

## Occurrence of wildlife and hunting activities in Imam Sahib, Aye Khanum and Darqad wetlands, Afghanistan, December 2007



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Cover photo: Dr Ali Madad Rajabi (middle), a research assistant with the WCS Afghanistan Biodiversity project, in a boat to Imam Sahib Island on the Amu Darya River, December 2007. In Imam Sahib, a police guard appointed by the head of the district accompanied the team throughout the survey.

*All photographs: WCS Ecosystem Health Project Team*

*Map: Mr. Rohullah Sanger, GIS analyst, WCS*

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## EXECUTIVE SUMMARY

We carried out field surveys between 2 December and 15 December 2007 in three wetlands of the Amu Darya alluvial plain, in northern Afghanistan: Imam Sahib (37°15'N– 68°50'E; c. 200 km<sup>2</sup>), Aye Khanum (37°11'N–69°27'E; 30 km<sup>2</sup>) and Darqad (37°25'N–69°30'E; c. 200 km<sup>2</sup>). Our surveys aimed at documenting the occurrence of wild bird and mammal species and to assess hunting activities in these areas. A keystone ecosystem of these wetlands is the Tugai forest, a rare river-side ecosystem once widespread in the floodplains and valleys of the arid regions of Central Asia. With their diverse stands of poplar and willow trees, their shrubs from various genera, and their tall reed grass communities and grassland clearings, Tugai ecosystems are oases for resident and migratory wildlife species. They are nowadays highly threatened by wood clearing for fuel or agricultural development, and by water diversion for irrigation.

We collected data through direct observations and questionnaire investigations of a randomly selected subset of local inhabitants (26 people). Questions concerned the presence in the area of selected key mammal and bird species, and hunting practices.

We recorded 72 bird species—with an additional 2 of questionable identification. Aye Khanum wetlands hosted the largest diversity of birds and showed the most preserved wetland ecosystem. The area seemed to have the potential to receive thousands of migratory and wintering water birds each year. We counted for example a large flock of 2120 greylag geese (*Anser anser*). During our surveys, we also observed other threatened species, such as the pygmy cormorant (*Phalacrocorax pygmaeus*), the white-tailed eagle (*Haliaeetus albicilla*), and the Egyptian vulture (*Neophron percnopterus*). Our ornithological observations also contributed to significantly extend the known winter spatial distribution of 28 bird species.

For mammals, we observed foot prints or fresh scats of red fox (*Vulpes vulpes*), wild boar (*Sus scrofa*), golden jackal or wolf (*Canis aureus* or *Canis lupus*) and Cape hare (*Lepus capensis*). The majority of interviewees reckoned Bactrian deers (*Cervus elaphus bactrianus*) had suffered serious decline due to over-hunting. Other species said to occur were the caracal (*Caracal caracal*), the Pallas's cat (*Otocolobus manul*), the wild

cat (*Felis silvestris*), the leopard cat (*Prionailurus bengalensis*), the badger or ratel (*Meles meles* or *Mellivora capensis*), the Indian crested porcupine (*Hystrix indica*) and the hedgehog (*Hemiechinus* sp.). Interview results suggested that Darqad may host the largest diversity of mammal species among the three surveyed areas; in particular the Bactrian deer may still inhabit this area. The Caspian tiger (*Panthera tigris virgata*) is extinct in the region.

Questionnaire investigations and direct observations showed that inhabitants of the area extensively hunt water birds in winter and during migration times. Their principal targets are waterfowl, in particular coots (*Fulica atra*), mallard duck (*Anas platyrhynchos*) and geese (*Anser* sp.). In addition they also hunt common pheasants which are said to be still common in the area. Bactrian deers are apparently so few now that they are rarely encountered. Canids seem to pay a tribute to pelt traders in winter. The wild boar (*Sus scrofa*) and the Cape hare (*Lepus capensis*) are seldom hunted for religious reasons.

## BACKGROUND INFORMATION

### Tugai ecosystem

Imam Sahib (37°15'N – 68°50'E; c. 200 km<sup>2</sup>), Aye Khanum (37°11'N-69°27'E; 30 km<sup>2</sup>), and Darqad (37°25'N-69°30'E; c. 200 km<sup>2</sup>) are three riverine lowland areas located along the Amu Darya River, in the northern part of the provinces of Kunduz and Takhar, in the north of Afghanistan (Figure 1). Imam Sahib is located north of the city of Kunduz, Aye Khanum is at the confluence of the Amu Darya and the Kokcha rivers in the Khwaja Ghar district (also named Yang-i Qala or Dasht-i Qala district), and Darqad lies in the area extending north between the Amu Darya and Kokcha rivers. One of the keystone ecosystems in these three areas is the Tugai forest (Plate 1), a rare and typical river-side ecosystem once widespread in the floodplains and valleys of the arid regions of Central Asia. With its diverse stands of poplar and willow trees and its shrubs of various genera such as *Tamarix*, *Elaeagnus*, and *Hippophae*, along with its patchwork of tall reed grass communities and grassland clearings, the Tugai offers oases for resident and migratory wildlife species. The Tugai forest ecosystem is also a resource of great value for water and soil conservation. It has evolved over thousands of years in response to successive periods of harsh and moist conditions. Typically Tugai areas are continuous but often narrow strips of forested areas along river valleys and constitute important corridors for wildlife. Because they occur in the most fertile lands available for irrigation, they have been largely converted to agriculture lands. The remaining areas suffer from logging, grazing and cultivation of hayfields, and collection of medicinal plants. Destruction of Tugai leads to an increase in river flow fluctuations, and river-bank erosion. In Afghanistan the last strongholds of this rare and fragile habitat are located on the relatively less accessible islands of the Amu Darya River.



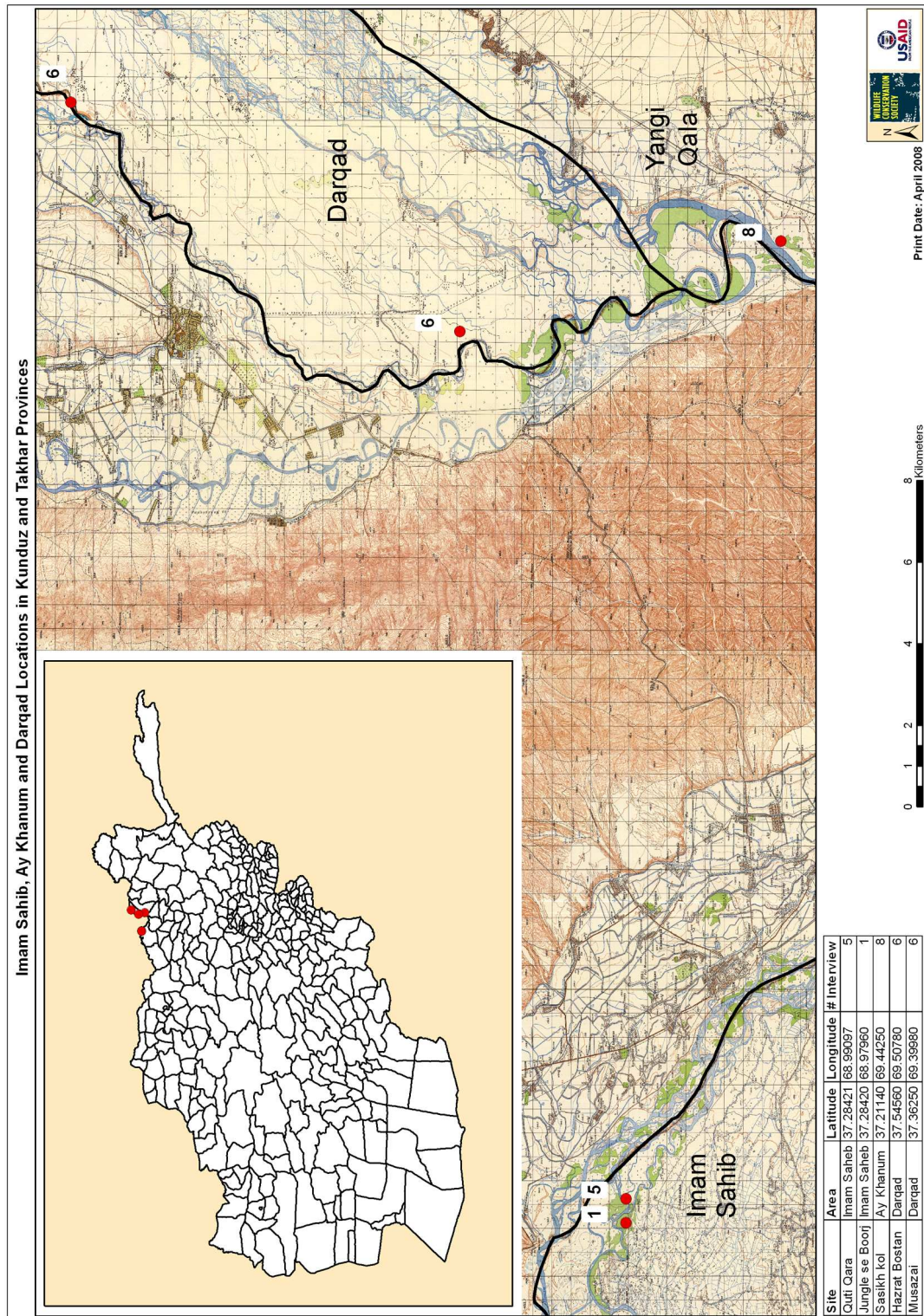


Figure 1. The study area in the Kunduz and Takhar Provinces, in northern Afghanistan, along the Afghanistan-Tajikistan border. Its location in Afghanistan is shown on the left upper corner. Plain circles on the close-up map show the localizations of questionnaire investigations with the number of interviews at each site.



Plate 1. An example of Tugai forest ecosystem along the Amu Darya River, Takhar Province, Afghanistan, December 2007. This densely forested habitat is mostly composed of poplar and willow trees and of various shrubs such as *Tamarix*, *Elaeagnus*, and *Hippophae*, together with tall reed grass communities and grassland clearings.

#### Protection status

According to the UNEP post-conflict environmental assessment report (UNEP, 2003) Imam Sahib and Darqad were declared as royal hunting reserves in the last century. Restrictions were put in place concerning hunting, collection of fuelwood and reclamation of lands for agricultural development. However the state of protection was never gazetted and specific boundaries were never described. In 1981 FAO recommended that both Imam Sahib and Darqad be considered for protected area status, but action was never taken (FAO, 1981). UNEP report also mentions that prior to Taliban period and recent drought (1999–2002), government administrators noted that the reserve status was widely respected by local residents, and that prohibited land-use activities were generally not conducted (UNEP, 2003).

#### Hydrology

The Amu Darya takes its source from the high altitudes of Afghan and Tajik Pamirs and receives a large number of tributaries in Central Asia, but dries up in the Turan lowlands in Turkmenistan and Uzbekistan. The main reason for this is the excessive use of water for cotton irrigation. As a consequence the Aral Sea, the natural outlet of the Amu Darya, suffers a dramatic reduction in surface water and water volume. Huge international efforts are presently being made to try to halt the phenomenon and improve the situation in the Aral Sea and its threatened ecosystems. Along its Afghan course, the Amu Darya sustains a good water flow in summer due to melting glaciers. The river has a minimal flow in winter with alluvial areas consisting in large mudflats



used by wintering water birds as forage grounds. The Amu Darya river basin<sup>1</sup> supports 57% of the total river flow in Afghanistan (Favre and Kamal, 2004). Marshlands and water bodies cover 16.2% and 2.5%, respectively, of the basin.

#### Human settlements

The Amu Darya river basin in Afghanistan supported in 2004 13.3% of the human settlements in Afghanistan, corresponding to a settled population (excluding nomadic population) of 2.9 million people or 14.3% of the population of Afghanistan (Favre and Kamal, 2004). Nearly 26% of the 90,692 km<sup>2</sup> of the river basin consist in cultivated lands either intensively or intermittently irrigated, while 5% consist in degenerated, open and closed forest cover. The population is largely agriculturalist, producing cereals, vegetables and fruits in intensively irrigated plains. A pastoralist subsistence economy persists in forests and marshlands. Poultry numbers are not known but a small-scale subsistence poultry production must at least occur as it is the case in most areas of Afghanistan. In general the region has experienced during the last decades a rapid economical development; and several locations, such as the Kunduz–Khanabad area, are among the most populated, ethnically complex and intensively cultivated areas of Afghanistan. During Taliban times, 300 families settled on Imam Sahib Island on a bid to flee from Taliban rule. UNEP visited the area in 2002 and found that 200 of them had since left the island; however the remaining people were clearing forests for fuelwood and to grow crops (UNEP, 2003).

#### Hunting

Hunting activities in northern wetlands have not been studied. However hunting pressure on wildlife may be significant as it is the case in protein-depleted populations when no authority enforces existing laws. An earlier survey carried out by our team in Dasht-e Nawar wetlands in Ghazni Province showed that the national ban on hunting in Afghanistan is only very partially followed by people who consider hunting as one of their vested rights (Ostrowski et al., 2008).

#### Wildlife

The historical distribution of the Caspian tiger (*Panthera tigris virgata*) encompassed the riverine habitats of Afghanistan, including a large portion of the Amu Darya and Murghab river basins. In 1950 however, it was only recorded in the islands of Darqad and Imam Sahib. An individual was killed in the Darqad area about 60 years ago (Habibi, 2003) and the last evidence of its presence in Afghanistan was foot prints in Darqad in 1967 (Kunhert, cited in Petocz, 1973). It is nowadays considered extinct in the country. The tiger used to prey mainly over Bactrian deers (*Cervus elaphus bactrianus*) and wild boars (*Sus scrofa*). According to Habibi (2003), the last strongholds of the Bactrian deer in Afghanistan are in Imam Sahib and Darqad, but

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<sup>1</sup> River basin is defined as the area that contributes hydrologically (including both surface and ground water) to a first-order stream, which in turn is defined by its outlet to the ocean or to a terminal (closed) lake or inland sea.

these populations are on the decline, because of habitat loss and over-hunting. In Afghanistan wild boars inhabit watercourse biomes. They used to be common in the river islands of the Amu Darya (Habibi, 2003). Because Islamic halal dietary laws forbid pork, they are only assiduously hunted when they raid crops. Other important wildlife found in the Afghan Tugai ecosystem include red fox (*Vulpes vulpes*), jackal (*Canis aureus*), and Cape hare (*Lepus capensis*).

Birdlife in the Afghan course of the Amu Darya River is poorly known. Habibi (2007) compiled bird records made by bird watchers, ornithologists, and scientists who worked in Afghanistan in the 1970s when the country was undergoing a period of peace, but none concerned the vicinity of the Amu Darya River. Imam Sahib and Darqad have been identified as Important Bird Areas by BirdLife International as they are supposed to host the last remnant populations of common pheasant (*Phasianus colchicus*) in Afghanistan (Evans, 1994). This is more based on the assumption that common pheasants in Afghanistan are restricted to the shrinking Tugai habitat than on direct observations. To our knowledge the most recent ornithological visit to the area was carried out in Aye Khanum by a mission commissioned by the Asian Development Bank (Ahmad Khan, 2005). The mission reported seeing 80 mallards (*Anas platyrhynchos*), 4 shovelers (*Anas chrypeata*), 50 common teals (*Anas crecca*), 10 gadwalls (*Anas strepera*), 8 black-winged stilts (*Himantopus himantopus*), 6 redshanks (*Tringa tetanus*), 2 godwits (*Limosa* sp.), 6 northern lapwings (*Vanellus vanellus*), and 8 Eurasian cranes (*Grus grus*), as well as an unspecified number of coots and harriers. Unfortunately the report neither documents the date nor the duration of the survey, although reported species assemblage plead for a late autumn or early spring visit.

## OBJECTIVES AND METHODS

### Objectives

Northern wetlands in the floodplains of the Amu Darya in Afghanistan have long been considered important bird areas, especially for waterfowl. This survey, carried out in December 2007 in the three main wetlands, was dedicated at collecting data on the occurrence of wild birds and mammals in the area, as well as at assessing local hunting pressure, and visible threats on the habitat. The survey also aimed at identifying possible cross contamination of the H5 subtype avian influenza virus between wild and domestic birds. Results concerning this aspect of the survey will be provided in another report.

### Methods

#### Dates of surveys

The survey took place between 5 December and 12 December 2007 during low water level, at a period when surveyed areas were expected to receive large flocks of winter visitors.

### Survey area and transport

We focused on areas of remnant Tugai ecosystem in Imam Sahib and Darqad, and on wetlands in Aye Khanum. The survey team drove to Kunduz, capital of Kunduz Province, and then to district settlements. We used a four-wheel-drive car to travel between the villages and settlements, and visited Tugai forest and wetland biomes by boat and by foot. Summary of activities per day can be found in Appendix.

### Data collection and analysis

Data were collected through direct field observations and questionnaire investigations. The report tries to be a snapshot of the occurrence of wild mammals and birds in the area at the time of the survey.

### *Interviews*

We collected data on hunting practices and occurrence of selected wild bird and mammal species in the area by interviewing an elder in randomly selected households. Overall, we interviewed 26 people: 6 in Imam Sahib, 8 in Aye Khanum, and 12 in Darqad. Two team members conducted the interviews in Dari (Persian language in Afghanistan) and one of them translated them into English afterwards.

Each interview lasted roughly 30 minutes and consisted in 24 predetermined questions about the background of the respondent (name, locality, GPS location, and average distance from flowing water), hunting practices (Do you hunt? When? For how long? How many kills per year? Which species? Hunting trend in the area? Reason for such trend? Where do hunters come from?), occurrence of wild birds (What are the most prominent bird species according to your personal experience?) and mammals in the area (According to a presented gallery of pictures does the following species occur in the area: tiger, wild boar, Bactrian deer, wolf, jackal, red fox, leopard, wild cat, Pallas cat, leopard cat, caracal, lynx, stone marten, hyena, hare, porcupine, hedgehog, others? If positive, where and when?), poultry owned (Species? Numbers? Contact with wild birds? Any sickness/disease for the past 2 years? Any treatment? Any human sickness related to poultries?). The same questions were presented in the same manner and order to each subject.

The present report only takes into account the questions dealing with hunting practices and the occurrence of mammals and birds in the area. We tallied answers and calculated the percentages of various responses.

### *Direct observations*

We spent 5–6 hrs/days surveying the remaining portions of the Tugai ecosystem in Imam Sahib and Darqad, and the wetland area in Aye Khanum. We recorded all wildlife sightings (species and for mammals: foot prints, dung, fur, burrows). We counted the number of birds observed during the surveys and corrected our estimates when individuals could have been recounted on several occasions.



Plate 2. Aye Khanum, composed of extensive areas of reed beds and shallow marshes, is probably one of the last relatively unspoiled wetland ecosystem in Takhar province, Afghanistan, December 2007.



Plate 3. A flock of greylag geese (*Anser anser*) in Aye Khanum wetland, December 2007. Thousands of them visit the area during winter, resting on the shallow water sand-banks located in the middle of the marshes. Geese are actively hunted in the area.

## RESULTS AND DISCUSSION

### Hunting

Only 8 (30.8%) out of the 26 interviewed persons admitted having hunted regularly over the past 10 years: one hunted all year round; four hunted only during autumn and winter, specifically targeting water birds; three hunted water birds in autumn and winter as well as mammals in winter. Summer is typically not a hunting season because people are then too involved with agricultural works. Two people admitted that they used to hunt until recently but no longer do. Although the majority of interviewed people denied hunting, we believe this activity is widely practiced in the area as it is largely perceived as an innocuous vested right. Bird hunting in northern wetlands seems to be practiced essentially in autumn and winter when the islands are more accessible because of lower water levels and when number of water birds increase. Hunters use shot guns and do not attempt to trap their preys. Mammals are also hunted but it was largely admitted that the Bactrian deer, a favorite game species, is becoming increasingly rare.

Concerning water birds, people hunt coots (*Fulica atra*), all species of ducks, and geese (*Anser* sp.). One hunter also targeted herons and egrets but just for the 'fun' of shooting them since he did not collect the dead birds. If the bird was only wounded, he would capture it and keep it as a pet bird in the backyard of his house. We have observed similar practices of keeping wounded wild birds as companion animals in other regions of Afghanistan (Ostrowski et al., 2008). Two hunters also targeted non water birds, in particular chukar partridge (*Alectoris chukar*) and common pheasants (*Phasianus colchicus*). All hunters exclusively used shotguns and hunted water birds in the early morning. The average harvesting rate calculated from questionnaire answers was c. 7 birds/week (range: 3–20). Assuming a continuous hunting season of 21 weeks (from October to February) —an unlikely hypothesis—, this would translate into c. 150 birds/season/hunter. Since water birds are hunted exclusively for their meat, this would constitute a significant source of protein, and we cannot exclude that some of the most assiduous hunters sell their catches. For 24 out of the 26 (92%) interviewees, hunting in the area is the fact of local people, while 2 (8%) respondents unconvincingly claimed it is exclusively practiced by outsiders from neighboring districts and provinces. Sixteen (61.5%) interviewed people reckoned hunting pressure had decreased in the area for the past 2–4 years, adversely 7 (27%) believed that hunting was on the increase, 2 (7.7%) had no opinion and one (3.8%) thought hunting pressure had not changed in the recent past. For those who believed hunting had decreased, it was mostly because of the hunting ban promulgated by the central authority in Kabul and of the risk of catching diseases such as avian influenza which was advertised to them by local authorities. No mention was made of egg collection activities.

Three persons admitted hunting mammals; they targeted foxes, wolves and jackals in winter to sell their pelts. One of these hunters also claimed he used to hunt 'deers'



(presumably Bactrian deers) in the past but no longer did because they had become too rare and difficult to find. He believed deer numbers had declined dramatically because of over-hunting.

## Birds

### Bird areas and important bird species

Of the three visited areas, Aye Khanum showed the most preserved wetland ecosystem (Plate 2), with the highest avifaunal diversity. We recorded 56 species of birds, including 18 of water birds and 5 of raptors. The area has the potential to host thousands of migratory and wintering water birds each year. During the survey we counted a large flock of 2120 greylag geese (*Anser anser*) (Plate 3), 210 coots (*Fulica atra*) and 139 mallards (*Anas platyrhynchos*). We also reported lower numbers of common teal (*Anas crecca*), Eurasian wigeon (*Anas penelope*), ruddy shelduck (*Tadorna ferruginea*), common shelduck (*Tadorna tadorna*), common merganser (*Mergus merganser*), and various species of waders. Most of these species are probably winter visitors migrating in autumn from more northern breeding grounds. Ornithologists from former Soviet Union have considered the waterfowl populations occurring in most parts of Afghanistan during autumn migration as part of a 'Siberian–Kazakhstan/Pakistan–India' biogeographic unit, nowadays more commonly called 'Central Asian Flyway'. This population breeds in and around the Ob River of northern Russia and winters in the Indus river drainage (Isakov and Shevarera, 1967, cited in Shank and Rodenburg, 1977). Although very few ornithological surveys have been carried out in Afghanistan, anecdotic observations support this delineation. The Siberian crane (*Grus leucogeranus*) for example has been recorded in Ab-e Estada (Shank and Rodenburg, 1977). We also observed two common pheasants, three pygmy cormorants (*Phalacrocorax pygmaeus*), a flock of eight common lapwings (*Vanellus vanellus*), a species of conservation concern at least in the western part of its range, and three adult white-tailed eagles (*Haliaeetus albicilla*), a globally threatened species, recorded for the first time wintering in the area. The current status of the common pheasant in the area is unknown. According to our interviews, the species is still considered as common and it is hunted. A number of specimens could also be captured to be traded as ornamental birds. We observed one such specimen in Ka Farushi bird market, Kabul, on December 2006 (Ostrowski, 2007), which according to the trader was coming from Takhar province, Afghanistan. There is little doubt that because of their paucity in the country, sizeable wetlands, such as Aye Khanum, which provide extensive resting and foraging habitat, must be of crucial importance for migrating and wintering water birds.

Of the three visited areas, Imam Sahib presented the lowest bird diversity with only 33 recorded species, including 5 water bird species and 5 raptor species. The most interesting observed birds were four common pheasants, one Egyptian vulture (*Neophron percnopterus*), and five pygmy cormorants. Imam Sahib suffers ecosystem impoverishment due to intensive land reclamation for agriculture. The main island is

also encroached by woodfuel collection and pastoral activities that seem to impact the habitat on a large scale. When combined these threats may negatively impact the populations of common pheasants. The occurrence of an Egyptian vulture was interesting, as the species currently suffers a dramatic decline due, at least in its Indian range, to poisoning by diclofenac, a drug widely used in the region to treat livestock. The species is nowadays listed as endangered (IUCN, 2007). Eventually we recorded pygmy cormorants, a species recently down listed from near threatened to least concern status by IUCN owing to the discovery of new colonies and the recovery of several declining populations in its eastern range (IUCN, 2007).

We counted 45 bird species in Darqad, which showed the lowest diversity of water bird species (3) of the three surveyed areas. We observed a good diversity of raptors including one black kite (*Milvus migrans*), one Eurasian sparrowhawk (*Accipiter nisus*), six long-legged buzzards (*Buteo rufinus*), two golden eagles (*Aquila chrysaetos*), one griffon vulture (*Gyps fulvus*), one Egyptian vulture (*Neophron percnopterus*), one bearded vulture (*Gypaetus barbatus*), two hen harriers (*Circus cyaneus*) and three kestrels (*Falco tinnunculus*). We also observed three common pheasants and three common lapwings (*Vanellus vanellus*). Similarly to Imam Sahib, the area suffers extensive woodfuel collection and agricultural development.

#### Cranes

Observations made by Dr Y. Lanovenko in Uzbekistan suggest that the lowland plains of the Amu Darya along its Afghan-Uzbek course have received large numbers of Eurasian cranes (*Grus grus*) and Demoiselle cranes (*Grus virgo*) during recent winters. This area seems to be a new wintering site for these species, perhaps as a consequence of global warming (<http://www.savingcranes.org>). Nothing is known however on the possible occurrence of wintering cranes in the lowland plains of the Amu Darya along its Afghano-Tajik course. Out of the 26 persons we interviewed, 18 (69%) answered that cranes did not visit the surveyed areas, 4 (15.5%) had no opinion and 4 (15.5%) mentioned that cranes in small numbers were occasional visitors to Aye Khanum during spring. We did not observe crane species during our visit. The mission commissioned by the Asian Development Bank recorded 8 Eurasian common cranes (*Grus grus*), although it is unclear at which period of the year this observation was made (Ahmad Khan, 2005). Our results suggest that Imam Sahib, Aye Khanum and Darqad were not in December 2007 wintering sites for cranes.

#### Overall list

During our visit we sighted 72 bird species, with an additional 2 of questionable identification: 22 (30.5%) are assimilated to water birds at large, 50 (69.5%) are non water birds, 11 (15.3%) being raptors. Using our observations, the results of the current interviews, the results of interviews in Dasht-e Nawar (Ostrowski et al., 2008) and in other areas in Afghanistan, as well as available literature (Rasmussen and Anderton, 2005; Habibi, 2007), we have attempted to clarify the status of the birds occurring in the area and to determine their predominant biome (Table 1).

Table 1. Taxonomic list of bird species observed in (1) Imam Sahib, (2) Aye Khanum and (3) Darqad areas on the Afghanistan-Tajikistan border, by the WCS Ecosystem Health Team in December 2007, with their status and biome use.

Common name	Scientific name	Status	Biome in area	Locality
Great cormorant	<i>Phalacrocorax carbo</i>	RB	Wetland	3
Pigmy cormorant	<i>Phalacrocorax pygmeus</i>	RB	Wetland	1, 2
Great egret	<i>Egretta alba</i>	RB	Wetland	2
Grey heron	<i>Ardea cinerea</i>	RB	Wetland	1, 2
Greylag goose	<i>Anser anser</i>	WV	Wetland	2
Common shelduck	<i>Tadorna tadorna</i>	WV	Wetland	2
Ruddy shelduck	<i>Tadorna ferruginea</i>	WV	Wetland	2
Common teal	<i>Anas crecca</i>	WV	Wetland	2
Eurasian wigeon	<i>Anas penelope</i>	WV	Wetland	2
Mallard	<i>Anas platyrhynchos</i>	RB	Wetland	2
Common merganser	<i>Mergus merganser</i>	WV	Wetland	2
Black kite	<i>Milvus migrans</i>	WV	Rangeland/Agric.	1, 3
Eurasian sparrowhawk	<i>Accipiter nisus</i>	RB, WV	Ubiquitous	1, 2, 3
Long-legged buzzard	<i>Buteo rufinus</i>	RB	Rangeland/Mountain	2, 3
Golden eagle	<i>Aquila chrysaetos</i>	RB	Mountain	3
Bonnelli's eagle	<i>Hieraaetus fasciatus</i>	RB	Wetland/Rangeland	2
White-tailed eagle	<i>Haliaeetus albicilla</i>	WV	Wetland	2
Griffon vulture	<i>Gyps fulvus</i>	WV	Mountain	3
Egyptian vulture	<i>Neophron percnopterus</i>	WV?	Rangeland	1, 2
Bearded vulture	<i>Gypaetus barbatus</i>	RB	Rangeland/Mountain	2, 3
Hen harrier	<i>Circus cyaneus</i>	WV	Rangeland	1, 3
Common kestrel	<i>Falco tinnunculus</i>	RB	Rangeland/Mountain	1, 3
Common pheasant	<i>Phasianus colchicus</i>	RB	Wetland/Tugai	1, 2, 3
Eurasian coot	<i>Fulica atra</i>	RB	Wetland	2
Northern lapwing	<i>Vanellus vanellus</i>	WV	Wetland/Agric.	2, 3
Common greenshank	<i>Tringa nebularia</i>	WV, PM	Wetland	2
Wood sandpiper	<i>Tringa glareola</i>	WV, PM	Wetland	2
Common sandpiper	<i>Actitis hypoleucos</i>	RB, WV	Wetland/Rangeland	1, 3
Common redshank	<i>Tringa totanus</i>	WV, PM	Wetland	2
Temminck's stint	<i>Calidris temminckii</i>	WV, PM	Wetland	2
Eurasian woodcock	<i>Scolopax rusticola</i>	WV	Wetland/Tugai	2
Common snipe	<i>Galinago galinago</i>	WV, PM	Wetland	2
Great black-headed gull	<i>Larus ichthyæus</i>	WV, PM	Wetland/Agric.	2
Black-headed gull	<i>Larus ridibundus</i>	WV	Wetland/Agric.	1, 2
Common tern	<i>Sterna hirundo</i>	PM	Wetland	1
Rock pigeon	<i>Columba livia</i>	RB	Mountain/Agric.	2, 3

Laughing dove	<i>Streptopelia senegalensis</i>	RB	Agric.	3
Eurasian collared-dove	<i>Streptopelia decaocto</i>	RB?	Wetland/Agric.	3
Little owl	<i>Athena noctua</i>	RB	Rangeland	2
Common hoopoe	<i>Upupa epops</i>	?	Rangeland/Agric.	3
Common kingfisher	<i>Alcedo atthis</i>	RB	Wetland	2
Eurasian skylark	<i>Alauda arvensis</i>	RB	Rangeland/Agric.	1, 2, 3
Crested lark	<i>Galerida cristata</i>	RB	Rangeland/Agric.	1, 2, 3
Citrine wagtail	<i>Motacilla citreola</i>	PM	Wetland/Agric.	1, 2
White wagtail	<i>Motacilla alba</i>	RB, WV	Wetland/Agric.	1, 2, 3
Water pipit	<i>Anthus spinoletta</i>	WV	Wetland/Rangeland	1, 2, 3
Hume's / short-toed lark	<i>Calandrella</i> sp.	?	Agric.	2, 3
Calandra / Bimaculated lark	<i>Melanocorypha</i> sp.	RB	Agric./Rangeland	1
Horned lark	<i>Eremophila alpestris</i>	WV	Agric./Rangeland	1, 2, 3
Brown dipper	<i>Cinclus pallasii</i>	WV	Wetland	3
Black-throated thrush	<i>Turdus [ruficollis] atrogularis</i>	WV	Wetland/Tugai	1, 2, 3
Black redstart	<i>Phoenicurus ochruros</i>	RB	Agric./Rangeland	1, 2, 3
Eversmann's redstart	<i>Phoenicurus erythronotus</i>	WV	Wetland/Tugai	1, 2, 3
Cetti's bush-warbler	<i>Cettia cettia</i>	RB	Wetland	3
Hume's leaf warbler	<i>Phylloscopus humei</i>	?	Rangeland/Tugai	2, 3
Turkestan tit	<i>Parus bokharensis</i>	RB	Rangeland/Tugai	2, 3
Walcreeper	<i>Tichodroma muraria</i>	WV	Mountain	3
Reed bunting	<i>Emberiza shoeniclus</i>	WV	Wetland/Tugai	1, 2
Corn bunting	<i>Miliaria calandra</i>	RB	Agric./Rangeland	2
European linnet	<i>Acanthis cannabina</i>	RB	Rangeland/Mountain	3
Fire-fronted serin	<i>Serinus pusillus</i>	RB	Agric./Mountain	2, 3
Eurasian goldfinch	<i>Carduelis carduelis</i>	RB, WV	Agric./Mountain	3
Desert finch	<i>Rhodospiza obsoleta</i>	RB	Agric./Rangeland	3
Common chaffinch	<i>Fringilla coelebs</i>	WV	Wetland/Tugai	1, 2, 3
Brambling	<i>Fringilla montifringilla</i>	WV	Wetland/Tugai	1, 2, 3
Eurasian tree sparrow	<i>Passer montanus</i>	RB	Ubiquitous	1, 2, 3
Rock sparrow	<i>Petronia petronia</i>	RB	Agric.	2
Common starling	<i>Sturnus vulgaris</i>	RB	Mountain	3
Common myna	<i>Acridotheres tristis</i>	RB	Ubiquitous	1, 2, 3
Red-billed cough	<i>Pyrhocorax pyrrhocorax</i>	WV	Rangeland/Mountain	1, 2, 3
Hooded crow	<i>Corvus corone cornix</i>	WV, RB	Agric./Rangeland	1, 2, 3
Carrion crow	<i>Corvus corone corone</i>	RB	Agric./Rangeland	1, 2, 3
Eurasian magpie	<i>Pica pica</i>	RB	Ubiquitous	1, 2, 3
Common raven	<i>Corvus corax</i>	WV	Rangeland/Mountain	2, 3

Status: PM=passage migrant; RB=resident breeder; W=winter visitor.

We believe 38 (51.3%) species are resident breeders in the area or in the surrounding mountains as it is the case for several raptor species, whereas 36 (48.7%) species are winter or migratory visitors to the area. During winter several resident populations might also receive the input of specimens coming from other areas. Owing to the harsh winter climatic conditions prevailing north and south of the surveyed areas, it is possible that many bird species retreat to the relatively warmer lowland areas of the Amu Darya basin at that time of the year. Twenty-two (29.7%) species seem to be mainly restricted to the wetland ecosystem, 16 (21.6%) occur in wetland and inhabited/cultivated lands or Tugai, 32 (43.2%) are not connected predominantly with wetland habitats and 4 (5.4%) are not biome-specialized and utilize all available ecosystems.

#### Spatial distribution and occurrence time

We have evaluated the spatial distribution and occurrence period of bird species observed during the present mission according to the maps of 'Birds of South Asia' (Rasmussen and Anderton, 2005), considered as the most authoritative yet produced for the region. Our observations did not support occurrence period as provided in this publication for 17 (23%) of the species we recorded (Table 2), which were supposed to be only breeding visitors to the area we surveyed. Four other species were reported as migratory visitors to the area and their presence in early December would only be consistent with such status should they were very late migrants. Eventually 7 species were not reported to occur in the surveyed area. Should we account for all these species, our observations contribute to significantly extend the known winter spatial distribution in the region for 28 bird species.

Possible reasons for the discrepancies between our observations and the distribution maps proposed by Rasmussen and Anderton (2005) are several. The most important one pertains to the method used by these authors to obtain distribution maps. For most species their maps were generated from a database of specimen material held in museums. Maps drawn from a small number of specimens such as in Afghanistan, an area poorly surveyed by ornithologists, are obviously less precise (as pointed out by authors in the introduction of volume 2). However bird variance in spatial distribution may also depend on biogeographical factors. For example birds are excellent indicators of climate change because effects can be seen quickly due to their mobile lifestyles as compared to more sedentary groups of species. Some studies have indeed found that bird distributions are most affected by climate and altitude (Storch et al., 2003). Therefore it is possible that the winter occurrence of species known in the past to be only spring/summer visitors to the northern wetlands of Afghanistan reveals a distributional shift caused by increasing ambient temperature. Bird distributions can also be affected by a variety of other factors not directly related to climate change, such as habitat degradation along with other forms of human disturbance. Eventually spatial distribution may also vary very fast in species known to be naturally expanding their range, such as the hooded crow (*Corvus corone cornix*).



Table 2. List of bird species for which we extend the spatial distribution or occurrence period in the region.

Species	Scientific name	Total number observed; and locality	Spatial distribution and occurrence time*
Great cormorant	<i>Phalacrocorax carbo</i>	7; Darqad	BV
Ruddy shelduck	<i>Tadorna ferruginea</i>	10; Aye Khanum	Id
Mallard	<i>Anas platyrhynchos</i>	139; Aye Khanum	Id
Black kite	<i>Milvus migrans</i>	5; Imam Sahib, Darqad	Id
Long-legged buzzard	<i>Buteo rufinus</i>	9; Aye Khanum, Darqad	Id
Egyptian vulture	<i>Neophron percnopterus</i>	2; Imam Sahib, Darqad	Id
Common sandpiper	<i>Actitis hypoleucos</i>	32; Imam Sahib, Aye Khanum, Darqad	Id
Common redshank	<i>Tringa totanus</i>	15; Aye Khanum	Id
Common tern	<i>Sterna hirundo</i>	1; Imam Sahib	Id
Eurasian collared dove	<i>Streptopelia decaocto</i>	123; Darqad	Id
Common hoopoe	<i>Upupa epops</i>	1; Darqad	Id
Common kingfisher	<i>Alcedo atthis</i>	5; Aye Khanum	Id
Hume's/Greater short-toed lark	<i>Calandrella acutirostris/brachydactyla</i>	43; Aye Khanum, Darqad	Id
White wagtail	<i>Motacilla alba</i>	12; Imam Sahib, Aye Khanum, Darqad	Id
Black redstart	<i>Phoenicurus ochruros</i>	14; Imam Sahib, Aye Khanum, Darqad	Id
Cetti's bush warbler	<i>Cettia cettia</i>	6; Darqad	Id
Hume's leaf warbler	<i>Phylloscopus humei</i>	14; Aye Khanum, Darqad	Id
Common greenshank	<i>Tringa nebularia</i>	13; Aye Khanum	MV
Wood sandpiper	<i>Tringa glareola</i>	34; Aye Khanum	Id
Citrine wagtail	<i>Motacilla citreola</i>	4; Imam Sahib, Aye Khanum	Id
Eversmann's redstart	<i>Phoenicurus erythronotus</i>	18; Imam Sahib, Aye Khanum, Darqad	Id
White-tailed eagle	<i>Haliaeetus albicilla</i>	3; Aye Khanum	NR
Hen harrier	<i>Circus cyaneus</i>	8; Imam Sahib, Darqad	Id
Northern lapwing	<i>Vanellus vanellus</i>	13; Aye Khanum, Darqad	Id
Great black-headed gull	<i>Larus ichthyaeus</i>	18; Aye Khanum	Id
Temminck's stint	<i>Calidris temminckii</i>	46; Aye Khanum	Id
Common chaffinch	<i>Fringilla coelebs</i>	68; Imam Sahib, Aye Khanum, Darqad	Id
Hooded crow	<i>Corvus corone cornix</i>	40; Imam Sahib, Aye Khanum, Darqad	Id

\* According to Rasmussen and Anderton (2005). BV: breeding visitor only; MV: migrant visitor only; NR: not previously recorded in the surveyed area.

All but two species, the common hoopoe (*Upupa epops*) and the common tern (*Sterna hirundo*) which were reported as single specimens, could probably be ruled out as vagrant species to the visited areas as they were usually reported in numbers and for 50% of them in at least two of the three surveyed areas.

Table 3. List of most prominent birds in Imam Sahib, Aye Khanum and Darqad according to 26 interviews.

Species	Result	Status	Hunted
'Ducks'	23/26	M, MB, W	Yes
'Herons and egrets'	23/26	MB, RB	Yes
Eurasian Coot	16/26	RB	Yes
Common pheasant	15/26	RB	Yes
'Geese'	13/26	W, M	Yes
'Hawks and falcons'	12/26	RB, M, W	No
'Vultures'	11/26	M, RB	No
White stork	7/26	MB	No
Common quail	5/26	MB	Yes
Chukar partridge	4/26	RB (Darqad)	Yes
'Crows'	3/26	RB	No
'Terns and gulls'	2/26	MB, W	No
Black stork	2/26	MB	No
Long-legged buzzard	2/26	RB	No
'Thrushes'	2/26	W	?
'Cranes'	2/26	M	No
Eurasian kingfisher	1/26	RB	No
'Eagle'	1/26	MB, W	No
Common myna	1/26	RB	No

Status: MB=Migratory Breeder, RB=Resident Breeder, W=Winter Visitor, S=Summer Visitor, M=Migratory

#### Important bird species according to inhabitants

Interviewed people considered 19 birds as important in the area (Table 3). The identity of 10 of these birds, such as 'ducks', 'herons and egrets' or 'hawks and falcons' could not be determined to the species level. The common pheasant, considered by most foreign visitors as a very important species in the area, came in third place behind 'ducks' and 'herons and egrets'. Interestingly the chukar partridge, a species widely hunted and trapped in Afghanistan, came only in 10<sup>th</sup> place and was only mentioned by interviewees from Darqad. Noticeably, the five species considered as the most important by the respondents were also known to be those most actively hunted, suggesting that the notion of importance was strongly related to the 'economical value' of the species. The two respondents who believed that 'cranes' were important birds in the area, were positive that they occur in the area in spring. No mention was made of the Siberian crane, although the species is known to have occurred in the 1970s in Afghanistan (Shank and Rodenburg, 1977). The appearance of the white stork (*Ciconia ciconia*) and the black stork (*Ciconia nigra*) in this list is noteworthy and they could both breed in the area.

In many localities in Afghanistan Eurasian sparrowhawks (*Accipiter nisus*) are traditionally captured by local people to be used as hawking birds (Ostrowski, pers. obs; Ostrowski et al., 2007; Ostrowski et al., 2008). We did not witness such activities during this survey. Yet, one interviewee in Aye Khanum mentioned that capturing sparrowhawks and falcons was common in the past but is no longer practiced.

Overall, the qualitative assemblage of prominent bird species as proposed by respondents matched our general understanding of the avifauna of northern wetlands, to the exception of storks, which might be visible in the area only during breeding or migration times.

#### Occurrence of mammals

##### Questionnaire results

- Cape hare (*Lepus capensis*): Nearly all interviewees reckoned that hares occur in the area throughout the year, mostly in the Tugai ecosystem but also in agricultural lands. For religious reasons the species is usually not hunted.
- Bactrian deer (*Cervus elaphus bactrianus*): The species may still occur in the area but in very few numbers and only in forested areas. It has dramatically suffered from over-hunting and loss of habitat. None of the interviewees actually saw a specimen of deer in recent years and all referred to second-hand sightings. In Aye Khanum a respondent mentioned that an individual was recently seen in the forest of Khoja Bauudin. One respondent in Darqad admitted seeing recently a specimen but on the Tajikistan side. We did not see any indices of presence during the survey (no foot prints, scats, marking trees or antlers).
- Wild boar (*Sus scrofa*): This species is claimed to be still abundant in the three surveyed areas. It is not hunted for religious reasons, although one respondent in Aye Khanum told us that several weeks ago a policeman had shot a wild boar in the area. The species seems to be hunted when raiding crops.
- Red fox (*Vulpes vulpes*): Respondents considered this species as very common in the area, both in Tugai forest and in the vicinity of human settlements and agricultural areas. In spring it is visible during day but retrieves to nocturnal life in summer when ambient temperature is high. It sometimes visits villages in winter but most often forages on water birds, rodents and poultries. The red fox is heavily persecuted as retaliation to poultry predation or for its pelt.
- Golden jackal (*Canis aureus*): Respondents considered the species as common. As for the red fox, it was said to be hunted because it attacks unattended livestock or for its pelt which has a substantial commercial value.
- Wolf (*Canis lupus*): This species seems to be less common than the jackal. Like other wild canids in Afghanistan, it is hunted when encountered.
- Caracal (*Caracal caracal*): Two interviewees in Darqad and one in Aye Khanum believed that this medium-sized cat occurs in the area.





From top to bottom: Plate 4. Droppings of a Leporidae, presumably the Cape hare (*Lepus capensis*), Aye Khanum, Takhar Province. Plate 5. Foot prints of a wild canid, presumably a red fox (*Vulpes vulpes*), Khoja Bauudin forest, Aye Khanum. Plate 6. Feces of wild boar (*Sus scrofa*) in Imam Sahib, Kunduz Province. December 2007.

- Pallas's cat (*Otocolobus manul*): Only one respondent in Darqad reported the occurrence of this species in the area, in the Tugai forest.
- Wild cat (*Felis silvestris*): It was reported to occur in the Tugai forest by 11 of 26 respondents.
- Leopard cat (*Prionailurus bengalensis*): It was reported to occur in the Tugai forest by 3 of the 12 respondents in Darqad.
- Badger / ratel (*Meles meles* / *Mellivora capensis*): It was reported to occur by single respondents in Imam Sahib and Darqad. Noteworthy this species was not readily proposed to respondents in the gallery of pictures.
- Indian crested porcupine (*Hystrix indica*): 16 out of 18 interviewees in Imam Sahib and Darqad reported that the species is common in the Tugai forest, agricultural lands and mountain areas surrounding the plain. They may be nocturnal pests and are actively chased when encountered in cultivated lands.
- Hedgehog (*Hemiechinus* sp.): Thirteen respondents mentioned the species as common in the area.

Although the following species were proposed in the photo gallery, all respondents were positive that tiger (*Panthera tigris*), leopard (*Panthera pardus*), lynx (*Lynx lynx*), stone marten (*Martes foina*) and hyena (*Hyena hyena*) do not occur in the area.

#### Direct observations and findings

- Cape hare (*Lepus capensis*): We observed scats and foot prints of a Leporidae species, presumably the Cape hare, in Aye Khanum Tugai forest (Plate 4). Because hares are not hunted for religious reasons, we speculate that the species is still common in the area.
- Red fox (*Vulpes vulpes*): We observed one individual, and on several occasions foot prints and scats of this species in the Tugai forest as well as in marshy lands in Aye Khanum (Plate 5). Red foxes are hunted during winter for their pelts.
- Wolf / Jackal (*Canis lupus* / *Canis aureus*): We observed one fresh foot print of a wolf or jackal in a range area in Aye Khanum. Similarly to the red fox, wolves are hunted in winter to collect and sell their pelts.
- Wild boar (*Sus scrofa*): We observed numerous foot prints and scats of this species in Imam Sahib (Plate 6). The species is apparently little hunted as considered impure by Islam.

#### Overall list

Five, 2 and 3 mammal species were observed (or had their tracks found) or have a very high likelihood of occurrence according to interviews in Imam Sahib, Aye Khanum and Darqad, respectively (Table 4).



Table 4: List of mammal species in Tugai ecosystems of Imam Sahib, Aye Khanum and Darqad according to 26 interviews and to direct observations carried out in December 2007.

Order	Family	Genus and species	Likelihood of occurrence*		
			Imam Sahib	Aye Khanum	Darqad
Lagomorpha	Leporidae	<i>Lepus capensis</i>	100%	Medium high	100%
Artiodactyla	Cervidae	<i>Cervus elaphus bactrianus</i>	Medium low	Very low	Medium high
	Suidae	<i>Sus scrofa</i>	Very high	Medium high	100%
Carnivora	Canidae	<i>Vulpes vulpes</i>	Very high	Medium high	Very high
		<i>Canis aureus</i>	100%	Medium high	Medium high
		<i>Canis lupus</i>	Very high	Medium low	Very low
	Felidae	<i>Caracal caracal</i>	0%	Very low	Very low
		<i>Otocolobus manul</i>	0%	0%	Very low
		<i>Felis silvestris</i>	Medium low	Medium low	Medium high
		<i>Prionailurus bengalensis</i>	0%	0%	Medium low
	Mustelidae	<i>Meles meles</i> or <i>Mellivora capensis</i>	Very low	0%	Very low
Rodentia	Hystriidae	<i>Hystrix indica</i>	100%	Very low	Medium high
Insectivora	Erinaceidae	<i>Hemiechinus</i> sp.	Medium high	Medium low	Medium high

\*Likelihood of occurrence was determined according to the number of interviewees positive that the species occurs in the area. Very high likelihood:  $\geq 80\%$ ; medium high likelihood:  $\geq 50\%$  and  $< 80\%$ ; medium low likelihood:  $> 20\%$  and  $< 50\%$ , very low likelihood:  $\leq 20\%$ .

The Cape hare, the red fox, the wild boar, the jackal and the porcupine seem to be still fairly common in the three visited areas as testified by the interviews and as corroborated by our findings in the field. Based on interview results, the last stronghold of the Bactrian deer seems to be Darqad Tugai forest where 60% of the interviewees claimed that it still occurs compared to none in Aye Khanum, and less than 20% in Imam Sahib. Aye Khanum which holds relatively little remains of Tugai forest was not expected to be a favorable habitat for the Bactrian deer. In Darqad and Aye Khanum, wolves appeared to be relatively less common than jackals. Respondents to the questionnaire also mentioned the presence of the wild cat, caracal, leopard cat and Pallas' cat in the surveyed areas, all occurring exclusively in the Tugai forest. However data drawn from questionnaire investigation concerning poorly visible species such as felids or mustelids must be interpreted with caution. Species belonging to these families are often difficult to identify in nature to species level, they are very discrete and typically of furtive occurrence. The occurrence of leopard cat and Pallas cat in Darqad would be in accordance with what is known of their past distribution in the country (Habibi, 2003). Eventually two respondents (one in Imam Sahib and one in Darqad) mentioned that a mustelid species, which according to their descriptions could be either a ratel (*Mellivora capensis*) or a badger (*Meles meles*), occur in the area. The general assemblage of mammal species in surveyed areas broadly matched the

species distribution compiled by Habibi (2003). Still, the few discrepancies are worth discussing. For example, Habibi (2003) did not report the presence of wild cat or caracal in the surveyed area, but responses of interviewees suggest that these species may occur. If confirmed it would significantly extend the distribution of this species to the north-east in Afghanistan. No mention was made by inhabitants of the common otter (*Lutra lutra*). This species is closely associated to water courses and wetlands and it could occur in the surveyed areas. The status and variety in the region of small mammal species belonging to the Rodentia, Chiroptera and Insectivora orders is largely unknown and would deserve a specific survey.

## CONCLUSIONS AND RECOMMENDATIONS

The majority of mammal species remaining in the surveyed areas have their last strongholds in the Tugai forests. This is particularly true for the Bactrian deer, the wild boar and all cat species. Their survival on the short term is therefore intimately linked to the conservation of these fast-declining forested areas. However, we need to document more accurately the presence of key mammal species in this ecosystem by using molecular genetics on collected feces, photo-trapping surveys, and more assiduous direct observations, such as developed by WCS in Nuristan.

All the Tugai forest areas surveyed during our survey presented evidences of serious forest clearing and wood cutting (Plate 7). Interviewed people mentioned that wood is collected exclusively to support local needs in fire wood (Plates 8 & 9). Cleared areas are often grazed by livestock (Plate 10) and then turned into agricultural fields which are easily irrigated because of the proximity of the Amu Darya. It is urgent to support a better protection of Tugai forest in northern areas of Afghanistan before remnant shreds of this valuable ecosystem vanish. Implementing a local ban on wood cutting is arguably achievable as most of these rare biotopes are nowadays restricted to islands in the Amu Darya River, constituting de facto isolated pockets of forest that should be relatively easy to secure by a fluvial patrol. The problem posed by human communities settled on several large islands is unquestionably thornier to resolve. As mentioned earlier communities in Kunduz region have a complex multi-ethnic background. The community inhabiting Imam Sahib Island is largely composed of Arab ethnics. It has been suggested that this community has only recently occupied the island (UNEP, 2003) but our interviews suggest that the Arab community has successfully settled in the area a long time ago. The Arab community is said to reluctantly welcome visitors, especially foreigners and the team was not allowed to visit the area without a guard provided by the head of district. Arab ethnics also occur in Aye Khanum although in lower numbers and in less clustered communities. No Arab communities occur in Darqad where Pashto and Uzbek ethnics are in largest numbers. Any conservation project in the area will have to rely on a good understanding of the specificity of each community in the area. For example we were told that most hunters were non-Arab ethnics whereas on Imam Sahib island wood clearing was done essentially by them.



From top left, clock wise: Plate 7. We photographed here the ultimate stage of wood clearing in Moussa Zair forest, Darqad, Takhar Province, Afghanistan. Undercover shrubs have disappeared collected as firewood by local inhabitants or grazed by livestock, while the older trees, inaccessible to most livestock suffer drastic cuts. Plate 8. Wood cutting is essentially done to support a local firewood market. This young woodcutter will sell his harvest at the nearest village, Moussa Zair forest, Darqad, Takhar Province, Afghanistan. Plate 9. Bundles of firewood just arrived by boat from Imam Sahib Island, Imam Sahib, Kunduz Province, Afghanistan. Plate 10. Livestock, such as here; sheep, goats and donkeys are left to pasture in the Tugai forest, grazing, browsing and overstepping extensively the forest undercover and by alleviating any possibility of plant regeneration, contributing to the irreversible degradation of this fragile and millennial riparian ecosystem, Moussa Zair forest, Darqad, Takhar Province, Afghanistan.

In addition, a conservation project in the area would have the highest chance to succeed if it was framed within a trans-boundary context. Large pieces of Tugai forest seem to persist on the Tajikistan side of the Amu Darya and it is possible that specimens of megafauna such as Bactrian deer may occur in higher numbers in Tajikistan. Unfortunately transboundary cooperation is unlikely to happen in the short term unless Afghanistan central government demonstrates its capability at efficiently controlling the borders of the country.

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## APPENDIX: SUMMARY OF DAILY ACTIVITIES (2–15 DECEMBER 2007)

- Sunday 2 December: Kabul to Kunduz — The team drove with WCS car from Kabul to Kunduz, capital of Kunduz Province in northern Afghanistan, purchased food and cooking gears in this city.
- Monday 3 December: The team meets with PRT authorities to evaluate security situation in the area. The land-mine clearance center was not accessible for visit. The team moved to Imam Sahib, Kunduz district (about a 2 hr-drive).
- Tuesday 4 December: Imam Sahib — The team met with the head of the district, explaining him the scopes of the work and introducing WCS, and then introduced itself to the police authorities in the area who provided a security guard. We surveyed the lowlands along the Amu Darya, near Tane Yakatoot (N37.2842 – E68.9796) site.
- Wednesday 5 December: The team surveyed Imam Sahib area and questioned inhabitants. It crossed a river arm and visited Jungle Se Borj, a riverine forest. Foot-prints and feces of wild boar (*Suis scrofa*), and jackal (*Canis aureus*) were found. The team also surveyed the avifauna.
- Thursday 6 December: Imam Sahib to Aye Khanum — The team met again with the head of the district, and briefed him about its observations. Then the team moved to Khwaja Ghar (5 hr-drive) and meet with the head of the district
- Friday 7 December: Khwaja Ghar (Aye Khanum) — The team went to Sasorqul Lake, surveyed the area and questioned local people.
- Saturday 8 December: Khwaja Ghar (Aye Khanum) — We visited the forests of Arab Kakul and Khoja Bawudin. Feces and foot-prints of foxes (*Vulpes vulpes*) and Cape hare (*Lepus capensis*) were found. Present avifauna was recorded.
- Sunday 9 December: Khwaja Ghar (Aye Khanum) — The team stayed in the guesthouse because of heavy rains.
- Monday 10 December: Khwaja Ghar to Darqad — The team drove to Darqad (2 hr-drive). We met with the head of the district and introduced the work of WCS. We were introduced to the local officer of the Ministry of Agriculture.
- Tuesday 11 December: Darqad — The team surveyed and carried out questionnaire investigations in the area located around Azrat Sultan Forest.
- Wednesday 12 December: Darqad — The team surveyed and carried out questionnaire investigations in the area located around Mussa Zai Forest.
- Thursday 13 December: Darqad to Khwaja Ghar — The team drove back to Khwaja Ghar.
- Friday 14 December: Khwaja Ghar to Kunduz — The team drove back to Kunduz.
- Saturday 15 December: Kunduz to Kabul — The team drove back to Kabul.