# Black-necked Crane

## Status, Breeding Productivity and Conservation in Ladakh, India

2000-2004

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*Photo Credit* : Pankaj Chandan/WWF-India

## Preface

This report on Black-necked Crane is the result of intensive studies and surveys in the harsh and unique environment of Ladakh. There are several findings which will be of great interest to ornithologists and particularly people working on cranes.

The report takes into account the interest of the general reader and therefore has the first two chapters accounting for general information on the cranes of the world and the Black-necked Crane respectively. The essence of the report lies in the chapter giving account of the survey observations from almost all the wetlands of eastern Ladakh, where the Black-necked Cranes are known to breed and feed. Such an exhaustive survey is the first ever to be conducted in all the 22 wetlands in this region. The information generated from the current survey has been put in perspective against past studies and a detailed analysis has been carried out. The section on the threats to the breeding cranes and the final chapter on recommendations should be of particular interest to conservation planners.

This report puts into one place most of the important research related to status, breeding productivity and conservation of the Black-necked Crane in the Ladakh region of India. It is hoped that the report will not only be a source of reference for researchers but also will be of help to planners and other stakeholders in conservation and management of the species and its habitat.

It is also hoped that this research will inspire further in-depth work on this unique species and the ecosystems that support it.

*Authors*

## Acknowledgements

A study like this spanning over years under hostile climatic conditions and challenging terrain of Ladakh can never be successful without the whole hearted support of numerous individuals and organizations. We have tried our best to thank all those who have contributed in one way or the other, in making this study possible.

We are greatly indebted to all the organizations, agencies and individuals in Ladakh, for their cooperation and support during various stages of the study. Our special thanks to Thupstan Chhewang, former Chief Executive Councillor, Ladakh Autonomous Hill Development Council (LAHDC), currently Member of Parliament from Ladakh; Rigzin Spalbar, Chief Executive Councillor, LAHDC; Tashi Dorje, former Deputy Commissioner, Leh; Sonam Lundup, former SDM, Nyoma; Mohd. Abbas, Forest Range Officer, Nyoma; M P Singh, Engineer, Indian Institute of Astrophysics; who guided us and facilitated the research at all stages.

We would like to thank the Indian Army and the Indo-Tibetan Border Police (ITBP) for their support and participation, which did not end with the study; the defence forces have pledged to continue supporting the conservation of Black-necked Crane. To name a few, Lt. Gen. Arvind Sharma, AVSM, VSM; Lt. Gen. M L Naidu, YSM, GOC 14 Corps; Maj. Gen N S Brar, COS 14 Corps; Daljeet Singh, former DIG, ITBP, Ladakh Sector and Brig. R K Shivrain, AVSM, who have been personally involved in this initiative.

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Last but not the least we greatly appreciate the warmth and hospitality of the people of Ladakh which made the hostile conditions seem hospitable and our work possible.

*Authors*

## Executive Summary

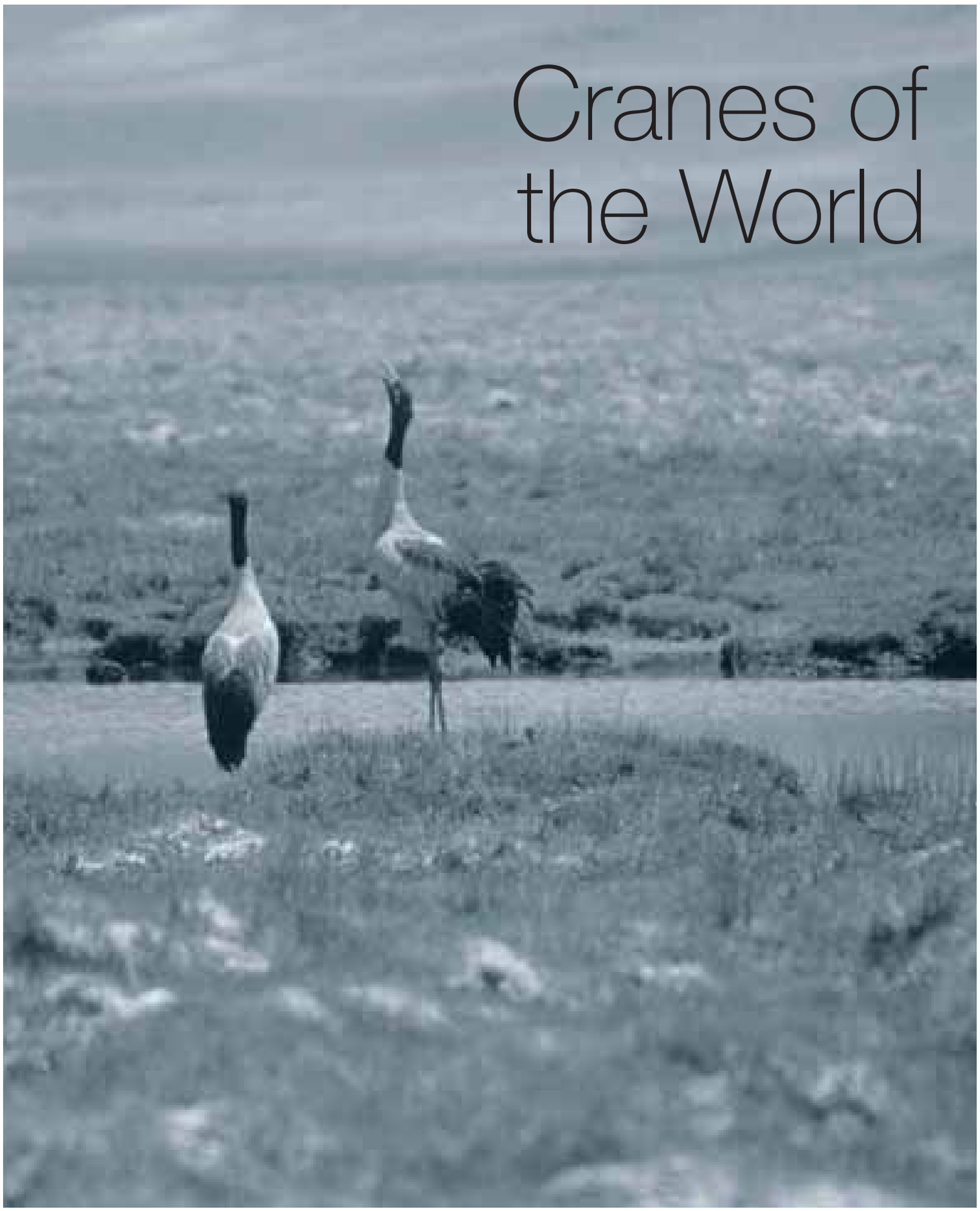
Ladakh dotted with some of the world's most unique and spectacular wetlands, also holds the distinction of being the only known breeding ground of Black-necked Crane, *Grus nigricollis* in India. Few studies which formed the basis for this initiative, have touched upon only some aspects of the ecology of the cranes, the reasons for which could range from hostile climatic conditions to inaccessibility of the region.

WWF-India has been working towards conservation of high altitude wetlands in the Ladakh region and has identified the Black-necked Crane as a priority species owing to its critically endangered status. Under this initiative, WWF in collaboration with the Department of Wildlife Protection, Jammu and Kashmir conducted the study for five consecutive seasons starting from May 2000 to November 2004 on the breeding population of Black-necked Crane and covered virtually all the potential wetlands in Ladakh. Regular surveys were conducted and the observations were analysed to find out breeding success and productivity. The analysis was made using an established methodology and the results indicate that though the population seems to be increasing, the overall breeding productivity is declining. The increase in the population is due to the discovery of new breeding sites and populations and the decline in breeding success is due to increased human activities, and resultant secondary impacts, like direct killing by dogs as well as pressure on habitat because of unplanned developmental activities.

The study indicates that incubation period and the first few weeks after hatching are the most crucial periods in the breeding cycle of the Black-necked Crane in Ladakh. Thus, immediate measures need to be taken to ensure that no disturbance is caused to the birds during the breeding season, especially the incubation period.

# Contents

# Cranes of the World



*A typical sight of crane rotating eggs in the nest*

## Introduction

Cranes are among the most spectacular birds on earth that travel thousands of kilometres without caring for boundaries created by human beings. There are 15 magnificent species of cranes throughout the world (Appendix 1). They are amongst the tallest of flying birds and the Sarus Crane holds the avian record in this regard (Archibald et al. 1981). They are characterized by a long neck and long legs. Between their compact plumage and migratory behaviour they manage to adapt to the cold and the seasonal flux quite successfully. Most species have distinctive coloured head and facial features. These are usually found in combinations of red plumage or exposed patches of red skin, surrounded by black, grey and white plumage, occasionally accompanied by pronounced wattles and ornate crests. The Blue Crane is an exception and has the least patterned head compared to other cranes. The feathering at the rear of the head in the adults of this species, however, is elongated, giving them a distinctive bulbous appearance (Johnsgard 1983). The bills are long and straight and are used for pecking at, or digging for food. Another typical feature of cranes, although not the Crowned Crane, is their elongated and convoluted trachea. This allows them to produce resonant and bugle like calls. A crane can be heard up to 3 to 4 km. In most species the windpipe is long and convoluted. The Crowned Crane, however, lacks this development and consequently does not produce the trumpet-like calls, and sounds instead rather plaintive. Male and female are similar in size and plumage. They reach sexual maturity between three and six years of age, are monogamous and breed once a year. The elaborate threat postures, duets, dances and mutual proximity constitute the vital ingredients in the development of a strong bond between two birds who are believed to pair for life.

At the onset of the breeding cycle, a crane pair defends against intrusion by other cranes, an acreage of wetland or grassland - their breeding territory. They perform a loud territorial duet known as the unison call, which also helps to synchronize the sexual cycle of the mates and thus assure the fertility of the eggs. The male and female are identical in plumage, the male being slightly larger in size. During the unison call of most species the male gives a series of low long calls while the female emits several shorter, higher notes. Listening and watching them perform unison call is, in fact, the most reliable way to determine the sex of most crane species.

Having performed their spectacular courtship displays, some crane pairs renovate their nest of the previous year, while some pairs build new nests next to the old ones, keeping a distance from their closest neighbour. Meanwhile immature birds and adults who have not been able to find partners join up and wander about in small groups. Normally a female lays two eggs, however the Crowned Crane, more often, lays three and sometimes four eggs. Both sexes incubate the eggs. A unison call

is often used to signal exchange of duties at the nest. When either parent suspects danger, it utters a warning call, which precipitates their departure. The oval shaped eggs vary in size according to the species. The smallest crane, the Demoiselle, has eggs equal to the volume of perhaps three chicken eggs, while the larger cranes such as the Sarus and the Wattled have eggs more than double that size. The colour of the eggs also vary. Crowned Crane eggs are usually light blue in colour, the small cranes of the Gruinae genus produce dark and heavily pigmented eggs, and the larger cranes usually lay lightly pigmented or white eggs.

Crane chicks remain with their parents throughout winter, and stay with them for part or all of the journey back to the northern latitudes. However, as the sexual cycle of the adults begins anew, the juveniles are driven away, often forcibly. A pair redefines its breeding territory, while the yearling birds join the other non-breeding birds in the flock. In their second spring, the young birds begin to exhibit sexual behaviour. Pairing and nesting usually occur in the third or fourth year.

In autumn, the cranes from the northern latitudes gather in flocks. Then, at mid-morning, on a clear day with a southerly wind blowing, the cranes begin to spiral skywards and head south, beginning their long migration. Continually emitting loud calls, which presumably helps to keep the flock together, they fly through the day in a 'V' formation or in a line, sometimes at altitudes over 18,000 feet. The chicks remain beside their parents and must remember the landmarks below to follow in the years to come.

Late in the day, the flock descends to roost at an available wetland,

***Second egg still under incubation***

where they rest for the night. Weather permitting, they continue their journey the next morning. Some of these resting areas are randomly visited by the cranes and other wetlands are traditionally used as staging areas and host the migrating cranes for several weeks. For example, Lake Ab-i-Estada in Afghanistan is an important staging area for the Siberian Crane which used to migrate over the Hindu-Kush mountains in their long journey between breeding grounds on the arctic tundras and wintering wetlands within the Keoladeo National Park in India. Unlike many other birds, their flight paths are regular and rigidly defined, so that flocks are sighted every year over the same regions. But in fine, clear weather the cranes tend to soar to such altitudes that it is almost impossible to see them with the naked eye! Only their harsh, strident cries betray their presence and position. When a large flock is flying in formation, its progress appears to be wavering and somewhat unorganized. But more frequently the cranes split up into smaller groups of ten to fifteen individuals, arranged in neat V-shaped formation, following one another closely.

Some ornithologists believe that the geometrical formations adopted by the cranes in flight save energy, because only the leader of each group is obliged to battle against wind resistance, the others taking the advantage of the draught produced by the wing beats of the birds ahead of them. It is noticeable, for example, that the leading bird is replaced at regular intervals by other members of the flock, allowing it some respite. This theory finds support from the field of aeronautics, for it has been established that a squadron of planes in formation use much less fuel than planes flying separately or in a straight line (Allan 1998).

During winter, cranes live in groups near ponds, lakes and arable land. While feeding on grains and vegetation, one or two individuals keep watch and at the first signal of alarm the whole colony takes to air.

## Distribution

Cranes are found on all continents of the world, except South America and Antarctica. Asia boasts the highest diversity, with eight breeding species. Two of these, the Demoiselle and Eurasian

***Crane preening itself***

cranes also extend into Europe as breeding species. There is also a small isolated breeding population of the former in north-eastern Africa (Cramp and Simmons 1980). Australia has two breeding species, one of which, the Sarus Crane, is shared with Asia (Allan 1998). North America is inhabited by two breeding species, the Whooping and Sandhill cranes. The breeding range of the latter extends into northeastern Siberia (Cramp and Simmons 1980) and therefore it could be considered as the ninth Asian breeding species (Allan 1998). Sub-Saharan Africa supports four breeding species, the Black Crowned, Grey Crowned, Blue and Wattled cranes (ibid.). In addition, Demoiselle and Eurasian cranes are non-breeding migrants to north-eastern sub-Saharan Africa (ibid.).

Of these, India receives the Siberian Crane, Demoiselle Crane and the Common Crane as migratory species. The Indian Sarus Crane is a resident of India as the name indicates and the Black-necked Crane breeds in Ladakh.

## Movements

Most cranes inhabiting temperate regions are strongly migratory, with widely distinct breeding and wintering ranges (ibid.). Cranes typically concentrate at traditional haunts prior to and during migration and the term 'staging area' has been coined for these sites (Krapu 1987). Tropical species are more sedentary and show marked local movements and some nomadism, although the extent of these can differ between populations of the same species. Some tropical cranes move between large wetland systems, others resort to seasonal altitudinal movements, and sometimes movements are brought upon by drought conditions. A low level of vagrancy has been reported for the Grey Crowned Crane in South Africa (Tarboton 1992). Many of the Wattled Cranes breeding in the vast Kafue Flats of southern Zambia frequently visit the Makgadikgadi wetlands in northern Botswana but the extent of this movement varies between years (Konrad 1981). In contrast, the Transvaal population in South Africa is wholly sedentary (Tarboton 1984). Altitudinal movements have been reported for the Blue Crane in Natal, South Africa (Walkinshaw 1973). Movements because of drought conditions occur among the Brolga Crane (Johnsgard 1983).

Extreme variation in the extent of migration can occur even in temperate species for example the Sandhill Crane has some populations, which annually migrate over thousands of kilometres between their breeding grounds in the Arctic tundra and the southern United States, while the southernmost breeding populations are entirely sedentary (Drewin and Lewis 1987). Cranes also show adaptability in their patterns of movements in response to man-made changes. These responses include alterations of migratory routes, stopovers and timing (Genard and Lanusse 1992). Migratory flights, and even flights between foraging areas and roosts, among some cranes, occur occasionally and even regularly at night (Williams et al. 1991).

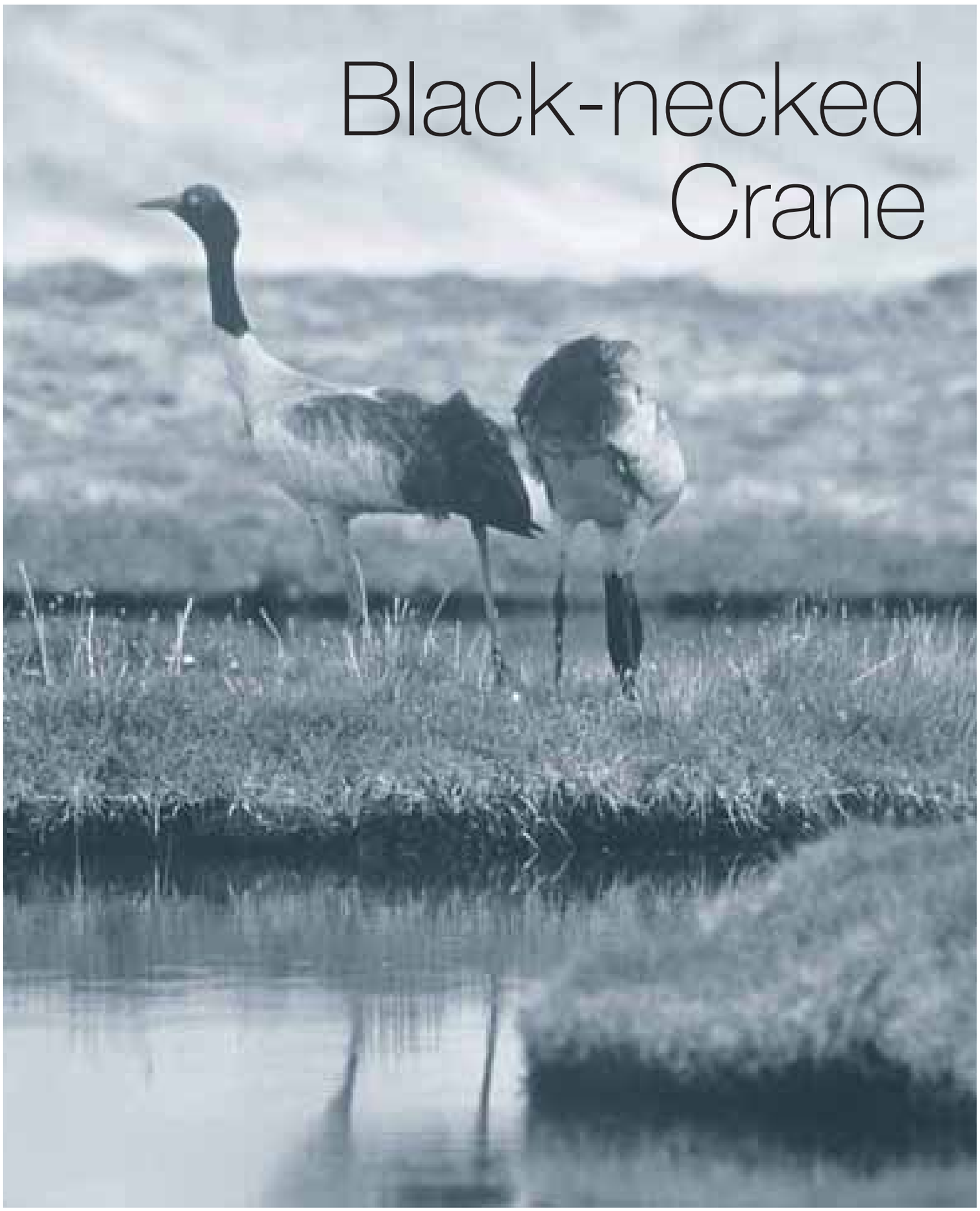
## Longevity

Wild cranes probably are long-lived, a feature suggested by their low breeding productivity and the age at first breeding (Allan 1998). Sufficient data from studies employing individually marked birds to confirm longevity exist only for the Sandhill Crane and even for this species the relevant information is meager (ibid.). A Siberian Crane, which lived for 82 years in captivity, evidenced the longest known life-span of any bird (Matthews and McWhirter 1992). These records demonstrate the potential for extended longevity in wild cranes.

## Conservation Status

Cranes are among the most threatened avian taxa. Seven of the world's fifteen species are listed in the International Council for Bird Preservation's (ICBP, now Birdlife International) checklist of threatened birds (Collar and Andrew 1988). These are the Hooded, Whooping, Black-necked, Redcrowned, Whitenaped, Wattled and the Siberian cranes. The conservation saga of the Whooping Crane is renowned and has become a symbol of conservation efforts to preserve threatened species (Binkley and Miller 1980). ◆

# Black-necked Crane



*A vigilant parent guarding the nest*

## Introduction

The Black-necked Crane is a tall bird, 135 cm tall with a wing span of about 62-64 cm. Both the sexes are almost of the same size but the male is slightly bigger than the female. The upper portion of the long neck, head, primary and secondary flight feathers, and tail are completely black and the body plumage is pale grey/whitish. A conspicuous red crown adorns the head. The bill is greenish and the legs and feet are black. The juveniles have a brownish head and neck and plumage is slightly paler than that of the adult. This magnificent crane which lives in the high altitude wetlands of the Tibetan Plateau can survive temperatures up to –30º C.

Black-necked Crane is the last of the world's cranes to be discovered by the scientific community. It was first sighted by the Russian naturalist, Count Przewalski near Lake Koko Nor in the north-eastern Tibet in 1876. Black-necked Crane was first reported from Ladakh in 1919 by the naturalist, F. Ludlow at Tsokar (Ludlow 1920) during a bird collection trip. This is the only species that the crane specialist Dr Laurence Walkinshaw was not able to study in the wild, and the only one that has eluded man's scrutiny and has retained its age-old aura of mystery and charm. This is not surprising since it inhabits a region that has been one of the earth's most physically impenetrable one.

Due to geographical inaccessibility across much of its range, until the 1980s this species was the least known of all crane species. In the past two decades, significant research and surveys have been conducted. Large wintering and breeding populations have been discovered in Tibet (Feng 1991; Dwyer et al. 1992; Bishop 1993) and northern Sichuan (Scot 1993; Yang 1991). Winter habitat use has been studied in Guizhou (Li 1997) and south-central Tibet (Bishop 1996). A migration study has also been conducted in the eastern portion of its range (Wu et al. 1994).

The total population of Black-necked Crane is estimated to be around 8000 (pers. comm. 29.11.2003, George Archibald, Chairman, International Crane Foundation). In recent years, winter counts of Black-necked Crane were conducted throughout its wintering range and research focusing on habitat selection, food, time budget and territories during winter have been carried out. While more birds and new wintering grounds have been located in the last four decades, actual population of this species still remains vulnerable. Wetlands are very important for this species for roosting and foraging. The crane almost exclusively roosts in wetlands, although the significance of wetlands varies from site to site. In wintering grounds, where farming activities are extensive, wetland habitats have been severely affected and degraded.Because of the significance of wetlands and the pressure on the species from agricultural activities vary from site to site, more

studies need to be done to make comparisons among wintering areas, and between wintering and breeding areas.

The Black-necked Crane is the only high-altitude crane among the 15 species in the world. Its range covers 28º-38º N and 78º-104º E, stretching from the Altun and Kunlun mountain ranges east to the Qilian and Wumeng mountain ranges and south to Himalayas.

The high altitude marshes and the lakes of the Qinghai - Tibetan Plateau (Tibet, Qinghai, Xinjiang, Gansu, Sichuan; China and eastern Ladakh; India) are the known breeding grounds of Black-necked Crane (Bishop 1996). The species is a winter visitor in Tibet, Yunnan and Guizhou (China), Myanmar (Burma) and Bhutan (Pfister 1998). A wintering population of about 27 birds has been reported from the Apatani valley of Arunachal Pradesh in India (Betts 1954). At present there are no records of the species in the valley as it is densely inhabited and two towns-Ziro and Hapoli-have developed here (Choudhury 2002). However there are confirmed reports of the presence of Black-necked Crane in the remote valleys towards the north and west of Apatani valley (ibid). In western Arunachal Pradesh, it winters regularly in small number at Santi valley (Gole 1990). The alarming decline in the population of Black-necked Crane in Arunachal Pradesh is due to the locals hunting them. In areas like Apatani valley, local people possess firearms and hunt the cranes (Kacher 1981), and the future of the species here is uncertain. In north Bengal, the species was recorded being seen twice in December 1992 and November 1993, once at the Moinabari Forest Beat near Bhutanghat, and once on the fringe of the Buxa Tiger Reserve (Choudhury 2002).

## General Distribution

The Black-necked Crane has a restricted distribution range on the Tibetan Plateau (Pfister 1998). The range of Black-necked Crane stretches across the Qinghai - Tibetan Plateau, east to Cao Hai Lake on the Yunnan-Guizhou Plateau (Bishop 1996). The species breeds at elevations of 2950-4900 m in the Qinghai-Tibetan Plateau and from eastern Ladakh to northern Sichuan province (Bishop 1996). The only known breeding population outside China is in eastern Ladakh in India. The wintering populations of the crane are found at lower altitudes (1900-3950 m) in Qinghai, on the Yunnan-Guizhou Plateau, in west-central and in north-west Arunachal Pradesh, India and north-eastern Bhutan (ibid). Earlier wintering flocks which are now considered to be extinct or at least no longer confirmed were recorded in the State of Arunachal Pradesh in India (Khacher 1981; Gole 1996) and Hadong province in North Vietnam (Bishop 1996).

## Black–necked Crane and the Cultural Heritage of the People of Ladakh

Black-necked Crane is a spiritual creature for the people of Ladakh. Most people of Ladakh are Buddhist. All forms of life are respected and killing or damaging any form of life is against the basic philosophy of Buddhism.

Several local monasteries in Ladakh have paintings of Gods and Goddesses together with the Black-necked Crane. One such painting is in a monastery at Phyang called Tashi Choszang, 17 km. from Leh. It is famous for the protective deity of the monastery, Abchi Choski Dolma. There is a separate room for Abchi in the monastery. A crane

### Distribution by Country

| Country | Status |
|---|---|
| Bhutan | W |
| China | B, W |
| India | B, W (Rare) |
| Myanmar | W? |
| Vietnam | X (w) |

Source: Bishop 1996
B = Present during breeding season
W = Present During winter
X = Extirpated: (w) as a wintering

painting along with Abchi hangs on the wall of this room and wherever there is a painting of Abchi, it is with a crane because the crane acts as an ornament of the Abchi. In the monastery there is a natural, dried Black-necked crane, reported to have been brought from a pond near Spituk, 160 years ago.

Black-necked Crane appears on thankas, religious paintings, hanging on the walls of monasteries. In the Changthang region of Ladakh, where the Black-necked Crane breeds, people live in harmony with the species and regard it as a holy bird. Sighting of the species is regarded as a sign of good luck. In Hanle and Chushul, local people consider the arrival of Black-necked Crane as a sign of coming prosperity.

## Breeding Ecology of Black–necked Crane in India

The Black-necked Crane arrives in Ladakh in late March or early April. The first activity is courtship followed by mating . During the present study, it was observed that on most occasions the mating took place in the early morning, only on few occasions during midday and on one occasion it took place in late evening. Nesting activity takes place during May and June and two eggs are laid, which hatch after 30-34 days. Within three to four months the chicks are almost the same size

*Crane at Lungparma marshes*

as adults and they migrate with the parents in late October or early November.

**Breeding Habitat**

The breeding habitat of Black-necked Crane in Ladakh can be broadly classified into two categories : Lacustrine Marshes and Riverine Marshes. Lacustrine marshes are the most common types of wetland found in the eastern part of Ladakh where this bird breeds. These wetlands with small mounds provide an excellent habitat for breeding. The lacustrine marshes range from 4000 to 4800 m. above sea level. Most of the wetlands are freshwater or brackish but some wetlands like Tsokar at an altitude of about 4600 m. are also saline in nature. During the winter months (December to March) these wetlands remain frozen. Annual precipitation is usually less than 100 mm. and glacier and winter snow melt are the major sources of water to these wetlands.

Open riverine marshes are found in the flood plains of the river Indus. The main examples of these type of habitats are Fukche, Dungti and Staklung.
These wetlands provide abundant food for the cranes in the form of tubers, snails, fish, etc.

The common floral species found in the marshes where these cranes breed are *Equisetum ramossimum, Lepidium apetalum, Pedicularis longiflora, Utricularia minor, Polygonum nummularifolium and Potentila anserina*.

In Ladakh the feeding pattern of the birds during the breeding season depends on the availability of food. In some wetlands like Hanle where there is an abundance of fish, the birds have been quite often observed feeding on these. Whereas in some wetlands like Yaya Tso where fish is not availablel in abundance the birds have been observed feeding on tubers and aquatic insects for most of the time.

**Nesting**

Out of the sixteen nesting sites in Ladakh most of the nests are built on grassy mounds situated at the centre of a small marsh. The sites are carefully selected by the birds so that no intruder can approach the nest. In one case at Staklung the cranes were found depositing mud at the centre of a small marsh and then giving it the shape of a nest by collecting the vegetation available near the site. Some nests like the one at Lalpahari and at Tsokar are built in water by collecting the vegetation from the same marsh. The average water depth near the nesting sites is about 3 ft. Except for nesting sites at Hanle, Chushul and Fukche all other nesting sites in Ladakh are situated quite far from each other at a distance which ranges from 10 to 100 km.

During the present study, it was observed that the same nesting mounds were used by the same pairs over the years. A crane tagged at Shado Bug at Hanle in 1995 by Chacko (Chacko 1995) was found to be nesting on the same mound till 2003. However, in 2004 the pair selected a new mound at a distance of about 300 m from the old mound.

Nesting activity at all sites in Ladakh starts with courtship and mating which begins in April and May. Both male and female participate in the construction of the nest which is done mostly in the evening. Though at some sites nesting activity has been recorded in late June and even in early July. In one case during the present study, renesting attempts and even mating was recorded at Lalpahari at Hanle after the first clutch laid was destroyed by dogs. Egg laying occurs from the last week of April till last week of June.

A clutch of two eggs are laid which hatch after 30-34 days. Both male and female share the incubation duties and repairing of the nests is done throughout the incubation period. During the nesting and incubation period the birds do not allow other species into their territory.

### Food

There have been few studies on the food habits of breeding Black-necked Crane. Vegetation, including *lloydia filiformis* and *Potentila anserina* have been observed in droppings and stomach contents (Lu et al. 1980; Zhou 1985). Several lizards were found in the stomach of one bird at Qaidam (Guo 1981). In Ladakh, Pfister (1998) reported that chicks predominantly feed on insects, other invertebrates and plant tubers. During the present study the birds were found feeding on fish and on tubers.

## Wintering Ecology

The Black-necked Crane winters primarily in four areas: northwest Yunnan / western Guizhou, Yarlung Tsangpo (river) valley and its tributaries in south-central Tibet. Small numbers of cranes may also winter in Vietnam and Myanmar (Wu et al. 1994).

## Migration

Very little is known about the migratory routes of the Black-necked Crane in the Tibetan Plateau. Three migration routes of the Black-necked Crane have been suggested by Wu et al. (1994):

### Eastern Route

The population of the species summering in Ruoergai Marsh is inferred to migrate south along Qionglai mountains and Min Jiang (river), through Ya'an, Leshan, Rongxian and Yibin before arriving at the Wumeng Shan region. The species remain in Ruoergai Marsh for about 170 days, and in the Wumeng Shan region for about 150 days, indicating a month long spring and fall migration between these two areas.
In support of this theory, two birds banded in Ruoergai Marsh were sighted at Cao Hai (Wu et al. 1994) and two birds were collected at Ya' an (Schafer 1939) and at nearby Rongxian (Li 1986).

### Central Route

The population of the species summering in Longbaotan, Qinghai province, is inferred to migrate along Tongtian He and Jinsha Jiang, Queershan mountain and Shaluli Shan mountain, passing through Shiqu, Garze, Litang of western Sichuan before arriving at the Hengduan Shan region of northwest Yunnan. One bird banded in Longbaotan was relocated at Napahai, approximately 800 km away. The species has been observed historically at Litang along this proposed migratory route (Dolan 1939; Schafer 1938) and can be seen at Garze in October and March (Lu 1986).

### Western Route

The western route was hypothesized by Wu et al., (1994) for the cranes breeding in south-eastern Xinjiang, Western Qinghai, central and western Tibet. According to these researchers, this population winters in the middle Yarlung Tsangpo valley, with

***Parent on the nest***

## Banding/ringing of Black-necked Crane in Ladakh, India, 1995

| Place of Banding | Date of Banding | Markings on the Rings | Colour of Rings Left/Right | Colour of Wing Tag |
|---|---|---|---|---|
| **TsoNyak, Chushul** | June 1995 | 01 Ladakh (Ring 1) June 95 Chacko-ICF | Green/Red /Green | Orange |
| **Mankhang / Lalpahari** | June 1995 | 02 Ladakh (Ring 2) June 95 Chacko-ICF | Green/Red /Black | Blue |
| **Shado Bug, Hanle** | June 1995 | 03 Ladakh (Ring 3) June 1995 | Green/Black /Red | Green |

Source : Chacko 1995

some crossing the Himalayas and wintering in Bhutan.

## Conservation Status

The Black-necked Crane is listed in the Appendix I of CMS (Convention on the conservation of Migratory Species) and also listed in the Appendix II of CITES (Birdlife International 2001). IUCN has categorized the bird as Vulnerable, under Criteria A1b, c, d A2c C1 (Bishop 1996). Under the Wildlife (Protection) Act, 1972, Govt. of India, the bird has been categorized as a Schedule I species. The bird has been given the status of the State Bird of Jammu and Kashmir (Sinha 2001).

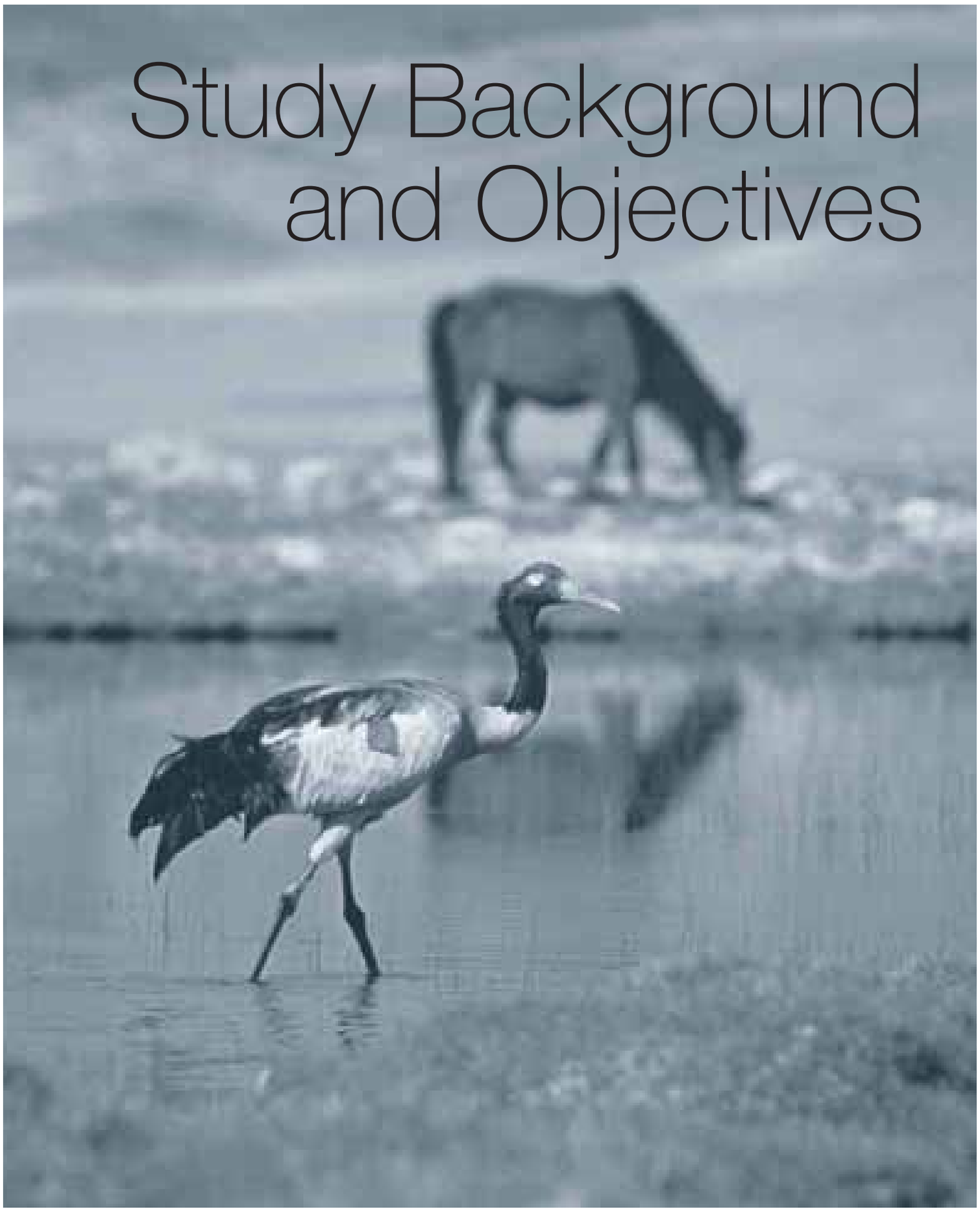
Chinese authorities have offered the bird the highest class of protection, listing it as endangered, in class 'A' (Pfister 1998).

## Banding Studies

The only banding/ringing of Black-necked Crane in India was done by Chacko in 1995 (Chacko 1995). The exercise was undertaken mainly to understand the migration route of the breeding population of Black-necked Crane and to confirm whether the same birds were returning to their respective nesting areas in the following years. In addition to bands, coloured tags were also placed on the wings of the birds. Another attempt of banding/ringing of Black-necked Crane in India was made by Chacko in 1996 but it was not successful. Subsequently, no effort has been made (Pfister 1998). A number of successful banding efforts have been made in Tibet ( Sherub 2002) and China (Wu Zhikang, et al.1989; Zhang Fuyun and Yang Ruoli. 1997; Li Fengshan, 1997; Archibald, G. 2002). The details are provided in Appendix V and VI. ◆

***The crane in its ideal habitat***

# Study Background and Objectives



WWF-India initiated a conservation project: 'Conservation of High Altitude Wetlands of Ladakh' in the Indian Trans-Himalaya in 1999 with the support from the WWF network. The primary objective of the project is to develop a strategy and action plan (involving all stakeholders) for conservation of high altitude wetlands, particularly, Tsomoriri, Tsokar, Pangong Tso, Hanle and Chushul. These wetlands in the Changthang region of Ladakh are part of the Tibetan Steppe Plateau, one of the Global 200 Ecoregions identified by the WWF network for priority conservation.

These wetlands are extremely fragile ecosystems and have great importance as breeding grounds of unique and rare avifauna, especially the Black-necked Crane and Bar-headed Goose. The Changthang region was open to tourism in 1994. Since then the number of visitors has tremendously increased and so has their impact on the surroundings. Seasonality of toursim to the region compounds the impact. Increasing development in the area is another threat.

The project was initiated by identifying the stakeholders-tour operators, the Indian Army and other paramilitary forces, local administration, schools, local communities etc. A series of consultations were held with each specific group to analyse their influence and impact and gain partnerships. Subsequently in July 2000, a National Consultation was held at Leh in which the scientific experts, Indian army officials, local NGOs, the district administration and local tour operators articipated. Immediately after this WWF-India established field offices at Leh and in village Korzok near Lake Tsomoriri to carry on the project work.

The Black-necked Crane was identified as a species deserving special concern considering the small population that breeds in

***Pangong Tso***

Ladakh. A detailed survey of the status of this species was initiated. As a pilot study, data was collected on the status and breeding pattern of the species at selected wetlands. The study was enlarged into a more organized scientific one because of the importance of the species as an indicator of the health of wetland ecosystems. WWF-India and Department of Wildlife Protection, Jammu and Kashmir conducted an intensive study of the population of Black-necked Crane at all the potential wetland sites in Ladakh following standard methodology.

## Study Area

The study area is situated in Changthang region of Ladakh in India.

The Himalayas extend for over 2500 km along the northern frontier of India in one giant sweep from the Nanga Parbat massif in the west to the Namche Barwa in the east. North of this high range lies the Tibetan plateau that was mostly formed as a result of tectonic upliftment of the Tethys Sea in the Miocene and Pliocene period (Wadia, 1966). The region is generally referred to as the Trans-Himalaya and is a cold desert. The vegetation in the region is sparse and productivity peaks only in the short summer season. This harsh environment is thus home to only highly adaptable flora and fauna.

The Tibetan plateau region is very vast and within India extends for 1,84,823 sq km in the states of Jammu and Kashmir, Himachal Pradesh with small portions extending into Sikkim and Uttaranchal mountains.

Ladakh is part of the Trans-Himalayas of the Tibetan Plateau. This area, a cold desert, is interspersed with high altitude plains, green patches of marshy meadows (with Carex and Caragana often interspersing these), willow plantations near habitations and sparse vegetation. The terrain is extremely rugged with high cliffs and exposed rocks.

The present study was conducted in eastern Ladakh commonly known as Changthang and is characterized by arctic conditions, wind-swept desert and barren hills. The Changthang region lies at 4000 m and above. The soil is sandy or sandy loam. Borax deposits in the dried marshy areas and around wetlands is a common feature. Strong and unpredictable winds make the area highly inhospitable. The single most characteristic feature of the region is the dryness (Sapru and Kachrroo 1976). In summer the temperature ranges from 0° C to 30° C and the winter temperature is between –10° C to – 40° C (Mishra and Humbert-Droz 1998).

This region has numerous wetlands - brackish as well as freshwater. Apart from their hydrological importance, the wetlands are

***Tent of a nomadic family in the study area***

***Parent crane feeding the chicks***

home to wide variety of flora and fauna. Most of these wetlands are of glacial origin and remain frozen from December to March. Cranes arrive in these wetlands in March and April and after completing their breeding cycle leave these wetlands in October and November. A unique tent-dwelling tribe, the Changpas, move around the wetlands of Ladakh in search of pasturelands.

The wetlands of Changthang are the only known nesting sites of the Black-necked Crane in India. Several other species of birds use these wetlands as their breeding grounds too, such as the Bar-headed Goose (*Anser indicus*), Brown-headed Gull (*Larus brunicephalus*), Great-crested Grebe (*Podiceps cristatus*), Ruddy Shelduck (*Tadorna ferruginea)* and Lesser Sand Plover (*Charadrius mongolus*).

Several species of mammals are found in the region, e.g. the Blue Sheep (*Pseudois nayaur*), Ladakh Urial (*Ovis orientalis vignii*), Tibetan Argali (*Ovis ammon hodgsoni*), Tibetan Wild Ass (*Equus kiang kiang*), Himalayan Marmot (*Marmota himalayana*), Red Fox (*Vulpes vulpes*), Tibetan Gazelle (*Procarpa picticaudata*), Snow Leopard (*Uncia uncia*), Wild Dog (*Cuon alpinus laniger*), Tibetan Wolf (*Canis lupus chanko*) and the Lynx (*Lynx isabellina*).

## Black–necked Crane in Ladakh: A Historical Perspective

The first record of Black-necked Crane in India was made by F. Ludlow on 2 June 1919 at Tsokar, when he shot one bird and collected its head and wings for identification (Ludlow 1920). After Ludlow's discovery and report of Black-necked Crane in Ladakh, Osmaston (1925) and Meintertzhagen (1927) also observed some breeding pairs

in the area. A joint expedition of the Bombay Natural History Society (BNHS) and WWF-India in 1976 led by Salim Ali (Hussain 1976) was the first venture that led to the conservation of the species during the breeding season. Later Parkash Gole conducted some studies on the nesting sites of Black-necked Crane in 1978 and 1980 (Gole 1983). In 1982 Chering Nurbu conducted a study on some nesting sites of the species in Ladakh (Nurbu 1983). A second BNHS-WWF-India expedition was undertaken in 1983 to study the feasibility of collecting eggs of Black-necked Crane for artificial incubation at Baraboo, Wisconsin, USA. S A Hussain suggested that such a programme was not advisable considering the impracticality of collecting crane eggs simultaneously from several nests (Hussain 1985). In 1986 and 1987, the BNHS conducted a study on the ecology of Black-necked Crane in different breeding areas of the species in Ladakh (Narayan 1987; Akhtar 1989). A more detailed and regular study of breeding of the species in Ladakh was initiated in 1992 and was carried on till 1997 (Chacko 1994, 1995, 1996 and 1997). During these years, Chacko established a database on the breeding success of the species at different nesting sites in Ladakh. He also initiated ringing of the birds during the study (Chacko 1995). Three birds were ringed and tagged at Tsonyak, Mankhang and Shado Bug (ibid.). In 1997, Pfister conducted a study on the breeding ecology and conservation of Black-necked Crane at Tsokar and Hanle (Pfister 1998). Collectively these findings may be considered as the benchmark information on status, distribution and occurrence of Black-necked Crane in Ladakh (Appendix II).

These studies have contributed greatly to the information on the breeding population of the Black-necked Crane in Ladakh. Almost all these studies were conducted only in a few areas, and information across eastern Ladakh was lacking. The present study aimed to fill this gap through intensive surveys from 2000 to 2004 covering 22 wetland sites.

## Objectives

The surveys were conducted at regular intervals with the following objectives:

- To establish the population status and identify nesting and feeding sites of Black-necked Crane in Ladakh.
- To determine the breeding productivity and identify the potential threats to the breeding population of Black-necked Crane in Ladakh.
- To devise strategies for the conservation of Black-necked Crane in Ladakh.

## Methodology

First, a thorough review of all the available literature was carried out. Based on the available information 22 wetlands were identified for intensive survey to record the Black-necked Cranes. The present study was conducted from May 2000 to November 2004.

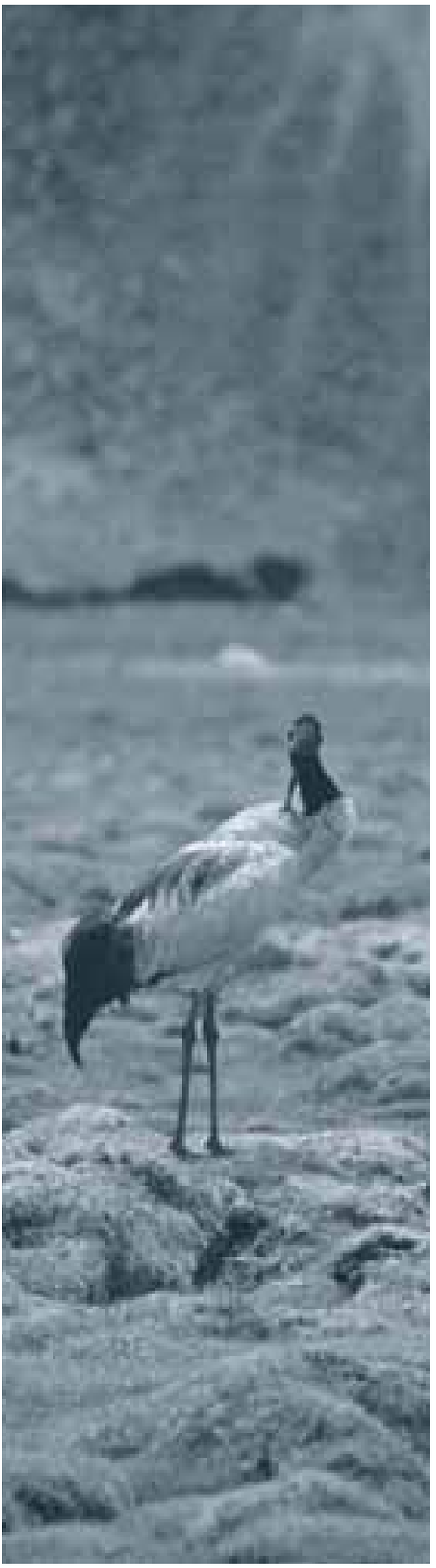
The entire population was counted between March to November in 2002, 2003 and 2004. Data was collected on the number of nests, number of eggs laid, hatching success and survival of fledglings.

Surveys were made in March- April, and October-November to establish the arrival and departure dates of the species. The day a Black-necked Crane was sighted for the first time was considered as the arrival date of the species (Oring and Lank 1982). Similarly the last date when the species was sighted in a particular area was considered as its departure date (Bhupathy et al. 1998).

The data used to estimate breeding productivity was collected from 15 pairs of birds in 2002, 16 pairs in 2003 and 15 pairs in 2004. The reproductive output of each nest was followed through the various stages of the life cycle, from the clutch laid, through hatching/ fledging and recruitment into the breeding population. As there were few sub-adults and as they differ little from adults, these were included in the adult category. Productivity was calculated as the number of young raised per successful female in the population in a year. To determine nesting success traditional method (successful nests/all nests) was employed (Mayfield 1961).

To estimate the population changes and to evaluate the seasonal variations in the overall population each year was divided into three seasons: pre-nesting (March-April), nesting (May-July) and post-nesting (August-November).

To study the behaviour of Black-necked Crane during the courtship, mating, incubation and post-breeding period before migration, focal animal sampling method (Altman 1974) was used. The Black-necked Crane is highly territorial and can be seen in their respective territories, so finding a particular pair was not difficult. Because of the openness of the habitat and the size of the bird more than 90 per cent of the sites were easy to locate. The activities were recorded in a defined format. One full day was devoted to record the activities of one pair. Activities of Black-necked Crane were divided into 16 categories, viz.,



(1) preening (2) chasing (3) walking (4) foraging (5) drinking (6) resting (7) yawning (8) courtship displays (9) mating (10) defecation (11) wing stretching (12) bill clattering (13) wing flapping (14) bathing (15) incubating the eggs and (16) feeding the chicks. Date, observation time, temperature (day's maximum and minimum) and cloud cover (cloudy/ sunny) were also recorded.

To study the inter- and intra-specific interactions, chasings were recorded while taking data on the activity patterns of the Black-necked Crane. The duration of aggressiveness shown towards other species, the species reacted to and their numbers were also recorded. The activity of Black-necked Crane before it chased an intruder was also recorded. Time taken to chase away an intruder, the distance chased and the distance between Black-necked Crane and the intruder before engaging in an aggressive act were also noted. To understand the reason for the conflict, the activity of the intruding species (before being chased away) was recorded too.

The types of threats and their likely impacts on the breeding population of cranes were also recorded.

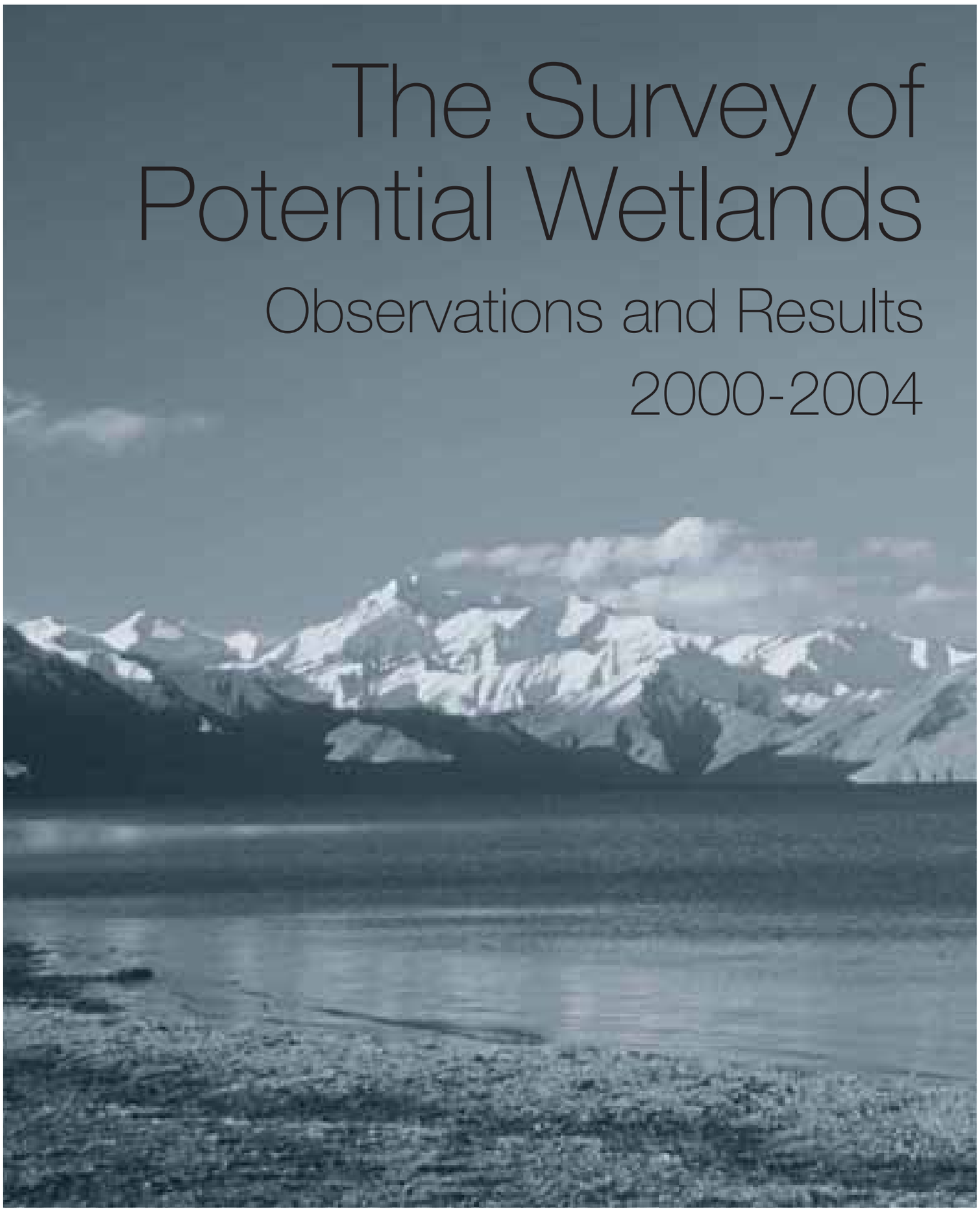
Development work going on around the wetlands were also recorded.

Nikon binoculars and spotting scopes were used to spot the birds. Locations were taken using a Garmin 12 CX GPS. A digital stop-watch, a hand tally counter and a still camera were used to record specific events. Direct or visual count method was used to count the birds. Such a method has been widely used for counting aquatic birds (Eltringham and Atkinson-Wiles 1961; Roux 1973; Zewarts 1976; Alford and Bolen 1977; Amat 1984; Sridharan 1989).

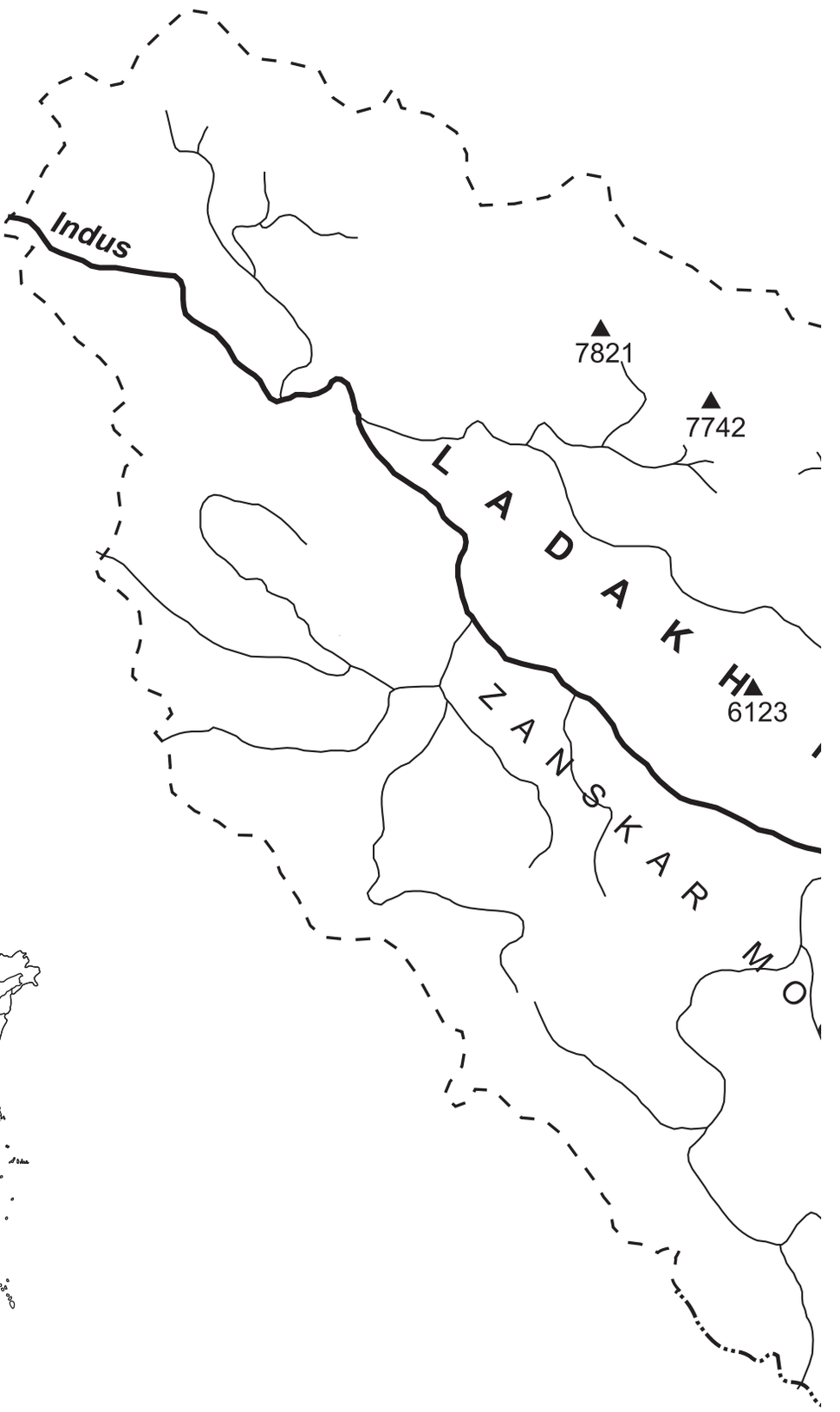
During the study, about 45000 km were coverd by foot and using a four wheel drive vehicle. ◆

# The Survey of Potential Wetlands

## Observations and Results 2000-2004



*Not to Scale*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International Boundaries
State Boundaries
District Boundaries

# Black-necked Crane Distribution in Ladakh


**Ladakh Region** India | **2000-2004**

*On lookout for a fish*

## Survey Summary

The present study comprises the survey which was initiated in May 2000 and completed in November 2004. In 2000 and 2001 WWF - India team conducted pilot studies focusing on Tsomoriri, Tsokar, Startsapuk Tso and Puga wetlands. In the same year the nesting of Black-necked Crane at the northern end of Tsomoriri was recorded. Gradually the surveys were organized and various important observations began to pour in. The study revealed several facts for the first time:

In 2001, three nests were recorded, one each at Tsokar, Startsapuk Tso and Puga. The nesting record at Tsokar and Puga are the first ever records of Black-necked Crane nesting at these wetlands (Appendix III).

In 2002, an intensive survey was conducted from April to December at all the potential wetland sites and 15 nesting sites recorded (Appendix IV). The team recorded 59 Black-necked Crane (49 adult and 10 chicks) which is the highest number ever recorded in Ladakh.

Except for Kyun Tso 1 Kyun Tso 2 and Pangong Tso, the species was recorded at all the other wetlands. Three new nesting sites, including Yaya Tso were also recorded during the same period. Yaya Tso at an altitude of 4820 m earns the distinction of being the highest breeding site of the Black-necked Crane in India.

During 2003, 60 birds were recorded which included 50 adults and 10 chicks.

In 2004, 64 birds were recorded which included 51 adults and 13 chicks.

## Wetland-wise Observations

## TSOKAR BASIN

The Tsokar basin consists of two lakes – Tsokar and Startsapuk Tso. These are located in the vast open plains which are at a little distance from the Leh-Manali road about 150 km. from Leh. Tsokar is a salt water lake and Startsapuk Tso is a freshwater lake. Both these lakes are connected to each other through a small channel. The water of the freshwater lake Startsapuk Tso drains into Tsokar through this channel. There are a large number of nomads who keep moving around these wetlands as these provide very good pastures for their livestock.

The nomads living around the lake have a very efficient system of pasture management. They do not use these pastures during the summer months when they move away to far off places and use these pastures only during the winter months. This pattern of use of these pastures is strictly enforced by the community and during the summer months at least two individuals from each family stay back as guards, rotating their guard duty the entire summer season. The pasturelands are thus allowed to regenerate during the summer months so that they can be used during the winter months, when grass is scarce. From the biological point of view with respect to avifauna this is very advantageous as all the biological activity, especially nesting and raising of chicks by different species of birds occurs during the summer months. By the time the nomads start using these pastures the birds are ready to fly to their wintering grounds.

### Crane Observation at Tsokar Basin (Tsokar and Startsapuk Tso)

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jun 1919** | 3 | | | | | Ludlow 1920 |
| **Jun 1924** | 3 | | | | | Osmaston 1925 |
| **May - Jun 1926** | 4 | | | | | Meinertzhagen 1927 |
| **May - Jun 1980** | 4 | | | | | Gole 1983 |
| **Jun 1982** | 2 | | | | | Nurbu 1983 |
| **Jun 1983** | 2 | | | | | Hussain 1985 |
| **Sept - Oct 1992** | 4 | | | | | Chacko 1992 |
| **May - Sept 1995** | 3 | | | | | Pfister 1995; Chacko 1995 |
| **Apr - Sept 1996** | 3 | 1 | 1 | 0 | 3 | Pfister 1996; Chacko 1996 |
| **Jun - Oct 1997** | 4 | 1 | 2 | 0 | 4 | Pfister 1998; Chacko 1997 |
| **May - Oct 2000** | 2 | 1 | 2 | 2 | 4 | Present study |
| **May - Oct 2001** | 4 | 2 | 2 | 2 | 6 | Present study |
| **Apr - Dec 2002** | 4 | 1 | 2 | — | 4 | Present study |
| **Mar - Nov 2003** | 4 | 2 | 4 | — | 4 | Present study |
| **Apr - Nov 2004** | 4 | 1 | 2 | 1 | 5 | Present study |

### Earlier Records

It is in the Tsokar basin where the cranes were first discovered in Ladakh. The first discovery of Black-necked Cranes in Ladakh was made by F Ludlow in 1919 at Tsokar on 2 June (Ludlow 1920). Later on Osmaston visited this wetland in June 1924 and reported three cranes from the area. In May and June in 1926 Meinertzhagen recorded four cranes from the area. In June 1982, Chering Nurbu recorded two cranes in this wetland. In 1992 Chacko recorded four cranes in this area. In 1995 and 1996 Chacko and Pfister surveyed this wetland and recorded three cranes from the area each year. In 1997 Chacko and Pfister again visited this wetland and recorded four cranes from the area (Pfister 1998).

### Tsokar

Tsokar is located at an altitude of 4582 m above the sea level. This salt water lake used to be a source of salt for the local people. But in the last few years the people are unable to extract salt from the lake because of flooding of the particular area from where they

*Tsomoriri*

used to extract salt. In the winters (December-April) nomads of the area live in small hamlets at Ralay village at the base of Thukjay Gompa. During these months people keep moving between Ralay and the settlement on the southern side of the freshwater lake -Startsapuk Tso, near lake Tsokar. The lake is very important not only because a pair of crane nests here but also because it is a home for other waterbirds.

## Survey

After the survey began, the cranes were first sighted in the first week of April 2002. At that time no nesting activity was recorded. The lake was still half frozen and cranes were sighted moving on the snow in the area near Ralay village. During the second visit to the area in May a crane was seen sitting on a nest incubating the eggs and another was seen feeding in a nearby marsh on the eastern shore of Tsokar. The nest was unusual, constructed in a marshy area covered by small mounds on three sides, near Ralay village. The next visit during June revealed that the cranes had left their nests and were feeding in a nearby marshy area. On enquiry from the villagers, we were told that the eggs were eaten by the dogs and hence the cranes were away from their nests. Later visits to the same area revealed that the cranes did not make any attempt to renest in the same area. During subsequent visits lasting up to October this pair was sighted feeding in various marshes around Tsokar. Occasionally, the pair also moved to nearby lake Startsapuk Tso and at times were seen feeding with the pair of cranes from that area, maintaining a small distance from the other pair

In 2003 a similar survey was conducted in the same area. The pair had successfully bred and produced one chick. But the chick was eaten by a feral dog in July 2003. Later the pair kept moving on and feeding in different areas at Tsokar, while spending most of the time feeding by the wetland at the base of the road connecting Ralay with Pangonago.

In 2004 the pair was sighted again in the wetland near Ralay. A nest was built in the same place where the birds had nested earlier. Two chicks were produced and hatching of both chicks was recorded-the second chick hatched 14 hours after the first. Both the chicks were sighted with the pair in July. But in August, only one chick was sighted. On enquiry from the local people it was found that one chick was killed by a feral dog.

This wetland was also surveyed in 2000 and 2001 and in both years a pair of crane was spotted in the area during various visits but they did not make any attempt at nesting.

## Threats

- Unregulated development such as construction of road and buildings near the wetlands.
- Increase in tourists camping around the wetland.
- Garbage such as tin cans and plastic bottles thrown away by the tourists.
- Excessive grazing by the horses brought up by the tourists.
- Off track driving by the vehicles.
- Labourers camping close to the nesting site.

*Expedition camps at Puga Valley*

## Startsapuk Tso

This is a freshwater lake on the southern side of Tsokar and is critically important as a breeding ground for large number of waterfowl. The water is supplied to the lake by the glacial streams from the south and the west and the water finally drains into Tsokar by a channel which connects these lakes. During the present survey a large number of Bar-headed Geese, Great-crested Grebe, Brown-headed Gulls, Common Terns were seen breeding in this area. In May and June 2002, 90 floating nests of the Great-crested Grebe were recorded on this lake and the number of nests recorded in May and June 2003 were 120. A large number of Gulls and Geese were also seen nesting together on the islands on the south-eastern side of the lake.

### Survey

In April 2002 a pair of Black-necked Crane was seen feeding in the marshes south-west of the lake. At that time it was assumed that the pair would definitely nest there as in the past two years (2000 and 2001) a pair of crane had bred successfully producing two chicks each year. In May only one crane was sighted. But a pair was sighted in June 2002 however they did not make any attempt to nest. The pair remained there till the last week of October when they migrated.

In 2003 the pair nested at the same location where it had in 2000 and 2001. This time the pair laid two eggs and produced one chick. But the pair and chick were attacked by a wolf in August and the chick was killed (Pers. comm. Sanjay Uniyal, Wildlife Institute of India).

In 2004, a pair was sighted again in the area during various field visits from April to October. The pair however did not make any attempt to nest.

### Crane Observation at Puga Valley

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| May - Oct 2001 | 2 | 1 | 2 | — | 2 | Present study |
| Apr - Dec 2002 | 6 | — | — | — | 6 | Present study |
| Mar - Nov 2003 | 5 | — | — | — | 5 | Present study |
| Apr - Nov 2004 | 5 | — | — | — | 5 | Present study |

### Threats

- Tourists camping around the wetland especially near the watch tower.
- Garbage thrown by the tourists.
- Construction of buildings on the southern side of the wetland.
- Vehicular movement right upto the edge of the wetland.
- Excessive grazing by the horses brought by the trekking groups.
- Disturbance to the birds created by tourists such as chasing the birds for photographs.

## PUGA VALLEY

Puga valley wetland is situated east of Tsokar and can be reached by crossing Pologunka La. Village Ankung is situated at the base of the Pologunka La where the valley is quite wide and becomes narrow towards village Sumdo. Puga is important for several resident and migratory species. The Golden Eagle and Bearded Vulture nest in this valley. A good poulation of Brahaminy Ducks and Common Merganser is found in this valley. Other birds found in this valley are the Brown-headed Gull, Pallas Gull and some waders like Redshank and Black-winged Stilt. This is the only place in Ladakh where a large population of Brahaminy Ducks is found even during peak winters. The valley is known for its hot-springs and mineral deposits

especially Borax. The Oil and Natural Gas Corporation (ONGC) of Government of India tried to exploit the geothermal energy in the area by installing a geothermal power station but was unsuccessful. The remains of the station now stand out like a sore thumb.

### Earlier Records

Several researchers had visited Puga valley in past but could not locate any Black-necked Crane. Pfister during a survey in 1997 found two Black-necked Cranes here but he believed that the birds were temporary visitors from Tsokar. He was of the opinion that Black-necked Crane occasionally came from Tsokar to feed at Puga valley (Pfister 1998).

### Survey

In 2001 a pair of crane nested here in a marsh in the centre of the valley but did not produce any chick. During the 2002 study no Black-necked Crane was recorded in this area in April and May. But in June six Black-necked Cranes were seen feeding on the western slopes of the valley. All the six cranes remained in the valley till October but did not make any attempt at nesting. It was seen that at most times five cranes were feeding together whereas the sixth one was seen feeding alone at a distance from the rest. About 340 Brahaminy Ducks in two flocks were recorded during a visit to the area on 9 January 2003. This was unique, as earlier it was believed that like other migratory birds Brahaminy Ducks also migrate from the area in October and November.

In 2003 five cranes were first spotted in this area in May and during various visits to the area in the following months cranes were seen feeding at different locations in the entire valley. The last visit to the valley in November 2003 did not reveal any cranes. But few Bar-headed Geese along with some Brahaminy Ducks and Common Mergansers were recorded from the area.

*Crane at Chumur during winter*

In 2004 five adult birds were recorded in May and were also seen during our visits from June to November. As the same group was sighted at Tsokar on various surveys this number is not considered in the overall count for the Tsokar Basin.

This does not, however, rule out the possibility of the cranes using Puga valley as a breeding area because during 2001 survey a nest was found in this valley though no chick was recorded.

### Threats

- Excessive grazing by livestock of the local nomads and Tibetan refugees.
- Camping by locals and tourists along the water channel.
- Disturbance to the birds by the visitors such as chasing.
- Large expedition camps of various organistions in the area.
- Unplanned and unregulated development activities such as construction of huge buildings and roads going on in the entire valley.
- Illegal quarrying for extraction of sulphur.

## TSOMORIRI

Tsomoriri is situated at an altitude of about 4600 m. It is fed by a number of small glacial streams, most of them flowing in from the north and the west, and has no external drainage. There are marshes on the north and south end, with the southern one being considerably longer. The streams and the bays on the north and south end have given rise to number of muddy depressions which serve as important feeding habitat for several migratory birds. Near the northern shore lies an island which is the

### Crane observation at Tsomoriri

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Aug 1995** | 3 | — | — | — | 3 | Mishra and Humbert-Droz 1998 |
| **Aug - Sept 1999** | 2 | — | — | — | 2 | Present study |
| **May - Oct 2000** | 2 | 1 | 2 | — | 2 | Present study |
| **May - Oct 2001** | 2 | — | — | — | 2 | Present study |
| **Apr - Dec 2002** | — | — | — | — | — | Present study |
| **Mar - Nov 2003** | 2 | — | — | — | 2 | Present study |
| **Apr - Nov 2004** | 2 | — | — | — | 2 | Present study |

*Nomads with their livestock in the wetland region*

main nesting site of Bar-headed Geese and Brown-headed Gull. The steep ravines in the west of the lake near Korzok, serve as a good nesting habitat of Brahaminy Duck. Marshlands around the lake are the ideal feeding ground for this species where they also raise their young. Immediately after hatching, the chicks roll down from hillock to the water of the lake. Two grebe species, viz., Black-necked Grebe and Great-crested Grebe also nest at the lake. The village of Korzok which is one of the highest permanent settlement in the world lies on the west of the lake. The agricultural fields and the nearby marshland at the confluence of the lake and the stream serve as an important feeding habitat for a large number of birds.

### Earlier Records

Mishra and Humbert-Droz who visited the area in 1995 reported three non breeding birds, at the southern end of the wetland (Mishra and Humbert-Droz 1998)

### Survey

The nesting of the Black-necked Crane at the northern end of the lake was first recorded in 2000. In 2000 the Cranes built a nest in a marsh north-east of the lake at the base of a hillock. A clutch of two eggs was laid in the last week of May, which were washed away by the rising water of the lake. In 2001 a pair was again sighted in the same area in April and May but they did not make any attempt to nest. No Black-necked Crane was recorded at this lake during the regular surveys in 2002.

In 2003 a pair of crane was seen feeding at Peldo on the northern end of the lake in May. This pair was also sighted feeding in the marshes during various follow-up visits except in August, and the pair was no longer sighted after October.

In the year 2004 the pair was sighted feeding at Peldo on various occasions from May to September 2004. This pair did not made any attempt to nest.

### Threats

- Dogs owned by ITBP personnel and nomads.
- Grazing pressure from the livestock owned by 120 families of nomads.
- Unregulated and unplanned development activities such as, construction of road connecting Peldo to Chumur, construction of big buildings in and around Korzok and brick making around the wetland.
- Tourists camping in non-designated areas.
- Garbage generated by the increased tourism.
- Disturbance to the birds by tourists camping in the area.

## LAM TSO – CHUMUR

This wetland is near the southern side of the Tsomoriri and is approachable by road from Hanle which is about 90 km away. The area is a vast open plain with patches of marsh surrounded by borax. A small lake, Lam Tso, is on the northern end of the wetland which is fed by a large number of springs. A large number of nomads spend most of the winter around this wetland as it provides good grazing pastures for their herds.

### Earlier Records

The first record of cranes in this

wetland was made by Parkash Gole in 1980 (Gole 1983), when a breeding pair of crane was recorded in this wetland. Later on Pfister and Chacko reported three cranes from this wetland in 1995, four in 1996 and six in 1997.

### Survey

The present survey found a pair of crane nesting here in June 2002 with a clutch of two eggs but the visit during July failed to find any chicks. This area appeared most interesting as a visit to this site in the last week of November, to ascertain the migration time of cranes, revealed that the cranes were still there. Another visit was made to this site in December when the two cranes were again sighted in the marsh at the base of an abandoned Tibetan settlement.

Except for the pair at Lam-Tso Chumur, all other birds migrated to their wintering grounds between the last week of October and the first week of November. In order to record whether any birds still remained, all the wetlands were again visited in December. But for the pair at Chumur no other crane was recorded. The pair at Chumur was again sighted moving near the marshes at Lam Tso on 17 January 2003, during the final visit of the 2002 survey. The wetland was completely frozen and the nomads were feeding the pair. This is the first ever incidence where a crane pair decided to stay back during the harsh winter.

*Bar-headed Geese at Chumur*

In addition to the pair of cranes, a large number of other migratory birds also breed and feed in this wetland. During the present survey a pair of Greylag Goose was found nesting at Lam Tso in 2001 and 2002. The other birds which breed in this wetland are the Great -crested Grebe, the Bar-headed Geese and Brahaminy Ducks.

During the regular survey in 2003 the pair was sighted again in the same area, on the shores of the Lam–Tso. They had built a nest and laid two eggs but no chicks were produced.

In year 2004 three adults were sighted in the area. Of these three, one was a loner. The pair here nested in June at the same place where nesting was recorded earlier. This pair did not produce any eggs.

### Threats

- Dogs owned by ITBP personnel and nomads.
- Excessive grazing on the pasturelands around the wetland quite close to the nesting sites of the birds.
- Local people mostly children of the nomads, have been seen disturbing the incubating birds.

**Crane Obervation at Lam Tso Chumur**

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jun 1980** | 2 | 1 | | — | 2 | Gole 1983 |
| **May - Sept 1995** | 3 | 1 | 2 | — | 3 | Pfister 1995; Chacko 1995 |
| **Apr - Sept 1996** | 3 | 1 | 2 | — | 4 | Pfister 1996; Chacko 1996 |
| **Jun - Oct 1997** | 4 | 1 | 2 | 2 | 6 | Pfister 1998; Chacko 1997 |
| **Apr - Dec 2002** | 2 | — | — | — | 2 | Present study |
| **Mar - Nov 2003** | 2 | 1 | 2 | — | 2 | Present study |
| **Apr - Nov 2004** | 3 | — | — | — | 3 | Present study |

## HANLE

The vast open plains of Hanle are known nesting sites of the Black-necked Cranes in Ladakh. This is the only wetland where there

*Camps near wetland during religious festivals*

is a large human population. The population includes a number of Tibetans who migrated to this part of India after the 1962 war. The Hanle river on the southern edge of the wetland is joined by a small water channel which runs all along the northern side of the wetland. The Hanle river drains into the river Indus at Loma. A population of nine birds was seen in this area in April 2002. It was observed at Hanle that before establishing their territories the cranes were feeding together most of the time.

In addition to the crane many other migratory birds also breed and feed in these wetlands. The common birds which breed in and around the wetlands of Hanle are Bar-headed Geese, Brahaminy Ducks, Gargany, Northern Pintail, Northern Shoveller and the Common Teal.

## Crane Observation at Hanle

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jun 1976** | 2 | 1 | 2 | 1 | 3 | Hussain 1976 |
| **Jul 1978** | 2 | 1 | — | — | — | Gole 1981 |
| **May - Jun 1980** | 1 | — | — | — | — | Gole 1983 |
| **Jun 1983** | 2 | — | — | — | 3 | Hussain 1985 |
| **Aug - Oct 1986** | 2 | 1 | 2 | 2 | 4 | Narayan et al. 1987 |
| **Sept - Oct 1992** | 4 | 2 | 4 | 1 | 5 | Chacko 1992 |
| **May - Sept 1995** | 7 | 1 | 2 | 2 | 9 | Chacko 1995 |
| **Apr - Sept 1996** | 6 | 3 | 6 | 2 | 8 | Chacko 1996 |
| **June - Oct 1997** | 9 | 3 | 6 | 3 | 12 | Pfister 1998 |
| **Apr - Dec 2002** | 9 | 4 | 7 | 1 | 10 | Present study |
| **Mar - Nov 2003** | 8 | 4 | 6 | 4 | 12 | Present study |
| **Apr - Nov 2004** | 9 | 3 | 4 | 4 | 13 | Present study |

### Earlier Records

Black-necked Crane was first recorded from the Hanle plains in 1976 by a WWF-India and BNHS team (Hussain 1976) who found a nesting pair, which later produced a chick. Subsequently, several researchers have recorded Black-necked Crane at Hanle. Chacko and Pfister recorded the highest number of Black-necked Crane -12- in 1997.

Within the Hanle plains, Jung Demo has been a traditional Black-necked Crane nesting area (Chacko 1996; Pfister 1997). Shado Bug is also a known nesting site for Black-necked Crane (Chacko 1995; Pfister 1997). In 1995, Chacko marked a bird here with a green tag on the right wing and coloured rings on both legs (Chacko 1995). This pair still nests in the same area.

### Survey

During the year 2002, 2003 and 2004 following nesting sites were recorded from the Hanle plains.

## Jung Demo

Jung Demo is a traditional nesting site of Black-necked Cranes (Chacko 1996; Pfister 1997). The site lies north of the Tashi Choling Gompa, a Buddhist nunnery . In 2002, a nest was constructed on a small mound at the centre of a small pond. In June the cranes were seen here incubating the eggs. Two eggs hatched successfully but in August a chick was eaten up by a rebo dog (dogs owned by nomads). The remaining chick successfully migrated with the parents in the last week of October.

In 2003 this pair constructed its nest a bit later than the pairs at Raar and at Shado Bug. The pair laid two eggs in July and produced one chick which successfully migrated

from the area along with the parents.

In 2004 the pair nested at the same place where it had nested in the previous years. Nesting started late in June but no eggs were produced.

## Raar

Raar lies at the bottom of a hillock. Cranes were first reported nesting here in 1996 (Pfister 1998).

In 2002 a pair of crane was observed building the nest in May. They laid two eggs in June. The nest was built on a small mound in the centre of a pond but the dogs could get to it and ate up both the eggs. Later, the pair was seen feeding in the same area and in the nearby marshes on the western side of the nesting site. Along with other cranes this pair also migrated from Hanle in the last week of October.

In 2003 the pair at Raar was very closely monitored from courtship displays to mating and from egg laying to hatching and finally till migration. The pair built a nest in the same place where they had nested in 2002. Two eggs were laid in the third week of July and one egg hatched on 22 July 2003, the other egg did not hatch. One chick fledged successfully and later migrated with the parents in the last week of October.

In 2004 the crane pair built a nest on the same mound which they had used earlier for nesting. This pair laid two eggs in early May and produced two chicks in June. Both chicks successfully migrated in October 2004.

## Shado Bug

This is also a known nesting site of the cranes (Chacko, 1995; Pfister 1997). The site lies on the southern side of two villages, Bug and Shado.

***Livestock grazing in the wetland***

The nesting site is situated quite close to the eastern side of the river Hanle. In 1995 Chacko marked a crane here with a green tag on the right wing and coloured rings on both the legs (Chacko 1995). This pair is still nesting in the same area. A crane with the tag was first located feeding at the base of Hanle monastery in May 2002. When followed closely it was observed that this was the same male bird which was tagged by Chacko in 1995.

That same year the cranes laid two eggs here in Ju ne but both eggs were eaten by feral dogs. The pair remained in the area till the last week of October, when they migrated along with other cranes.

In 2003 the pair was spotted again and were followed very closely. The pair built a nest on the same mound where they had nested in 2002. Two eggs was laid in the second week of June and the eggs hatched in the third week of July. Both chicks fledged successfully and migrated with the parents in the last week of October 2003.

In 2004 the same tagged bird was again sighted in the same wetland.

***Male crane killed by Golden Eagle at Mankhang/Lalpahari***

This year the pair shifted their nesting site 500 m from the place where they normally nested. The mound used to nest was about 4 ft from the edge of the wetland. Thus this was an unsafe location for nesting. This pair was followed quite closely from nesting to egg laying to hatching and all these events were recorded. Two chicks were produced which migrated in October along with other birds in the wetland.

## Chukil Koma

This is a new nesting site for the Black-necked Crane at Hanle. A pair were seen nesting for the first time in June 2002. The nest was built in a pond similar to that at Jung Demo. This nest was built quite late and only one egg was laid which was eaten by a raven. Later the cranes left the nest and were sighted feeding in the nearby marshes on many occasions. This pair migrated in the last week of October.

In 2003 the pair selected the same site for nesting. Of the four nests at Hanle, this was again the last to be built. Nesting started late in the first week of July, no eggs were laid and the cranes left the nest after some time. This pair continued to feed in this area for most of the time but also moved to other areas from time to time.

In 2004 a pair was sighted feeding in the same wetland. They did not, however, make any attempt at nesting. Everyone who visited Hanle by road could see this pair clearly as the wetland where they fed was quite close to the road.

### Threats

- Reclamation of wetland for agriculture.
- Tremendous biotic pressure brought on by the settlements of the local nomads and the Tibetan refugees in the area.
- Huge camps of nomads that come up for religious ceremonies in summer months.
- Many enclosures made by different Government agencies for fodder production.
- Development of roads through the marshes and new buildings coming up in the reclaimed wetland areas.
- Raising of electric poles all across the wetland.

*A family of cranes at Mankhang*

## MANKHANG / LALPAHARI

Mankhang, situated about 22 km north of Hanle towards Loma on way to Nyoma, is one of the traditional nesting sites of the Black-necked Crane in Ladakh. This place is also known as Lalpahari as there is a red hillock situated quite close to the wetland,. It is a small marshy area, quite close to the road which connects Loma with Hanle.

### Earlier Records

One Black-necked Crane was recorded for the first time at

### Crane Observation at Mankhang/Lalpahari

| Month/Year | Adults | Nests | Eggs | Chicks fledged | Total No. of cranes | Reference |
|---|---|---|---|---|---|---|
| **Jul 1978** | 1 | — | — | — | 1 | Gole 1981 |
| **May - Jun 1980** | 2 | 1 | 2 | 1 | 3 | Gole 1983 |
| **Jun 1982** | 1 | — | — | — | 1 | Nurbu 1983 |
| **Jun 1983** | 2 | 1 | 2 | 2 | 4 | Hussain 1985 |
| **May - Sept 1995** | 2 | 1 | 2 | 0 | 2 | Chacko 1995 |
| **Apr - Sept 1996** | 2 | 1 | 2 | 1 | 3 | Chacko 1996 |
| **Jun - Oct 1997** | 2 | 1 | 2 | 1 | 3 | Chacko 1997 |
| **Apr - Dec 2002** | 2 | 1 | 2 | 2 | 4 | Present study |
| **Mar - Nov 2003** | 2 | 1 | 2 | 1 | 3 | Present study |
| **Apr - Nov 2004** | 2 | 1 | 2 | 1 | 2 | Present study |

*Crane feeding the chicks*

Mankhang in July 1978. In May-June 1980, a pair along with a chick were recorded. In 1982, only one bird was recorded here. In 1983, a pair with two chicks were recorded. Chacko and Pfister recorded two Black-necked Crane in 1995, three in 1996 and three in 1997 from this wetland (Chacko 1995, Chacko 1996, Pfister 1998).

### Survey

In 2002, the team observed a pair of Black-necked Crane that had established its territory at Mankhang quite early, in the third week of April. In the second week of May, the pair incubated their eggs which hatched in the third week of June. The pair successfully reared the chicks and migrated with the juveniles in the last week of October.

In April 2003 a pair of Black-necked Crane started nesting. Two eggs were laid in the first week of May. Only one egg hatched in the second week of July. Again regular monitoring revealed that the pair was successful in rearing the chick and the family migrated in the last week of October.

In 2004, a pair made a nest in the usual nesting place. The pair produced two chicks in the first week of June. One chick was killed in July by the dogs owned by the nomads. In September, the male was attacked by a Golden Eagle and killed. The female and the chick were sighted feeding together till they migrated in October.

### Threats

- A road connecting Loma with Hanle passes quite close to Mankhang. Disturbance due to vehicular traffic is increasing. Furthermore, visitors passing by disturb the nesting birds for photographs.
- Nomads pitch tents close to the nesting site of the cranes and their dogs are a major threat to the breeding birds in this area.
- There is tremendous grazing pressure on the wetland by about 3000 sheep and goats, 100 yaks and 60 horses.

### Crane Observation at Staklung

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Aug - Oct 1986** | 2 | — | — | — | 2 | Narayan et al. 1987 |
| **Sept - Oct 1992** | 2 | — | — | — | 2 | Chacko 1992 |
| **May - Sept 1995** | 4 | — | — | — | 4 | Chacko 1995 |
| **Apr - Sept 1996** | 2 | — | — | — | 2 | Chacko 1996 |
| **May - Sept 1997** | 3 | — | — | — | 3 | Pfister 1998 |
| **Apr - Dec 2002** | 2 | 1 | 2 | 2 | 4 | Present study |
| **Mar - Nov 2003** | 2 | 1 | 2 | 1 | 3 | Present study |
| **Apr - Nov 2004** | 2 | 1 | 2 | 2 | 4 | Present study |

## STAKLUNG

Staklung is a vast flat area at an altitude of 4173 m. The wetland is fed by a stream flowing from the west to the east and joining the Indus above Nyoma. Few springs on the eastern side also feed the wetland. A large part of the area is covered with hard clay devoid of any grass cover. During rains the silt comes down and this impacts the grasslands close to the wetland.

### Earlier Records

The presence of Black-necked Crane at Staklung was first reported in 1978. Two birds were recorded at the wetland in 1986. In 1992, Chacko recorded a pair from the area. Chacko and Pfister recorded four birds in 1995, and in 1997 two birds from the area (Chacko 1992; Chacko 1995; Pfister 1998).

### Survey

In 2002 a pair of Black-necked Crane was found in May nesting on the north-eastern side of the wetland. A clutch of two eggs was laid. The eggs hatched in June and the chicks were seen moving with the parents. The family migrated in the last week of October. This was the first record of Black-necked Crane nesting at Staklung.

In 2003, the pair again nested in the same area in April. Two eggs were laid in the second week of May. One chick was produced which migrated with the parents in the last week of October.

*Chicks of Brahminy Duck*

In 2004 the nesting activity started earlier and the pair laid two eggs in May. Two chicks were produced and they successfully migrated in October 2004.

### Threats

- A road running across the wetland connecting village Rongo with village Nether.
- Nomads pitching their tents close to the nesting site in summer.
- Regular rains during the past have brought lot of silt from the mountains near the wetland and this has destroyed the pastures and the wetland to a great extent.
- Grazing pressure in and around the wetland. About 300 horses, 160 Yaks and 3000 sheep and goats graze in this wetland.

### Crane Observation at Yaya Tso

| Month/Year | Adults | Nests | Eggs | Chicks Survived | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Apr - Nov 2002** | 2 | 1 | 2 | 2 | 4 | Present study |
| **Jan - Nov 2003** | 2 | 1 | 2 | — | 2 | Present study |
| **Apr - Nov 2004** | 2 | 1 | 1 | 1 | 3 | Present study |

## YAYA TSO

Located at an altitude of 4820 m, Yaya Tso is one of the most beautiful lakes in Ladakh. More than half the valley area is covered by the lake, and a meadow and marsh lies on its eastern side. The lake is fed by glacial streams flowing through the marsh into the lake. The lake serves as an ideal nesting habitat for a large number of species, viz., Bar-headed Goose, Black-necked Grebe and Brahminy Duck.

### Earlier Records

There is no earlier record of Black-necked Crane at Yaya Tso.

### Survey

During the survey in 2002, a pair of Black-necked Crane established its breeding territory in the marsh on the eastern side of the lake in May. The pair built a nest on a mound almost in the center of a pond in June and laid two eggs in the third week of the same month. The eggs hatched in the last week of July. Two chicks were sighted with the parents in the following months and

all migrated in October when the lake had begun to freeze. This is the first ever record of the Black-necked Crane breeding at Yaya Tso and the site has now the distinction of being the highest nesting site of the Black-necked Crane in India.

In April 2003, the visit to the lake did not reveal any Black-necked Crane. At that time the lake and the surrounding wetland areas were completely frozen and only a few gulls and Brahminy Ducks could be seen. In May a pair of Black-necked Crane was again seen nesting in the same area. The pair laid two eggs in June and two chicks were produced but both were lost. One was killed by a wolf in the first week of August and the reason for the death of second could not be ascertained. The pair were seen feeding in early October in the same area even though the wetland had already started freezing.

The pair began nesting in the first week of June 2004 and laid one egg and produced a chick. During the visit to the wetland in July, hatching of the chick was also recorded. This chick was sighted feeding with the parents during many visits. The family of three was not sighted in the area after first week of October.

### Threats

- The construction of a road connecting Mahe Gompa with Chushul.
- Excessive grazing during the summer months. About 1500 sheep and goats, 200 yaks and 20 horses graze in the limited pastureland available around the wetland.
- Dogs owned by 15 families of nomads have been seen chasing the birds, adults and chicks, on many occasions.
- During the special pooja at Mahe Gompa, large numbers of people visit the area and take their vehicles right up to the edge of the wetland.

## DUNGTI

Dungti is a vast sandy plain on the Indus near Loma which is on the way to Fukche. Marshy areas found on both sides of Indus act as major feeding and breeding grounds for a large number of water birds. A large colony of Bar-headed Goose and Brown-headed Gull have been found nesting in these marshes and on the islands in Indus.

### Earlier Records

Dungti is a known feeding area of Black-necked Crane but no nesting has ever been recorded here. The first record of the species feeding in this area was made in 1978 when Parkash Gole recorded a pair of non-breeding birds here (Gole 1980). Later, several researchers have observed Black-necked Cranes feeding in this area (Pfister 1998).

### Survey

During the intensive phase of survey, in 2002, a pair of Black-necked Crane was sighted near the road in May. The pair was busy with the courtship displays. At that time it was believed that the pair might nest here. But during subsequent visits the birds were never sighted again in this area.

In 2003, the survey team found a pair feeding in this area in April but only one bird was sighted once in July.

A pair was sighted feeding in the area during many field visits in 2004. This pair did not make any attempt at nesting.

### Threats

- Motorable road close to Dungti marshes creates disturbance.
- There is tremendous grazing pressure from the livestock owned by about 40 families of nomads.
- Nomads camping in the wetland areas during the summer months.
- Dogs owned by the nomads, army personnel and ITBP

## FUKCHE

Fukche is situated near village Koyul on the west of the Indus. It is a vast open plain with borax deposits, which gives it a whitish look.

### Earlier Records

Black-necked Crane was first recorded at Fukche wetland in 1926 (Meintertzhagen 1927). In 1978 Parkash Gole also reported a pair here. In 1982 Chering Nurbu too recorded a pair here. In 1992 Chacko recorded two pairs here. In 1995 Chacko recorded a breeding pair which produced two chicks.

### Crane Observation at Dungti

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jul 1978** | 2 | — | — | — | 2 | Gole 1981 |
| **Jun - Oct 1997** | 4 | — | — | — | 4 | Pfister 1998 |
| **Apr - Dec 2002** | 2 | — | — | — | 2 | Present Study |
| **Mar - Nov 2003** | 2 | — | — | — | 2 | Present Study |
| **Apr - Nov 2004** | 2 | — | — | — | 2 | Present Study |

*A pair of crane with chicks at Chushul*

In 1996 Chacko again recorded a pair which produced one chick. In 1997 Chacko recorded two pairs, each of which laid a clutch of two eggs each but ultimately only one chick survived.

### Survey

During intensive survey in 2002, two pairs of Black-necked Crane were seen nesting. Both nests were quite close to the Indus and were about 2 km from each other. Each pair laid two eggs in May. All four eggs were eaten by dogs. The birds did not make further attempts at renesting. Later, these birds were observed feeding in the same area and at times, in the nearby wetlands. They were observed feeding quite close to each other in September. After the second week of October the birds were not sighted at Fukche.

In April 2003, again two pairs of Black-necked Crane were seen establishing territories. Nesting started in the last week of April and two eggs were laid in each nest. One chick hatched successfully in one nest. Two eggs in the other nest were eaten by dogs. The birds were sighted in the same area till the second week of October.

In May 2004 six adults were recorded. At the same time two nests were also recorded. In June two eggs were laid in each nest. Eggs in one nest were destroyed by feral dogs but in the other nest two chicks were produced which successfully migrated with the parents.

### Threats

- Dogs owned by the Army and the ITBP personnel.
- There is tremendous grazing pressure on this wetland during the summer months.
- The building of a major canal and roads all along the wetland.

### Crane Observation at Fukche

| Month/Year | Adults | Nests | Eggs | Chicks fledged | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **May - Jun 1926** | 2 | — | — | — | 2 | Meinertzhagen 1927 |
| **Jul 1978** | 2 | — | — | — | 2 | Gole 1981 |
| **May - Jun 1982** | 2 | — | — | — | 2 | Nurbu 1983 |
| **Sept - Oct 1992** | 4 | — | — | — | 4 | Chacko 1992 |
| **May - Sept 1995** | 2 | 1 | 2 | 2 | 4 | Chacko 1995 |
| **Apr - Sept 1996** | 2 | 1 | 2 | 1 | 3 | Chacko 1996 |
| **Jun - Oct 1997** | 4 | 2 | 4 | 1 | 5 | Pfister 1998 |
| **Apr - Nov 2002** | 4 | 2 | 4 | — | 4 | Present study |
| **Mar - Nov 2003** | 4 | 2 | 4 | 1 | 5 | Present study |
| **Apr - Nov 2004** | 6 | 2 | 4 | 2 | 8 | Present study |

## CHUSHUL MARSHES

Chushul marshes are famous breeding areas for the Black-necked Crane. A large village by same name, Chushul, is situated almost at the center of these breeding areas. The village is bordered on three sides by marshes and two small lakes. The entire village is criss crossed by small streams that flow in from the western and northern sides and finally find their way in lake Pangong Tso in the east of the village. The area has a luxuriant cover of grass, shrubs and herbs.

*Non-breeding congregated at Chushul*

Most of the villagers had been semi-nomadic before trying to settle permanently in the village. Livestock farming and agriculture are the main sources of income of the local people.

## Earlier Records

A large number of researchers and conservationists have visited Chushul from time to time and have reported few breeding as well as non-breeding Black-necked Crane from this wetland. Osmaston recorded six Black-necked Crane here for the first time in 1924. In 1926 Meinertzhagen recorded four birds here. In 1976 a team led by Dr. Salim Ali, the world renowned Indian ornithologist, recorded three Black-necked Crane along with a nest at this wetland. Parkash Gole, visited the area and reported four and five Black-necked Crane In 1978 and 1980 (Gole 1981; Gole 1983), respectively (which also included two chicks during each year). In 1982 Chering Nurbu recorded a pair in the area (Nurbu 1983). In 1983 Hussain recorded three birds from this wetland (Hussain 1985). In 1986 Narayan recorded sixteen Black-necked Crane and this is the highest number of birds so far recorded at Chushul (Narayan et al. 1987). In 1987 Akhtar reported eleven birds at Chushul (Akhtar 1989). In 1992, 1995 and 1996, Chacko recorded six, eight and ten birds, respectively (Chacko 1992; Chacko 1995; Chacko 1996). In 1997 Chacko and Pfister reported 12 cranes from this area (Pfister 1998).

### Crane Observation at Chushul Marshes

| Month/Year | Adults | Nests | Eggs | Chicks Survived | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jun 1924** | 6 | — | — | — | 6 | Osmaston 1925 |
| **May - Jun 1926** | 4 | — | — | — | 4 | Meinertzhagen 1927 |
| **June 1976** | 3 | 1 | 2 | — | 3 | Hussain 1976 |
| **May - Jun 1978** | 2 | 1 | 2 | 2 | 4 | Gole 1981 |
| **May - Jun 1980** | 3 | 1 | 2 | 2 | 5 | Gole 1983 |
| **Jun 1982** | 2 | 1 | 2 | — | 2 | Nurbu 1983 |
| **Jun 1983** | 3 | 1 | 2 | — | 3 | Hussain 1985 |
| **Aug - Oct 1986** | 14 | 1 | 2 | 2 | 16 | Narayan et al 1987 |
| **Jul - Nov 1987** | 9 | 1 | 2 | 2 | 11 | Akhtar 1989 |
| **Sept - Oct 1992** | 5 | 2 | 3 | 1 | 6 | Chacko 1992 |
| **May - Sept 1995** | 6 | 2 | 4 | 2 | 8 | Chacko 1995 |
| **Apr - Sept 1996** | 6 | 3 | 5 | 4 | 10 | Chacko 1996 |
| **Jun - Oct 1997** | 10 | 3 | 6 | 2 | 12 | Pfister 1998 |
| **Apr - Dec 2002** | 12 | 3 | 6 | 2 | 14 | Present Study |
| **Mar - Nov 2003** | 8 | 3 | 6 | 2 | 10 | Present Study |
| **Apr - Nov 2004** | 8 | 2 | 4 | 1 | 9 | Present Study |

## Survey

During the intensive survey in 2002 and 2003, three nesting sites and one feeding site of the Black-necked Crane were found

at Chushul marshes. The details of each site are given below.

### Tsigul Tso

This is one of the most productive lakes of Ladakh. Several species, including the Bar-headed Goose and Brown-headed Gull breed here. This small lake is surrounded by large marshy areas on three sides. Some small water springs enter the lake from the western side and the overflow from the lake in the eastern end forms a small channel that runs all along the village and finally drains into the Pangong Tso.

In 2002, a pair of Black-necked Crane nested on an island, south-west of Tsigul Tso. Two eggs were laid and birds were seen incubating the eggs in the second week of May. These eggs were probably eaten by ravens or dogs though the exact reason behind the loss of eggs could not be established. The pair was later observed feeding in the nearby areas till they migrated in the first week of November.

In 2003, a pair of Black-necked Crane was sighted again in the same area in April. This year, the nesting started late, in May, when compared to the previous year. Two eggs were laid in the first week of June. Both the eggs hatched. These chicks and the parents were closely monitored for exact migration date, which was 28 October 2003.

In 2004 the pair nested in May. Two eggs were laid but no chick was produced. Both the adults were sighted feeding in the same wetland area and they migrated in the first week of November.

### Tso Nyak

Tso Nyak is another known nesting site of the Black-necked Crane. It lies to the north-east of Chushul village. This is a small water-body interlocked on three sides by small, elevated mounds. The main sources of water are few small springs on the southern side. The outlet from this waterbody joins the stream coming from Tsigul Tso, which finally drains into the Pangong Tso.

In 2002, a pair of Black-necked Crane nested on the south-eastern side of the lake and laid two eggs in May. Both the eggs hatched in the last week of June. The two chicks remained with the parents and the family successfully migrated in the first week of November.

In 2003, the pair was again sighted feeding in the same area. Nesting started in the last week of April and two eggs were laid in May. Both eggs were eaten by dogs in May. Later on, the pair were seen feeding in the same wetland till the second week of November after which they migrated.

In 2004, one nest with two eggs was recorded in the same area where nesting was recorded earlier. Only one egg hatched. This chick successfully migrated with the parents in the last week of October.

### Jamarding

Jamarding is another nesting site of the Black-necked Crane near the Chushul War Memorial. The area has a large number of small mounds in the marshes. This wetland is on the western side of the Trishul peak.

In 2002, a pair of Black-necked Crane nested here at the centre of

***Tourist camps near Tsomoriri***

*Lungparma marshes*

a small pond. The nest was very well built but the two eggs laid in May were eaten by dogs. The adult pair was sighted feeding with the pair at Tsigul Tso. The pair migrated with other birds in the first week of November.

In 2003, a pair again nested at the same location and laid two eggs in May. Again the eggs were eaten by dogs. Later, the pair were sighted in the same area and the nearby marshes. They migrated in the second week of November.

In 2004 a pair was sighted feeding in the wetland on various occasions. This time the pair did not make any attempt to nest and migrated along with other birds in the area and was not sighted after the first week of November.

### Hot Spring Marshes

On the way to Tso Nyak from Chushul, there is a hot spring which has large marshes on its eastern and western side. This is a very important feeding area for the Black-necked Crane. In 2002 six non-breeding birds were recorded at this wetland. These birds were first sighted in June and they migrated along with other birds in the last week of October.

In 2003, only one pair of Black-necked Crane was sighted feeding here and remained there till the third week of November when it migrated.

In 2004 a pair was sighted feeding in the area on many occasions during the survey period. This pair also migrated along with other birds from the area in the first week of November.

#### Threats

- Human population increase in Chushul is putting tremendous pressure on the wetland.
- Waste/garbage thrown by the army and villagers in the stream running through the village.
- More and more nomads settling in the area.
- Huge grazing pressure on all the wetlands in the area.
- Increasing development activities such as construction of roads and building.
- A large number of dogs owned by the Army and ITBP personnel and the local people.
- Bathing and washing activities at the hot springs.

## LUNGPARMA

Located at an altitude of 4558 m, Lungparma wetland lies along the track from Chushul to Tangtse, in the Kargyam valley and extends for about 40 km from the village Parma in the south-east to village Sato in the north-east. The valley forms a long stretch of marsh

### Crane Observation at Lungparma

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **Jun 1982** | 2 | — | — | — | 2 | Nurbu 1983 |
| **May - Sept 1995** | 2 | — | — | — | 2 | Chacko 1995 |
| **Apr - Sept 1996** | 2 | 1 | 1 | — | 2 | Chacko 1996 |
| **Jun - Oct 1997** | 2 | 1 | 2 | — | 2 | Pfister 1998 |
| **Apr - Dec 2002** | 2 | 1 | 2 | 1 | 3 | Present Study |
| **Mar - Nov 2003** | 3 | 1 | 2 | 1 | 4 | Present Study |
| **Apr - Nov 2004** | 2 | 1 | 2 | 1 | 3 | Present Study |

bordered on two sides by high rocky-ravines. Glacial channels from the mountains feed the stream that runs through the valley. The stream finally becomes a small river. The main villages all along the valley are Parma, Kherapali, Harong and Sato. The stream widens in some places to form big pools surrounded by vast marshes that serve as important breeding and staging sites for a large number of waterfowl.

#### Earlier Records

Chering Nurbu first recorded Black-necked Crane at Lungparma in 1982 (Nurbu 1983). The first recorded nesting at Lungparma was made by Chacko in 1996 when a pair laid two eggs but no chicks were produced (Chacko 1996). In 1997, Chacko again reported a pair here (Pfister 1998).

#### Survey

During the intensive phase of survey, in 2002, a pair of Black-necked Crane was found nesting on a huge elevated mound. Two eggs were laid in May. There was very little water around the nesting site at that time and the nest easily accessible. The eggs hatched in June and two chicks were seen feeding with the parents till the first week of August. In September, only one chick was found. On enquiry, the survey team was told that the other chick had died naturally but the dead chick could not be recovered. The pair successfully migrated with one chick in the last week of October.

In April 2003, a pair was sighted in the same area along with a sub-adult. In May, the sub-adult was seen feeding alone at a considerable distance and the pair nested on the same mound. Two eggs were laid and a chick successfully fledged. This chick along with the parents were sighted in the same area till migration in the last week of October.

In 2004, the pair was first sighted in the wetland in the last week of April. Nesting started in May and two eggs were laid the same month. Only one egg hatched. This chick successfully migrated along with the parents in October.

#### Threats

- Dogs owned by the local people.
- Presence of a large number of labourers during the summer months disturbs the birds. Moreover, the number of dogs also increases in the area as they feed on the leftover food of the labourers.
- Increasing grazing pressure.
- Local people encroaching on the wetland by building small enclosures for grass.
- Developmental activities in the area e.g. construction of roads and buildings.
- Camping by tourists near the wetland.
- Fishing by the labourers.

## HARONG MARSHES

Harong wetland lies on the west of Sato village in the Kargyam valley. These marshes lie quite close to the road, which connects Tangsay with Chushul. The marshes are bordered on two sides by rocky ravines. A large number of glacial channels feed this wetland and finally these channels take the shape of a small river which runs all across the valley, widening at various places. There are many good pastures in the valley all along the river. These pastures along with various marshy areas act

### Black-necked Crane Observation at Harong Marshes

| Month/Year | Adults | Nests | Eggs | Chicks | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **May-Sept 1995** | 3 | — | — | — | 3 | Chacko 1995 |
| **April-Sept 1996** | 3 | 1 | 1 | — | 3 | Chacko 1995 |
| **Jun-Oct 1997** | 4 | 1 | 2 | — | 4 | Pfister 1998 |
| **Apr–Dec 2002** | 2 | — | — | — | 2 | Present Study |
| **Mar-Nov 2003** | 4 | — | — | — | 4 | Present Study |
| **Apr–Nov 2004** | 3 | — | — | — | 3 | Present Study |

*Tsigul Tso Chushul*

as a good feeding ground for a large number of migratory waterfowl.

### Earlier Records

Black-necked Crane was reported at Harong marshes by Chacko in 1995 (Chacko 1995). In 1996, Chacko and Namgyal reported a nesting pair at a small pool at Barma in the area (Chacko 1996, Namgyal 1996). Two eggs were laid but both were washed away by the floods (Chacko 1996, and Namgyal 1996). Chacko surveyed the same area in 1997 and reported a pair of crane from this area but no nesting was recorded (Pfister 1998).

### Survey

During the survey in 2002, no Black-necked Crane was sighted here in April and May. In June, a pair of Black-necked Crane was sighted feeding in the area but no nesting was recorded. The birds were sighted feeding in the nearby marshes on many occasions. They were last sighted in the area on 23 October.

In 2003, four Black-necked Crane were seen in the same area. None made any attempt at nesting. All four birds were seen feeding together on many occasions. These birds were last sighted in the area in the last week of October.

In 2004, three non breeding birds were recorded feeding at different locations in the valley during the entire survey period. These birds migrated along with other birds in October.

### Threats

- Increasing grazing pressure.
- Dogs owned by the local people.
- Labourers coming to the area in the summer months disturb the birds.
- Local people encroaching on the wetland by building small enclosures to protect the grass and other fodder.
- Construction of roads and buildings.

### Crane Observation at Pangog Tso

| Year | Adults | Nests | Eggs | Chicks Fledged | Total No. of Cranes | Reference |
|---|---|---|---|---|---|---|
| **2000** | — | — | — | — | — | Present study |
| **2001** | — | — | — | — | — | Present study |
| **2002** | — | — | — | — | — | Present study |
| **2003** | 2 | — | — | — | 2 | Present study |
| **2004** | 2 | — | — | — | 2 | Present study |

## PANGONG TSO

This lake is situated at an altitude of 4218 m. It is the largest of all the lakes in the area. Spread over an area of 700 sq km, it is situated about 153 km, from Leh city. The two-third part of the lake is in China. This lake has many extended marshes which are an ideal feeding habitat of Black-necked Cranes.

### Earlier Records

There are no earlier records of Black-necked Crane at Pangong Tso.

### Survey

This wetland was regularly surveyed during the entire survey period from 2000 to 2004. No cranes were recorded in the area in 2000, 2001 and 2002. But in 2003, a pair of non breeding birds was recorded at Thakung. A pair was also recorded.

### Threats

- Grazing pressure on the wetland.
- Dogs owned by the Army and the ITBP.
- Boating in the wetland using the mechanized boats.
- Large number of tourists visiting the area and driving along the edge of the wetland.
- Big tourist camps coming up near the wetland.

## Result & Analysis – Breeding Productivity

The number of young reared per pair per annum is the most widely used measure of breeding success in avian studies (Allan 1998). It can be expressed relative to either the total number of mated pairs or the number of breeding pairs, which lay eggs (Allan 1998). During the present study, the former approach has been adopted, as it is preferable in accessing the overall breeding productivity of a particular population. The proportion of juvenile birds in the population, as assessed during the post-breeding period has been widely used to assess the productivity of several crane populations. Information on this measure of recruitment to the total population is easily collected and need not be negatively affected by the flocking habits of cranes. It is extremely valuable in conservation and management assessments especially as it provides extensive sample size of population-wide productivity and measures survival of young well beyond the fledging period. Healthy populations of a crane species should have about 10-15 per cent juveniles in the post-breeding period (Archibald et al. 1981).

### Breeding Productivity of Black-necked Crane in Ladakh

| Year | Breeding Pairs | Eggs Laid | Chicks Fledged | Breeding Success in % | Reference |
|---|---|---|---|---|---|
| **1995** | 5 | 10 | 6 | 60 | Chacko 1995 |
| **1996** | 12 | 21 | 9 | 43 | Chacko 1996 |
| **1997** | 12 | 24 | 9 | 37.5 | Pfister 1998 |
| **2002** | 15 | 29 | 10 | 33.3 | Present Study |
| **2003** | 16 | 30 | 10 | 31.5 | Present Study |
| **2004** | 15 | 27 | 13 | 43.3 | Present Study |

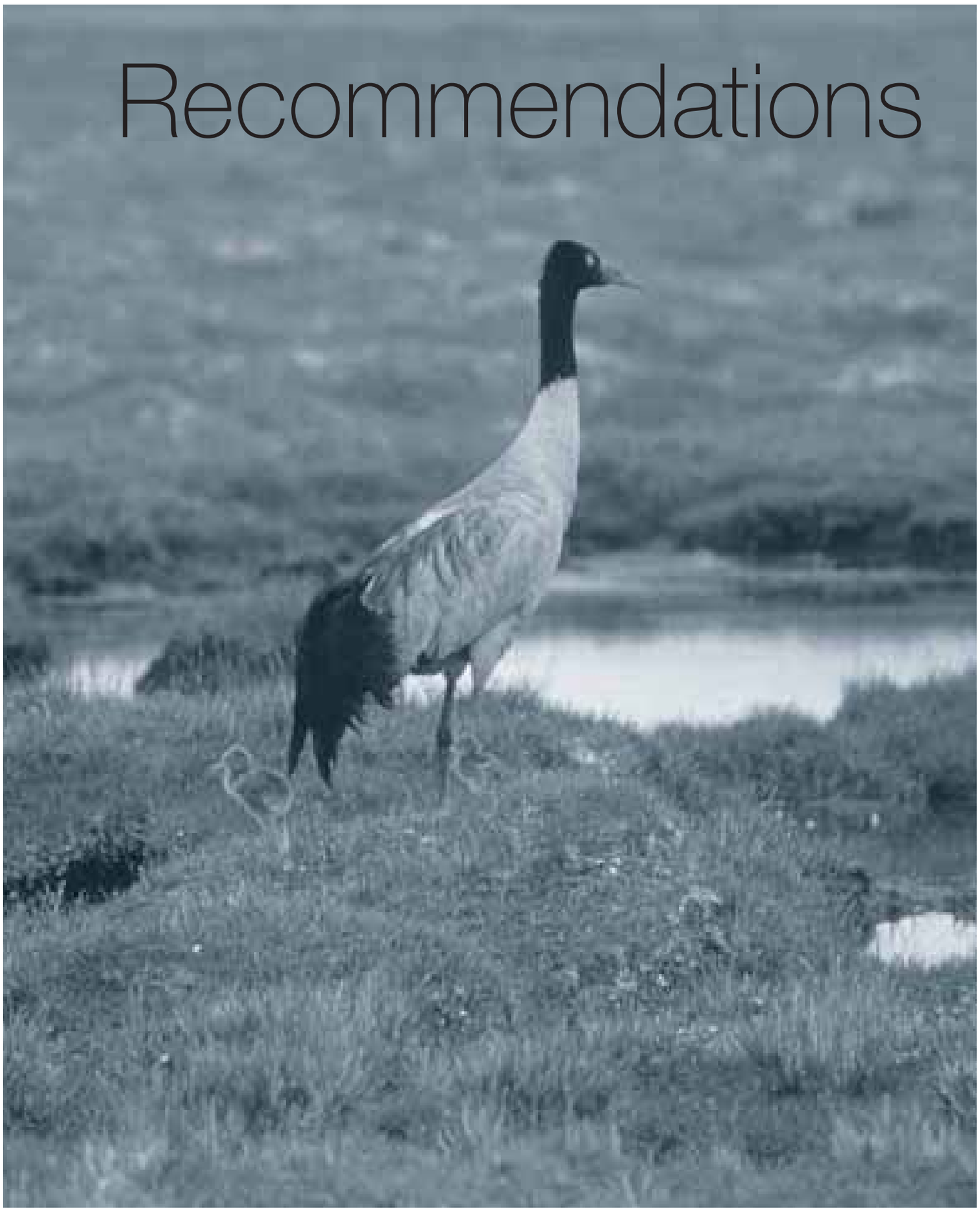
## Breeding Productivity Comparison

There are very few studies of productivity based on monitoring the success of individual breeding pairs (Allan 1998). Bennett and Bennett (1990), Dwyer and Tanner (1992) and Nesbitt (1988, 1992) provide useful reviews of such studies for Sandhill Crane. Pomeroy (1980) and Mafabi (1991) have conducted some studies on the breeding productivity of Grey crowned Crane. Neumann (1987), Prange and Mewes (1991) have conducted similar studies for the Eurasian Crane. A study on the breeding productivity of Demoiselle Crane has been conducted by Winter (1991). Tarboton et al. (1987) and Walkinshaw (1981) have conducted studies on the breeding success of Wattled and Greater Sandhill Cranes, respectively. In Ladakh a few studies have been conducted on the breeding success of Black-necked Crane (Chacko 1995; Chacko 1996; Pfister 1997). A comparative account of the breeding success of different species of cranes is summarized here. ◆

### Comparative account of the breeding success of different species of cranes

| Species | Young/Breeding Pair/year | Total Breeding Pairs | Source |
|---|---|---|---|
| **Black-necked Crane** | 1.2 | 5 | Chacko 1995 |
| | 0.75 | 12 | Chacko 1996 |
| | 0.75 | 12 | Pfister 1997 |
| | 0.66 | 15 | Present Study 2002 |
| | 0.62 | 16 | Present Study 2003 |
| | 0.86 | 15 | Present Study 2004 |
| **Grey crowned Crane** | 1.0 | 12 | Pomeroy 1980 |
| | 0.58 | 12 | Mafabi 1991 |
| **Eurasian Crane** | 1.01 | 146 | Neumann 1987 |
| | 1.09 | 1,517 | Prange and Mewes 1991 |
| **Demoiselle Crane** | 0.88 | 17 | Winter 1991 |
| **Wattled Crane** | 0.23 | — | Tarboton et al. 1987 |
| **Greater Sandhill Crane** | 1.39 | 204 | Walkinshaw 1981 |

# Recommendations



## Recount of threats

The most important threat to the successful breeding of the Black-necked Crane in Ladakh is the direct physical damage to the eggs and the chicks, caused by the feral dogs. The large number of dogs kept by the Armed forces and the nomads also cause huge damage to the crane eggs and chicks. The problem is heightened as the number of these dogs is increasing. Most of these dogs survive on the left over food of the Army and ITBP camps.

Another major threat to the bird is the loss of habitat. The human pressure on the wetlands, the primary habitat of the cranes, has increased tremendously over the last decade. Ninety per cent of income of the local people comes from livestock. The increase in human population, growing at about 2.4 per cent. (Kitchloo 1997) combined with the large increase in livestock population is putting heavy pressure on the very few available pasturelands, most of them, near wetlands. The increased grazing pressure directly leads to degradation of the wetland habitat.

*Construction of road through Hanle marshes*

The heightened population pressure on wetlands and the resultant loss due to reclamation of land for agriculture and development work is one of the key threats to the wetlands. In addition, watershed projects catering to increased agriculture divert water away from the wetlands. Some of these projects have created enclosures in the wetland areas to save the pastures for nomads which adversely impact the wetlands.

The plantations in the wetlands, as done in Hanle, has also degraded the natural habitat of the bird.

Another important threat that needs to be addressed is the impact of tourists and toursim on the birds and their breeding grounds. The tourist seasons clashes with the breeding season and hence the impact is direct and huge. In addition, a large number of tourists are unaware of the importance of the species.

Taxi drivers have been found to be encouraging the tourists to

*Nomads Camp near the wetland*

*Faral dog near the wetland*

approach the nests of the birds for the sake of photographs.

Local people have a lot of respect for the bird. But during the study period at many nesting sites children of the nomads who follow the livestock have been seen moving closer to the nests to touch the eggs. This has been observed at Hanle, Chushul, Chumur and Lungparma.

## Recommendations

The report recommends the following initiatives for the long-term conservation of the Black-necked Crane and management of its habitat in Ladakh. The recommendations are both general and site specific.

- The Department of Wildlife Protection, Indian Army and ITBP should work together in controlling the menace of feral dogs. Indian Army's Ecology cell at Leh could play a crucial role in increasing the awareness levels and ensuring preventive action on the field.
- All development work around the wetland should be monitored and should get a clearance from the Department of Wildlife Protection, Government of Jammu and Kashmir. To strengthen the Wildlife department, and improve coordination, an Advisory Committee comprising of representatives from major government departments, scientific experts and local community representatives may be constituted under the aegeis of Ladakh Autonomous Hill Development Council (LAHDC).
- Regular awareness camps should be organized for the local people, the nomads and other stakeholders. These camps could address a range of issues from handling the pressure from tourism, to protecting the cranes and wetlands.
- Special education and awareness activities should be carried out for the children of nomads who follow the livestock.
- Traditional ecological practices for pasture management, as practised by the nomads in Tsokar, should be encouraged in other areas as well.
- Any physical intervention for the conservation of bird habitat should be done in proper consultation with scientific experts.
- No plantations should be done in the wetlands and surrounding areas.
- Taxi drivers, cooks, guides and other support staff that accompany the tourists should undergo a mandatory training module on environmental guidelines. NGOs such as LeDEG, SLC, WWF could play a lead role in designing the module and the Tour Operators Association/Taxi Driver's Association should work hand in hand to operationalize it.
- Local community Trusts should be created at other wetland sites on the lines of the Tsomoriri and Tsokar Conservation Trusts.
- Regular and sustained monitoring of the species should be ensured. Ground staff of the Department of the Wildlife Protection should be properly trained to carryout the monitoring of the species on regular basis and to ensure involvement of the locals in the conservation process.
- Reclamation of wetlands for agricultural land at Hanle plains

*Grazing herds of nomads*

*Off track driving through the pasturelands*

should be immediately stopped.

- Physical structures, which could obstruct the bird in flight, such as the electric poles should be avoided in the wetland vicinity.

### The following intensive studies are recommended:

- A satellite telemetry study on the Black-necked Crane to determine the migration route.
- Studies on habitat requirements of Black-necked Crane, e.g.

  – study on the vegetation of the wetlands used by the cranes as their nesting and feeding sites, and

  – study on the water quality of the wetlands which are being used as nesting sites.
- A study on the socio-economic importance of the High Altitude Wetlands of Ladakh. ◆

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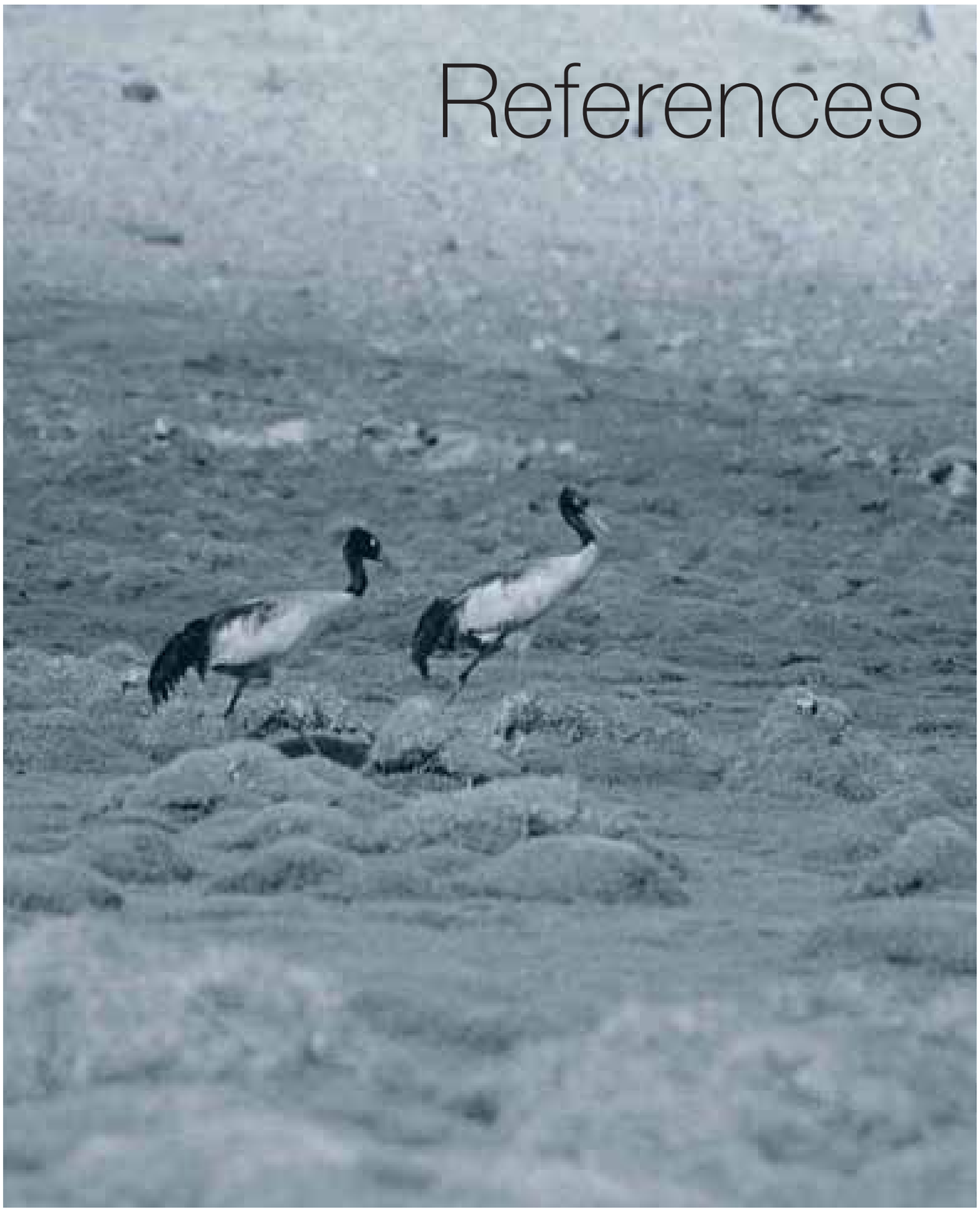


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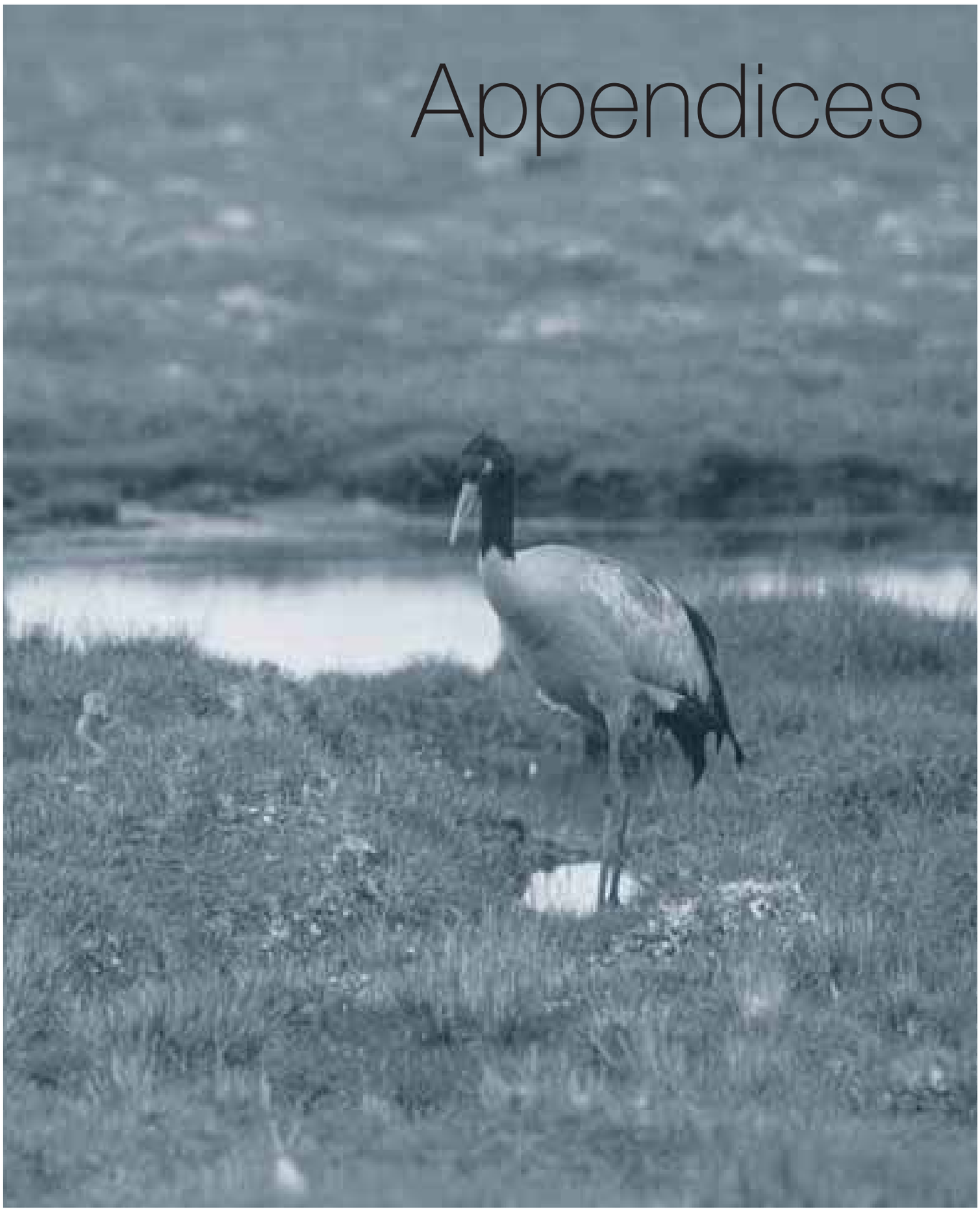
# Appendices



## Cranes of the World

| Common Name | Scientific Name | Discovered By | Distribution |
|---|---|---|---|
| **Black Crowned Crane** | *Balearica pavonina* | Linne 1758 | Central and east Africa to west Africa. |
| **Grey Crowned Crane** | *Balearica regulorum* | Bennett 1833 | East Africa to South Africa |
| **Demoiselle Crane** | *Anthropoides virgo* | Linnaeus 1758 | Summer : Eurasisa to Central Asia<br>Winter : Central and East Africa, Indian subcontinent |
| **Blue Crane** | *Anthropoides paradisea* | Lichtenstein 1793 | South Africa |
| **Wattled Crane** | *Bugeranus carunculatus* | Gmelin 1789 | South west Ethiopia and western Tanzania to South Africa |
| **Siberian Crane** | *Grus leucogeranus* | Pallas 1773 | Summer : Siberia, Mongolia<br>Winter : South east China, India, Iran |
| **Sarus Crane** | *Grus antigone* | Linnaeus 1758 | North India, southeast Asia, north Australia |
| **Brolga** | *Grus rubicundus* | Perry 1810 | Australia and southern New Guinea |
| **White-naped Crane** | *Grus vipio* | Pallas 1811 | Summer : South-east Russia, north Mongolia, north east China<br>Winter : East China, Korea, south Japan |
| **Eurasian Crane** | *Grus grus* | Linnaeus 1758 | Summer : Northern Europe to Siberia and Central Asia.<br>Winter : Spain, North Africa to South and South-east Asia. |
| **Hooded Crane** | *Grus monachus* | Temminck 1835 | Summer : South-east Russia, north-east China<br>Winter : East China, South Korea and south Japan |
| **Black-necked Crane** | *Grus nigricollis* | Prezhwalsky 1876 | Summer : Tibet and south west- China, Ladakh/India.<br>Winter : South Tibet to south China, Bhutan, Myanmar |
| **Red-crowned Crane** | *Grus japonensis* | Muller 1776 | Resident of kurile islands and north Japan.<br>Summer : South-east Russia, north-east China.<br>Winter : East China , Korea. |
| **Whooping Crane** | *Grus americana* | Linnaeus 1758 | Summer : Canada<br>Winter : Southern USA |
| **Sandhill Crane** | *Grus canadensis* | Linnaeus 1758 | Florida, Georgia, Mississippi/USA, and Cuba.<br>Summer : East Siberia, Canada, north and north-west USA, northern Mexico |

Source: The Crane Family and its Distribution (Holstein, 1991)

## Black-necked Crane Observation in Ladakh

| Month / Year | Number of Black-necked Crane | | No. of Wetlands Covered | Reference |
|---|---|---|---|---|
| | Total Sightings | Breeding Pairs | | |
| **June 1919** | 3 | 1 | 2 | Ludlow 1920 |
| **June 1924** | 11 | 4 | 7 | Osmaston 1925 |
| **May - June 1926** | 10 | 5 | 8 | Meinertzhagen 1927 |
| **June 1976** | 5 | 2 | 4 | Hussain 1976 |
| **July 1978** | 12 | 1 | 10 | Gole 1981 |
| **May - June 1980** | 14 | 3 | 10 | Gole 1983 |
| **June 1982** | 13 | 3 | 9 | Nurbu 1983 |
| **June 1983** | 7 | 2 | 6 | Hussain 1985 |
| **August - October 1986** | 16 | 2 | 8 | Narayan et. al. 1987 |
| **July - November 1987** | 9 | 1 | 5 | Akhtar 1989 |
| **September - October 1992** | 17 | 4 | 14 | Chacko 1992 |
| **May - Sep 1995** | 22 | 5 | 18 | Chacko 1995 |
| **May - August 1996** | 25 | 12 | 18 | Chacko 1996 |
| **June - September 1997** | 38 | 12 | 18 | Pfister 1998 |
| **April – December 2002** | 59 | 15 | 22 | Present Study |
| **April – November 2003** | 60 | 16 | 22 | Present Study |
| **April – November 2004** | 64 | 15 | 22 | Present Study |

**Appendix III**

## Nesting of Black-necked Crane Recorded in Ladakh

| Name of Site | Year of Nesting | Location | Altitude (m) | Reference |
|---|---|---|---|---|
| **Tsigul Tso, Chushul *** | 1978 | N 33º 34' 43.4" E 78º 37' 27.6" | 4445 | Gole 1983 |
| **Shado Bug, Hanle *** | 1980 | N 32º 44' 42.3" E 78º 58' 25.3" | 4298 | Gole 1983 |
| **Lam Tso Chumur *** | 1980 | N 32º 42' 38.0" E 78º 33' 22.2" | 4405 | Gole 1983 |
| **Mankhang/Lalpahari *** | 1994 | N 32º 57' 18.8" E 78º 54' 15.8" | 4215 | Chacko 1995 |
| **Tso Nyak, Chushul *** | 1995 | N 33º 37' 43.8" E 78º 40' 36.6" | 4348 | Chacko 1995 |
| **Sato (Harong Marshes) *** | 1996 | | | Chacko 1996 |
| **Lungparma *** | 1996 | N 33º 46' 29.5" E 78º 22' 50.5" | 4558 | Chacko 1996 |
| **Jamarding, Chushul *** | 1996 | N 33º 35' 29.0" E 78º 41' 01.6" | 4394 | Chacko 1996 |
| **Fukche 1 *** | 1995 | N 32º 57' 21.4" E 79º 11' 56.3" | 4180 | Chacko 1996 |
| **Fukche 2 *** | 1997 | N 32º 57' 51.4" E 79º 11' 56.3" | 4178 | Pfister 1998 |
| **Raar, Hanle *** | 1996 | N 32º 46' 47.3" E 78º 57' 02.0" | 4326 | Chacko 1996 |
| **Jung Demo, Hanle *** | 1996 | N 32º 48' 07.6" E 78º 57' 41.6" | 4305 | Chacko 1996 |
| **Startsapuk Tso *** | 1996 | | | Chacko 1996 |
| **Peldo, Tsomoriri** | 2000 | | | Present Study |
| **Puga** | 2001 | | | Present Study |
| **Tsokar** | 2001 | N 33º 19' 45.6" E 78º 02' 07.7" | 4582 | Present Study |
| **Staklung** | 2002 | N 33º 05' 20.7" E 78º 42' 25.9" | 4173 | Present Study |
| **Chukil Koma, Hanle** | 2002 | N 32º 46' 53.9" E 78º 59' 20.9" | 4276 | Present Study |
| **Yaya Tso** | 2002 | N 33º 18' 59.2" E 78º 29' 08.8" | 4820 | Present Study |

* Site covered during present study.

Sites with GPS Locations and Altitude are the sites where nesting was recorded in 2002

**Appendix IV**

## Nesting Sites of Black Necked Crane in Ladakh (2003)

| Name of Site | Location | Altitude (m) |
|---|---|---|
| **Lam Tso Chumur** | N 32º 42' 38.0" E 78º 33' 22.2" | 4405 |
| **Jung Demo, Hanle** | N 32º 48' 07.6" E 78º 57' 41.6" | 4305 |
| **Raar, Hanle** | N 32º 46' 47.3" E 78º 57' 02.0" | 4326 |
| **Shado Bug, Hanle** | N 32º 44' 42.3" E 78º 58' 25.3" | 4298 |
| **Mankhang / Lalpahari** | N 32º 57' 18.8" E 78º 54' 15.8" | 4215 |
| **Staklung** | N 33º 05' 20.7" E 78º 42' 25.9" | 4173 |
| **Fukche 1** | N 32º 57' 21.4" E 79º 11' 56.3" | 4180 |
| **Fukche 2** | N 32º 57' 51.4" E 79º 11' 56.3" | 4178 |
| **Jamarding, Chushul** | N 33º 35' 29.0" E 78º 41' 01.6" | 4394 |
| **Tsigul Tso, Chushul** | N 33º 34' 43.4" E 78º 37' 27.6" | 4445 |
| **Tso Nyak, Chushul** | N 33º 37' 43.8" E 78º 40' 36.6" | 4348 |
| **Lungparma** | N 33º 46' 29.5" E 78º 22' 50.5" | 4558 |
| **Yaya Tso** | N 33º 18' 59.2" E 78º 29' 08.8" | 4820 |
| **Chukil Koma, Hanle** | N 32º 46' 53.9" E 78º 59' 20.9" | 4276 |
| **Tsokar** | N 33º 19' 45.6" E 78º 02' 07.7" | 4582 |
| **Startsapuk Tso** | N 33º 19' 45.6" E 78º 02' 07.7" | 4590 |

# Banding of Black-necked Crane in Tibet

| Place of Banding | Date of Banding | Band Combinations Right / Left |
|---|---|---|
| **Shensha district Tibet** | July 2000 | /y |
| **Shensha district Tibet** | July 2000 | Y |
| **Shensha district Tibet** | July 2000 | W |
| **Shensha district Tibet** | July 2000 | /w |
| **Shensha district Tibet** | July 2000 | R |
| **Shensha district Tibet** | July 2000 | /r |
| **Shensha district Tibet** | July 2000 | w./b. |
| **Shensha district Tibet** | July 2000 | r./w. |
| **Shensha district Tibet** | July 2000 | w./r. |
| **Shensha district Tibet** | July 2000 | y./y. |
| **Shensha district Tibet** | July 2000 | b./y. |
| **Shensha district Tibet** | July 2000 | b./w. |
| **Shensha district Tibet** | July 2000 | w./y. |
| **Shensha district Tibet** | July 2000 | y./b. |
| **Shensha district Tibet** | July 2000 | y./w. |
| **Shensha district Tibet** | July 2000 | r./r. |
| **Shensha district Tibet** | July 2000 | r./b |
| **Shensha district Tibet** | July 2000 | b./y. |

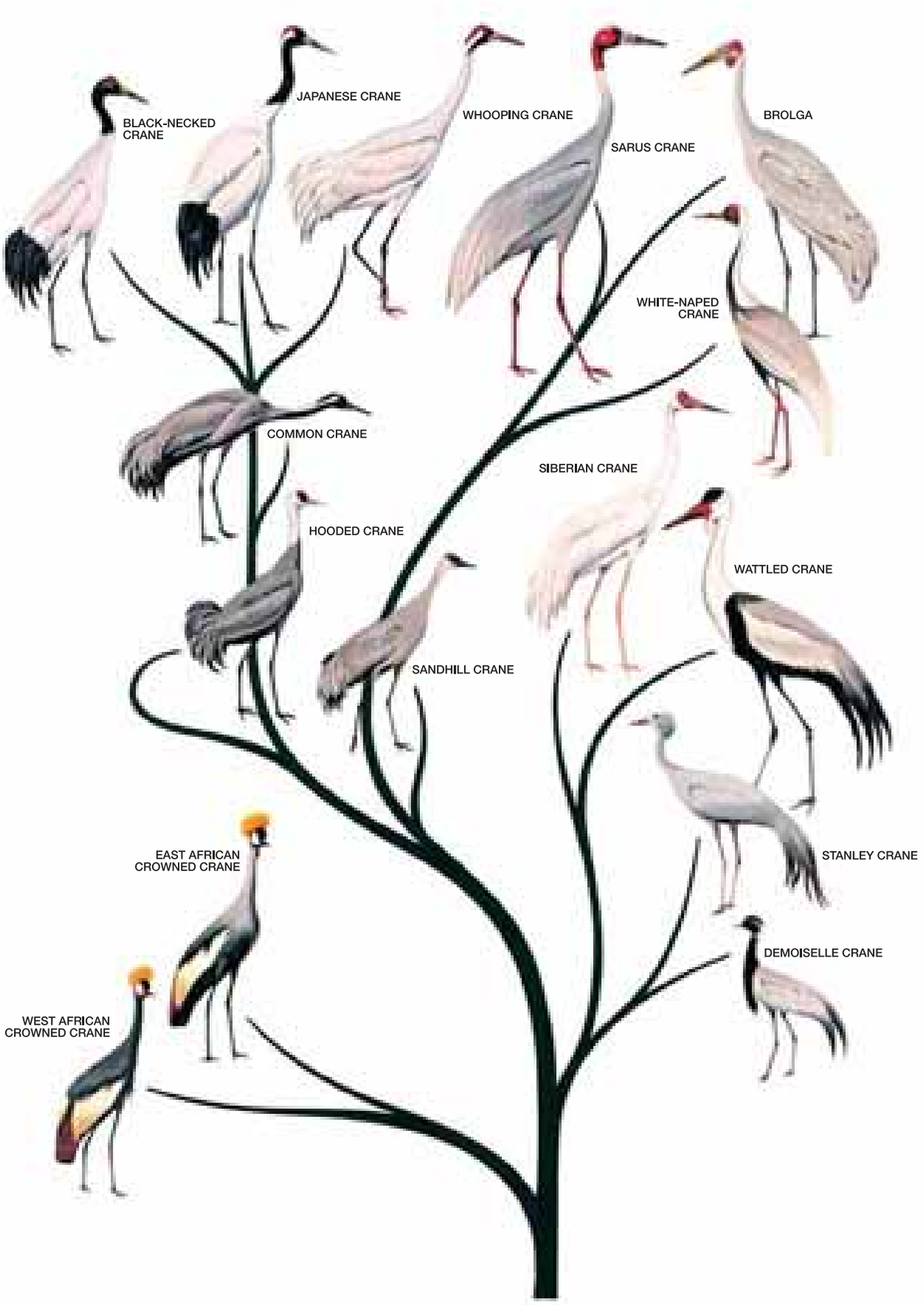
Source : Pers. Comm. Sherub 2002

# Banding of Black-necked Crane in China

| Banding site | Banding date | Metal band | Colour bands | | Recovering site | Recovering date | Literature |
|---|---|---|---|---|---|---|---|
| | | | Left leg | Right leg | | | |
| **Cao Hai** | 1985-01-26 | 00-0501 | | Red, with white digits – 100 | Cao Hai | 86~87~88 | Wu Zhikang et al1 |
| **Cao Hai** | 1985-03-15 | 00-0521 | | Red, with white digits – 101 | Cao Hai | 85~86 | Wu Zhikang et al1 |
| **Cao Hai** | 1987-02-08 | | | Orange, with black digits – 4 | | | Wu Zhikang et al1 |
| **Cao Hai** | 1986-12-26 | | | Red, with digits – 140 | Cao Hai | 89~93 | Zhang Fuyun et al2 |
| **Ruoergai** | 1986-06-21 | | Red | Orange, with black digit – 2 | Ruoergai | 1987-10-03 | Wu Zhikang et al1 |
| **Ruoergai** | 1986-07-20 | | Red | Orange, with black digit – 3 | Ruoergai | 1987-10-03 | Wu Zhikang et al1 |
| | | | | | Cao Hai | 1987-11-13; 1987-11-30 | |
| **Ruoergai** | 1987-12-07 | 00-0706 | Red, with white digits – 160 | | | | Wu Zhikang et al1 |
| **Ruoergai** | 1987-12-07 | 00-0705 | Red, with white digits – 161 | | | | Wu Zhikang et al1 |
| **Ruoergai** | 1987-12-07 | 00-0708 | Red, with white digits – 162 | | | | Wu Zhikang et al1 |
| **Ruoergai** | 1987-12-07 | 00-0707 | Red, with white digits – 163 | | Cao Hai | 1988-03-27 | Wu Zhikang et al1 |
| **Ruoergai** | 1987-12-07 | 00-0709 | Red, with white digits – 164 | | | | Wu Zhikang et al1 |
| **Ruoergai** | 1987-12-07 | | Red, with white digit – 3 | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1988-06-24 | | White | | Napaihai | 1988-11-14 | Wu Zhikang et al1 |
| **Longbaotan** | 1988-06-25 | | White | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1988-06-25 | | White | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-06-06 | | Green | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-06-23 | | Green | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-06-23 | | Green | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-06-21 | | Green | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-06-02 | | Green | | | | Wu Zhikang et al1 |
| **Longbaotan** | 1987-07-03 | | White | | | | Wu Zhikang et al1 |
| **Cao Hai** | 1994-12-04 | N00-9243 | White | Red<br>Red | | | Li Fengshan3 |
| **Cao Hai** | 1994-12-04 | N00-9242 | White<br>Red | Green | | | Li Fengshan3 |
| **Cao Hai** | 1995-01-22 | M00-5452 | White | Red<br>White | | | Li Fengshan3 |
| **Cao Hai** | 1995-01-20 | M00-5459 | White | Red<br>Green | | | Li Fengshan3 |
| **Cao Hai** | 1994-12-06 | N00-9250 | Green<br>Green | Red | | | Li Fengshan3 |
| **Shensa** | 2000-7-12~25 | | Yellow | | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | | Yellow | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | | White | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | White | | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | Red | | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | | Red | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | Blue | White | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | White | Red | | | Archibald4 |
| **Lubuo** | 2000-7-12~25 | | Red | White | | | Archibald4 |
| **Mujui** | 2000-7-12~25 | | Yellow | Yellow | | | Archibald4 |
| **Mujui** | 2000-7-12~25 | | Yellow | Blue | | | Archibald4 |
| **Mujui** | 2000-7-12~25 | | White | Blue | | | Archibald4 |
| **Mujui** | 2000-7-12~25 | | Yellow | White | | | Archibald4 |
| **Tobe** | 2000-7-12~25 | | Yellow | Blue | | | Archibald4 |
| **Tobe** | 2000-7-12~ 25 | | White | Yellow | | | Archibald4 |
| **Tobe** | 2000-7-12~ 25 | | Red | Red | | | Archibald4 |
| **Tobe** | 2000-7-12~ 25 | | Blue | Red | | | Archibald4 |
| **Tobe** | 2000-7-12~ 25 | | Yellow | Blue | | | Archibald4 |

Sources: 1 Wu Zhikang, et al. 1989. A study on migration and population structure of Black-necked Cranes. Guizhou Institute of Biology. Unpublished report pp.35. 2 Zhang Fuyun and Yang Ruoli. 1997. Bird migration research of China. Beijing: China Forestry Publishing House, pp:364. 3 Li Fengshan, 1997. Developing a land management system for Cao Hai and its watershed to safeguard resources needed by Black-necked Cranes and people. Ph.D. Dissertation at University of Wisconsin, Madison, Wisconsin, USA, pp. 201. 4 Archibald, G. 2002. Color-banding of Black-necked Cranes in Tibet. China Crane News 6 (supplement): 18-19.

# The Family Tree of Cranes




Source: The Cranes, WWF-India publication

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