓	✓	✓	BR		
CRIMSON-BROWED FINCH	<i>Propyrrhula subhimachala</i>	✓		✓		BR		
WHITE-WINGED GROSBEAK	<i>Mycerobas carnipes</i>	✓	✓	✓	✓	BR		
ROCK BUNTING	<i>Emberiza cia</i>	✓	✓	✓	✓	BR		
TOTAL		94	51	64	96	134	1	7

Legend

BR	Breeding resident
SV	Summer visitor
PV	Passage visitor
IR	Individual records
VULNR	Vulnerable
CRTCL	Critical

Appendix VII Protected Birds of Nepal

Common Name	Scientific name	Habitat	UMBCP (Y/N)
Danfe, Himalayan Monal	<i>Lophophorous impejanus</i>	Grassy slope, forest	N
Cheer	<i>Catreus wallichii</i>	Grassy slope	N
Monal, Satyr Tragopan	<i>Tragopan satyra</i>	Forest, bamboo thicket	N
White Stork	<i>Ciconia ciconia</i>	Wetland, farmland	N
Black Stork	<i>Ciconia nigra</i>	Wetland, farm, forest	N
Sarus Crane	<i>Grus antigone</i>	Wetland	N
Lesser Florican	<i>Sypheotides indica</i>	Grass land	N
Bengal Florican	<i>Houbaropsis bengalensis</i>	Grass land	N
Great Hornbill	<i>Buceros bicornis</i>	Forest	N

Appendix VIII Birdlife International IUCN Red list Category found in Nepal 2002

Common name	Scientific Name	Remarks
Critically Endangered		
Pink-headed Duck	<i>Rhodonessa caryophyllacea</i>	Probably extinct
White-rumped Vulture	<i>Gyps bengalensis</i>	
Slender-billed Vulture	<i>Gyps tenuirostris</i>	
Endangered		
Bengal Florican	<i>Houbaropsis bengalensis</i>	
Lesser Florican	<i>Sypheotides indica</i>	
Greater Adjutant	<i>Leptoptilus dubius</i>	
Vulnerable		
Spot-billed Pelican	<i>Pelecanus philippensis</i>	
Lesser Adjutant	<i>Leptoptilos javanicus</i>	
Baer's Pochard	<i>Aythya baeri</i>	
Pallas's Fish-eagle	<i>Haliaeetus leucoryphus</i>	
Greater Spotted Eagle	<i>Aquila clanga</i>	
Imperial Eagle	<i>Aquila heliaca</i>	
Lesser Kestrel	<i>Falco naumanni</i>	
Swamp Francolin	<i>Francolinus gularis</i>	
Cheer Pheasant	<i>Catreus wallichii</i>	
Sarus Crane	<i>Grus antigone</i>	
Wood Snipe	<i>Gallinago nemoricola</i>	
Indian Skimmer	<i>Rynchops albicollis</i>	
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	Probably extirpated from Nepal
White-throated Bushchat	<i>Saxicola insignis</i>	
Jerdon's Babbler	<i>Chrysomma altirostre</i>	
Slender-billed Babbler	<i>Turdoides longirostris</i>	
Grey-crowned Prinia	<i>Prinia cinereocapilla</i>	
Bristled Grass-warbler	<i>Chaetornis altirostre</i>	
Kashmir Flycatcher	<i>Ficedula subrubra</i>	
Finn's Weaver	<i>Ploceus megarhynchus</i>	
Near Threatened		
Oriental Darter	<i>Anhinga melanogaster</i>	
Painted Stork	<i>Mycteria leucocephala</i>	
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	
Black-headed Ibis	<i>Threkiornis melanocephalus</i>	
Ferruginous Duck	<i>Aythya nyroca</i>	
White-tailed Eagle	<i>Haliaeetus albicilla</i>	
Lesser Fish-eagle	<i>Ichthyophaga humilis</i>	
Grey-headed Fish-eagle	<i>Ichthyophaga ichthyaetus</i>	
Cinereous Vulture	<i>Aegyptius monachus</i>	
Red-headed Vulture	<i>Sarcogyps calvus</i>	
Pallid Harrier	<i>Circus macrourus</i>	
Satyr Tragopan	<i>Tragopan satyra</i>	
Black-bellied Tern	<i>Sterna acuticauda</i>	
Great Hornbill	<i>Buceros bicornis</i>	
Yellow-rumped Honeyguide	<i>Indicator xanthonotus</i>	
Rufous-throated Wren-babbler	<i>Spelaeornis caudatus</i>	
Rufous-rumped Grassbird	<i>Graminicola bengalensis</i>	

Source: www.birdlife.net/species/index.cfm?GeoRecID=148

Appendix IX Climatic data of Mustang (LoManthang)

Latitude 29° 11' Longitude 83° 58'

Altitude 3705 m.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean precipitation (mm)	11	13	6	2	1	14	56	62	9	0	3	7	184
Mean temperature (°C)	- 4.0	- 3.2	1.0	6.1	9.2	12. 8	14. 0	13.7	11. 7	7.6	2.4	-1.5	5.8
Estimated pE (mm)	-	-	-	-	-	-	-	-	-	-	-	-	-
Precipitation variability (mm):													
Maximum	18	42	18	7	8	49	118	119	39	1	11	18	296
Median	11	6	1	1	0	5	49	52	4	0	0	5	185
Five- year low	2	1	0	0	0	0	22	25	2	0	0	0	-
Ten-year low	-	-	-	-	-	-	-	-	-	-	-	-	-
Minimum	0	0	0	0	0	0	12	23	2	0	0	0	155

Mean number of days per year with minimum temperature 0° C or less: 187

Absolute maximum temperature 25.4° C. Absolute minimum temperature -26.1° C

Source: Jackson, 1994

Appendix X Local name of few birds found in Mustang

S.N	Common name	Local name
1.	Pigeon	<i>Punmu, Dhonguk</i>
2.	Black-necked Crane	<i>Trung trung</i>
3.	Hoopoe	<i>Tilipupu</i>
4.	Martin	<i>Nimhalha</i>
5.	Himalayan Griffon	<i>Chrkyo</i>
6.	Raven	<i>Okpo, Chiktyok</i>
7.	Yellow-billed Chough	<i>Kyomo</i>
8.	Horned Lark	<i>Chiptuk, Dikpa</i>
9.	Lammergeir	<i>Kholdho</i>
10.	Partridge	<i>Shyakpa</i>
11.	Chukar	<i>Shapka Kyamo</i>
12.	Tibetan Partridge	<i>Dheprapka</i>
13.	Ruddy Shelduck	<i>Nuru</i>
14.	Black Kite	<i>Nyuthijing, Tinkyur</i>
15.	Owl	<i>Huukpa</i>
16.	Golden Eagle	<i>Lhak</i>
17.	Trees Sparrow	<i>Chyulta</i>
18.	Grey-backed Shrike	<i>Jyammtete</i>
19.	Snow Cock	<i>Kangba, Khomo</i>
20.	Jungle Crow	<i>Dhaprang</i>
21.	Demoiselle Crane	<i>Jhyalong</i>

Appendix XI Cave location

Site	Remarks
1. Chhuksang	– in front of village
2. Tsaile	– below and in front of village – 2 sites
3. Chungsi	– 3 sites
4. Syangmochen	– 1 site
5. Ghilling	– below and in front of village
6. Tamagaun	– above village
7. Ghemi	– above village
8. Dhakmar	– in front of village
9. Tsarang	– below and in front of village
10. Chhosyar/Gharphu	– several sites
11. Samjung	– above village
12. Comfort valley	– between Tsarang and LoManthang – (2 site)

