



UNEP



NEPA



GEF



# Biodiversity Profile of Afghanistan

An Output of the National Capacity Needs Self-Assessment for  
Global Environment Management (NCSA) for Afghanistan

June 2008

**United Nations Environment Programme  
Post-Conflict and Disaster Management Branch**

*First published in Kabul in 2008 by the United Nations Environment Programme.  
Copyright © 2008, United Nations Environment Programme.*

*This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source.*

*No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.*

*United Nations Environment Programme  
Darulaman  
Kabul, Afghanistan  
Tel: +93 (0)799 382 571  
E-mail: [qadeer.karyab@unep.ch](mailto:qadeer.karyab@unep.ch)  
Web: <http://www.unep.org>*

#### *DISCLAIMER*

*The contents of this volume do not necessarily reflect the views of UNEP, or contributory organizations. The designations employed and the presentations do not imply the expressions of any opinion whatsoever on the part of UNEP or contributory organizations concerning the legal status of any country, territory, city or area or its authority, or concerning the delimitation of its frontiers or boundaries.*

*Unless otherwise credited, all the photos in this publication have been taken by the UNEP staff.*

*Design and Layout: Rachel Dolores & Matija Potocnik*

# Table of Contents

Foreword.....	6
Author's Note .....	8
Executive Summary .....	9
1 Introduction .....	11
2 What is Biodiversity? .....	11
3 Why is Biodiversity Important to Afghanistan? .....	12
4 Afghanistan's Human Population .....	12
5 Topography, Climate and Hydrology .....	13
6 Biogeography and Ecological Classification .....	15
7 Afghanistan's Land Cover .....	19
8 Afghanistan's Eco-regions.....	20
8.1 Closed Forest Vegetation .....	20
8.1.1 East Afghan Montane Conifer Forests (PA0506) .....	20
8.1.2 Baluchistan Xeric Woodlands (PA1307) .....	21
8.2 Open Woodland Vegetation.....	22
8.2.1 Central Afghan Mountains Xeric Woodlands (PA1309) .....	22
8.2.2 Paropamisus Xeric Woodlands (PA1322).....	22
8.3 Semi-Desert Vegetation.....	22
8.3.1 Afghan Mountains Semi-Desert (PA1301).....	23
8.3.2 Badkhez (Badghis)-Karabil Semi-Desert (PA1306) .....	23
8.3.3 Central Persian Desert Basins (PA1313) .....	23
8.3.4 Registan-North Pakistan Sandy Desert (PA1326) .....	23
8.4 Subalpine and Alpine Vegetation .....	24
8.4.1 Karakoram-West Tibetan Plateau Alpine Steppe (PA1006).....	24
8.4.2 Pamir Alpine Desert And Tundra (PA1014) .....	24
8.4.3 Hindu Kush Alpine Meadow (PA1005) .....	24
8.4.4 Ghorat-Hazarajat Alpine Meadow (PA1004).....	24
9 Eco-region Status.....	25
10 Afghanistan's Wetlands.....	26
11 Afghanistan's Riparian Areas .....	27
12 Afghanistan's Species .....	27
12.1 Mammals .....	28
12.2 Birds.....	29
12.3 Reptiles.....	30
12.4 Amphibians .....	31
12.5 Fish .....	31
12.6 Invertebrates .....	32
12.7 Plants.....	32
12.8 Lichens and Fungi .....	33
13 Afghanistan's Species at Risk.....	34
13.1 IUCN Red List of Threatened Species.....	34
13.1 Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES).....	34
14 Afghanistan's Endemic Species .....	35
15 Afghanistan's Protected Areas .....	35
15.1 Band-i-Amir National Park.....	37
15.2 Ajar Valley Wildlife Reserve.....	39
15.3 Ab-i-Estada.....	40
15.4 Dasht-i-Nawar.....	41
15.5 Hamun-i-Puzak .....	43
15.6 Kol-i-Hashmat Khan .....	44
15.7 Wakhan .....	45
15.8 Nuristan .....	47
15.9 Zadran .....	47
15.10 Imam Sahib.....	47
15.11 Darqad .....	47
15.12 Northwest Afghanistan.....	48
15.13 Registan Desert .....	48
16 Afghanistan's Agricultural Biodiversity .....	49
16.1 The Significance of Agricultural Biodiversity .....	49
16.2 Varieties of Agricultural Species .....	49
16.3 Wild Species as the Ancestors of Agricultural Species.....	50
16.4 Afghanistan's Crop and Livestock Species and Varieties .....	50

17 Recommended Priority Actions for Conserving Afghanistan's Biodiversity .....	52
18 Acknowledgements.....	53
19 Literature Cited .....	53
Appendix 1 The Mammals of Afghanistan: A Checklist.....	58
Appendix 2 The Birds of Afghanistan: A Checklist .....	68
Appendix 3 The Reptiles of Afghanistan: A Checklist.....	87
Appendix 4 The Amphibians of Afghanistan: A Checklist .....	93
Appendix 5 The Fish of Afghanistan: A Checklist.....	94
Appendix 6 The Butterflies of Afghanistan: A Checklist .....	99
Appendix 7 The Mosquitoes of Afghanistan: A Checklist .....	105
Appendix 8 The Liverworts of Afghanistan: A Checklist .....	106
Appendix 9 The Lichens and Fungi of Afghanistan: A Checklist .....	107
Appendix 10 Afghan Species Listed on the IUCN Red List of Threatened Species.....	112
Appendix 11 Afghan Species Listed on Appendices I and II of the Convention on the Trade in Endangered Species (CITES).....	114
Appendix 12 A Subject Bibliography of Afghan Biodiversity .....	117

## List of Tables

Table 1	World Meteorological Office Global Standard Normal Mean Monthly Temperature (C) from seven Afghan Stations .....	13
Table 2	World Meteorological Office Global Standard Normal Mean Monthly Precipitation (mm) from seven Afghan Stations .....	13
Table 3	Udvardy Realms, Provinces and Biomes Present in Afghanistan.....	16
Table 4	Comparison of Differing Biogeographic Classifications for Afghanistan .....	16
Table 5	Description of WWF-US Eco-regions Found in Afghanistan .....	18
Table 6	Subjective Classification of Human Impact on Composition, Structure and Function of WWF-US Eco-regions in Afghanistan .....	25
Table 7	List of Afghan wetlands known or expected to be biologically significant .....	26
Table 8	Number of Species Known to Exist in Afghanistan .....	28
Table 9	Important Bird Areas (IBAs) in Afghanistan listed by Evans (1994) .....	29
Table 10	Species known to be endemic to Afghanistan .....	35
Table 11	UNEP-WCMC's World Database on Protected Areas information on Afghanistan's Protected Areas.....	36
Table 12	Species diversity of Afghanistan's agriculture.....	51

## List of Figures

Figure 1	Map of Udvardy Provinces in Afghanistan (from Sayer and Van der Zon [1981]).....	15
Figure 2	WWF-US Eco-region Classification of Afghanistan and Neighbouring Countries .....	17
Figure 3	Freitag's (1972) classification of the potential vegetation of Afghanistan prior to alteration by human activity. Redrawn by Sayer and Van der Zon (1981) .....	20
Figure 4	Map of Afghanistan's Protected Areas .....	38

## Acronyms and abbreviations

ACC	Afghan Conservation Corps
AIMS	Afghanistan Information Management Services
AVHRR	Advanced Very High Resolution Radiometer
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
CR	Critically Endangered
DNRM	Department of Natural Resource Management
EMBL	European Molecular Biology Laboratory
EN	Endangered
EX	Extinct
FAO	Food and Agriculture Organization of the United Nations
GLCC	Global Land Cover Classification
GRIN	Genetic Resources Information Network
IBA	Important Bird Area
IIP	Implementation and Investment Program
IUCN	World Conservation Union
MAIL	Ministry of Agriculture, Irrigation and Livestock
MDG	Millennium Development Goal
NCSA	National Capacity Needs Self-Assessment for Global Environment Management
NEPA	National Environmental Protection Agency
PRT	Provincial Reconstruction Team
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
UNHCR	United Nations High Commissioner for Refugees
VU	Vulnerable
WCMC	World Conservation Monitoring Centre
WCS	Wildlife Conservation Society
WMO	World Meteorological Office
WPAD	World Protected Areas Database
WWF	World Wildlife Fund

## Foreword

Afghanistan is a country rich in living resources and natural beauty. Its spectacular landscapes of mountains, deserts, woodlands and forests are home to a wide range of flora and fauna existing in multiple ecological settings. Natural resources and associated biological diversity provides the livelihood basis for up to 80% of the Afghan population. At the same time, biodiversity is being degraded as immediate needs, ongoing conflict, internal displacement, high rates of population growth, low levels of education, and poverty, result in a prioritization of survival over the longer-term sustainability of natural resource use and management. The potentially far-reaching impacts of biodiversity loss and natural resource degradation for the Afghan people led the Government of the Islamic Republic of Afghanistan to sign and ratify the United Nations Convention on Biological Diversity (UNCBD) in 1992.

The year 2008, however, presents Afghanistan with many opportunities to move towards the conservation of its biological diversity. The Forest Law, Rangeland Law, Land Policy and protected area regulations have all been drafted and are currently being reviewed by the Afghan Government. There are multiple community based natural resource management initiatives being supported by the Government and the International Community around the country.

And the draft management plan for Band-e-Amir protected area is in its final stages of approval.

With funding from the European Commission, Government of Finland and Global Environment Facility (GEF), the United Nations Environment Programme (UNEP) has supported the Government of the Islamic Republic of Afghanistan to implement the National Capacity Needs Self-Assessment for Global Environment Management (NCSA) which aims to identify country level priorities and needs for capacity building to address global environmental issues and, in particular, enhance the capacity of Afghanistan to meet its existing commitments under the UNCBD, the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC). As part of this process, UNEP has supported the elaboration of this Biodiversity Profile of Afghanistan, 2008.

This report presents a comprehensive summary of the status of Afghanistan's biodiversity in 2008. I sincerely hope that this report will be useful not only to the people of Afghanistan, but also to all donor countries and international organizations supporting the conservation and sustainable management of the country's biological resources.

Asif Zaidi  
Programme Manager  
United Nations Environment Programme

## Foreword

It is saddening to see the degradation of Afghanistan's biological diversity, to the detriment of our country's sustainable development. Drought and mismanagement of our precious water resources are affecting agricultural productivity and the health of our families, desertification is reducing the carrying capacity of our land, and the unsustainable harvesting of our precious forest resources marks the loss of a national treasure.

It is in this context that the Government of the Islamic Republic of Afghanistan has paid considerable attention to environmental issues in recent years. The National Environmental Protection Agency (NEPA) has been established as an independent agency with the goal to "protect the environmental integrity of Afghanistan and support sustainable development of its natural resources through the provision of effective environmental policies, regulatory frameworks and management services that are also in line with the Afghanistan Millennium Development Goals (MDGs)". The Ministry of Agriculture, Irrigation and Livestock (MAIL) has recently completed its 10-Year Agricultural Master Plan and associated Implementation and Investment Programme (IIP), identifying natural resources as one of the key cross-cutting priorities.

The Afghan Government has also fully recognized the important role that the Afghan people have

to play in the conservation of our biological heritage. Living alongside biological resources and interacting with them on a daily basis, the active participation of local communities in natural resource management plans and strategies is considered essential.

Since 2002, UNEP has provided consistent support to institutional strengthening and capacity building within the environmental field. This report represents one example of the important outputs that have been generated during this period. This report, Biodiversity Profile of Afghanistan, 2008, provides the first-ever comprehensive review of the status of biodiversity that has been carried out in Afghanistan. The Afghan Government and international community alike will benefit greatly from this report as environmental management policies are debated, approved and implemented. On behalf of the Government of the Islamic Republic of Afghanistan, we urge readers to take note of Afghanistan's rich biological diversity, recognize the serious threats that face this important resource, and join forces to ensure that this rich natural heritage is not lost to Afghanistan forever.

Obaidullah Ramin  
Minister of Agriculture,  
Irrigation and Livestock

Mostapha Zaher  
Director-General of the National  
Environmental Protection Agency

## Author's Note

This report is an attempt to provide a comprehensive summary of the status of Afghanistan's biodiversity in 2008. The hope is that it will serve as a handy and scientifically credible reference for anybody seeking reliable information on Afghan biodiversity.

For many reasons, comprehensively describing Afghanistan's biodiversity is a challenging task. First, little research has been undertaken on Afghan biodiversity. There are many thousands of species that have not been recognized by scientists and there is little information on the status or distribution of most of those that have been catalogued. Second, most of biodiversity research was undertaken prior to the outbreak of war in 1979 and is therefore out of date. Unfortunately, the current security situation makes it difficult to reassess, validate and update this older information. Third, much of the biodiversity research has been published in obscure journals and a wide variety of languages thereby making it inaccessible. Fourth, much of the more recent information on Afghan biodiversity has uncritically recycled old material without citing original sources making it very difficult to assess the validity of the data. And last, because Afghan species are relatively poorly known, considerable taxonomic uncertainty remains leading to constantly changing classification and scientific names.

The first part of the report is a short, narrative interpretation of Afghanistan's biodiversity emphasizing various approaches to eco-regional classification, summaries of species and species-at-risk, identification of known biodiversity hotspots,

and a short summary of the country's agricultural biodiversity.

Lists of species known to occur in Afghanistan are included as Appendices 1 – 8. In reviewing these data, it became clear how much basic fieldwork remains to be done to produce reliable species lists, even for well-known groups such as birds and mammals. Considerable botanical research has been undertaken in Afghanistan, but it has not yet been synthesized. Consequently, no checklists for vascular plants are included.

Appendices 10 and 11 list those Afghan species that are at risk of extinction at the global scale. However, almost no information is available on the current status of species within the borders of Afghanistan, although it is readily obvious that many species have declined dramatically over the past three decades. An urgent need is to initiate the process of formally assessing the distribution and population trends of Afghanistan's biodiversity, starting with mammals.

A bibliography of over 500 publications on Afghan biodiversity, sorted by subject, is included as Appendix 12. This list is by no means complete and I was unable to locate and translate most of the references. Ideally, some organization would assume responsibility for completing the bibliography and keeping it up-to-date. Acquiring the publications and scanning them into an accessible digital library would be a great service.

I hope that this profile of Afghanistan's biodiversity proves to be useful.

Christopher C. Shank



## Executive Summary

Biodiversity, the variety of living things, is sometimes called 'the wealth of the poor' because rural people living close to the land depend upon biodiversity to provide natural goods and ecological services. History shows that environmental degradation is often a contributing factor to the collapse of civilizations and that vibrant, healthy societies depend on a healthy environment that is rich in biodiversity.

The intent of this report, which was an output of the National Capacity Needs Self-Assessment for Global Environment Management (NCSA) project implemented by the United Nations Environment Programme (UNEP), is to provide a summary of what is known in 2008 about the status of Afghanistan's biodiversity. There are three components:

- a narrative summary of Afghan biodiversity;
- a listing of known species of Afghan mammals, birds, reptiles, amphibians, butterflies, molluscs and liverworts; and
- a subject bibliography of published information on elements of Afghan biodiversity.

Much of the information on Afghanistan's biodiversity is old and no longer reliable. Little significant information has been gathered since the onset of war in 1978. However, the few recent investigations suggest that Afghanistan's biodiversity has suffered enormously in the last three decades.

Afghanistan is comprised of eight unique biogeographical Provinces of which seven belong to the Palearctic Realm. Only a small area in the lower Kabul River Valley is of Indo-Malayan origin. A recent classification breaks Afghanistan down into 15 smaller eco-regions of which four are considered as critical/ endangered, eight as vulnerable and only two as relatively stable and intact.

The species composition of all eco-regions has been significantly reduced through a combination of overgrazing, fuel collection and exploitation by large herbivorous animals. Deciduous and evergreen true forests are limited to the monsoon-influenced eastern part of the country and once comprised about 5% of Afghanistan's surface area. Recent

analyses suggest that only 5% of these original forests may still exist. Open woodlands dominated by pistachio and juniper once comprised about 38% of Afghanistan. Satellite image analysis of selected areas in 2002 found that tree density was too low to be detected anywhere, suggesting that this once widespread ecosystem is on the verge of extinction in Afghanistan. The vast areas of sub-alpine vegetation was probably originally steppe grassland but is now almost entirely comprised of grazing-resistant cushion shrubland.

Analysis of recorded species records shows that there are 137 to 150 species of mammals, 428 to 515 birds, 92 to 112 reptiles, six to eight amphibians, 101 to 139 fish, 245 butterflies, and 3,500 to 4,000 vascular plant species native to Afghanistan. The range in numbers results from uncertainty in taxonomy and the questionable validity of some records. A total of 39 species and eight subspecies appear on the World Conservation Union (IUCN) Red List as being globally threatened with extinction. There are 23 Afghan species listed on Appendix I and 88 on Appendix II of the Convention of the International Trade in Endangered Species of Wild Flora and Fauna (CITES). No formal assessment has been made of species at risk at the national scale, but many species, particularly large mammals, are obviously at risk of extinction within Afghanistan. Only seven vertebrate species are known to be endemic to Afghanistan, but estimates for endemic plant species range from 20 – 30% (i.e. about 600 – 1,200 species).

Afghanistan is an arid country and the few wetlands that do exist are therefore of great significance to biodiversity. A list of 21 wetlands of known or potential significance is provided in this report.

Afghanistan currently has no legally instituted or effectively managed protected areas. Prior to 1978, one National Park, four Waterfowl Reserves and two Wildlife Sanctuaries were designated by the Government, but were never formally and legally declared as such and management was minimal. A list of 15 potential protected areas proposed by various parties is provided in this report.

Afghanistan was one of the most significant centres for the origin and development of humanity's crop plants. Consequently, there are numerous local

landraces of wheat and other crops in use by Afghan farmers. Nine local breeds of sheep are found in Afghanistan along with eight breeds of cattle and seven of goats.

Nine priority actions are suggested for the conservation of Afghanistan's biodiversity.

1. Establish priority and feasible protected areas as legally recognized and effectively managed entities. Priority areas should be Band-i-Amir, Ajar Valley, Pamir-i-Buzurg, and Dashte Nawar.
2. Develop a protected areas system plan for Afghanistan designed to protect representative areas of high biodiversity in all major eco-regions.
3. Survey all wetlands and potential protected areas listed in this document to determine current status and suitability for inclusion into the protected areas system plan.
4. Initiate a national Red-Listing process for Afghan mammals with the technical assistance of IUCN, incorporating targeted surveys to establish current status of priority species.
5. Encourage national and international scholars to develop a comprehensive flora of Afghanistan.
6. Develop effective plans to intervene in the destruction of the remaining monsoon-dependent forests of eastern Afghanistan.
7. Develop effective plans for preserving and recovering remnant pistachio and juniper forests in northern Afghanistan.
8. Develop programs to preserve native Afghan landraces of crop plants and livestock.
9. Develop a National Biodiversity Strategy and Action Plan for Afghanistan.

# 1 Introduction

Afghanistan is a country rich in living resources and natural beauty. Its striking landscapes of mountains, deserts, open woodlands and forests are home to a vast array of species existing in a multitude of ecological conditions. Unfortunately, the upheaval of the recent decades of war, a changing climate and rapid population growth appear to have left the country's environment in ruins. Once Afghanistan achieves conditions of basic personal and political security, true development will require, among other things, maintaining and enhancing the quality of the environment that Afghans depend upon for their livelihoods.

Before concrete measures can be undertaken to protect and rehabilitate the Afghan environment, a better understanding of current conditions must be developed. Very little recent information is available, with most of the primary literature based on first-hand observations pre-dating 1980. With few exceptions, recent summaries of Afghanistan's



Band-e-Amir is located in Bamiyan Province of Central Afghanistan and is the first proposed national park in Afghanistan

biodiversity and environment have depended upon secondary sources, often uncited, ultimately referring to data that are decades old.

This report attempts to provide a focused and well-documented desk study of what is currently known about Afghanistan's biodiversity. Every attempt has been made to go back to primary sources to ensure the credibility of the data. The report consists of three parts:

1. a narrative summary of the major aspects of Afghan biodiversity;
2. authoritative checklists of known Afghan species based on current taxonomy; and
3. a reference list on Afghan biodiversity categorized by major subjects.

The paper was developed for the Kabul office of the United Nations Environment Programme (UNEP) as part of the National Capacity Self-Assessment for Global Environment Management (NCSA) project for Afghanistan.

## 2 What is Biodiversity?

Biodiversity is a contraction of "biological diversity" and defined by the United Nations Convention on Biological Diversity as:

*... the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.*

Central to the concept of biodiversity is the idea of "variability" or the differences among collections of living things. This variability can arise from number or types of species, from the different ways that species are organized into biotic communities and ecosystems, and from the vast array of genetic differences existing between individuals, populations and species.

Afghanistan's biodiversity is manifested in many ways: number of species, differences in groups of species in various areas, the widely differing ecosystems found in various parts of the country and the genetic variation found in natural species and in agricultural crops and animals.

### 3 Why is Biodiversity Important to Afghanistan?

The primary value of biodiversity to Afghans lies in the tangible goods and services that biodiversity provides to Afghans. The most obvious of these are the direct uses of the components of biodiversity from traditional crops, fruits, grazing, fuel, timber harvesting, fishing, and hunting. Less obvious are the “ecosystem services” provided by biodiversity. These include soil fertility, erosion control, crop pollination, and climatic stability, to name a few. The ecosystem services provided by biodiversity are rarely understood and usually taken for granted, but as Diamond (2005) has argued, loss of these ecosystem services has often contributed in a central way to the decline and ultimate collapse of societies.

Biodiversity has been termed “the wealth of the poor” (World Resources Institute 2005) because the poor tend to be rural people living close to the land and dependent on it for the goods and services provided by biodiversity, e.g. productive crop and grazing land, fuel, building materials, wild fish and game. Land rich in biodiversity is a form of wealth, even if that wealth cannot be measured in strictly monetary terms.

The converse is that a country that has eliminated its biodiversity is a country condemned to remain poor. Without the basic goods and services provided by biodiversity it is not possible for rural people to make a living from the land. Poverty and emigration are the only options. If Afghanistan is to develop into a vibrant and economically secure nation, it must first halt the loss of its biodiversity.

### 4 Afghanistan’s Human Population

The estimated population of Afghanistan in July 2005 was 29,928,987 (CIA World FactBook website), nearly double the population at the beginning of the period of war and civil strife in 1978. This figure represents the upper estimate for the 2005 population predicted by the World Bank in 1978 (Sayer and Van der Zon 1981; p. 13).

Afghanistan remains a predominately rural nation, but is rapidly becoming urbanized. In 1970, only 11% of the population was urban. This rose to 23.3% in 2003 and is expected to reach 41.9% by 2030 (United Nations Population Division 2006). The natural growth rate is a 2.6% per year as compared to the 2000 global growth rate of 1.4% (Population Reference Bureau 2005). Accordingly, 44.7% of the population is under 14 years of age (CIA World Factbook website), setting the stage for rapid population growth in the future. The doubling time for the Afghan population is less than 30 years. The population projected by 2050 is 81,933,000 (Population Reference Bureau 2005). Since 2001, more than 3.5 million refugees have returned to Afghanistan while nearly two million still remain abroad (UNHCR “Return to Afghanistan” website).

More people put more demands on the natural environment, leading inevitably to decline in biodiversity. The rapidly increasing population of Afghanistan presents the major underlying challenge to biodiversity conservation and ultimately to the quality of life of Afghans.



Collection of licorice (*Glycyrrhiza glabra*) around the Amu River, Balkh Province, Northern Afghanistan

## 5 Topography, Climate and Hydrology

The area of Afghanistan is 652,089 km<sup>2</sup> (National Geographic Society 1995), just slightly smaller than the US state of Texas and just slightly larger than France. The dominating feature is the central massif forming the spine of the country. The Hindu Kush is the general name given to a 1,000 km mountain system extending southwesterly from northern Pakistan and descending in elevation into the low-lying semi-deserts of western and north-western Afghanistan. The terminology is inconsistent but, properly speaking, the Hindu Kush Range itself is comprised only of the mountains north-east of Kabul and extending into northern Pakistan. Several other ranges radiate outwards from the Hindu Kush Range including the Eastern Safed Koh (comprised of the Koh-i-Baba, Salang, Koh-i-Paghman and Spin Ghar ranges) Suleiman Range, Siah Koh, Koh-i-Khwaja Mohammad Selseleh-i-Band-i-Turkestan, and the Western Safid Koh (Siah Band and Doshakh, historically referred to as the Paropamisus) (Library of Congress nd).

The highest point in Afghanistan is Mount Nowshak (or Nowshakh) at 7,484 m and the lowest about 400 m in the Siestan. Approximately 27% of Afghanistan lies above 2,500 m elevation (UNEP 2003a,

pp. 21). The mountains grade into semi-desert open woodlands and shrublands forming a great crescent surrounding the northern, southern and western parts of the mountainous regions. Extensive desert regions are found in the southwest, while the extreme east is characterized by monsoon-influenced forests.

Afghanistan has an arid and semi-arid continental climate with cold winters, hot summers and most precipitation falling in the winter. World Meteorological Organization (WMO) "Global Standard Normals" for Afghanistan were collected from seven stations over the period from 1956-1983 (National Climatic Data Centre website). Table 1 shows the Global Standard Normal mean monthly temperature (C°) for each station. It shows clearly that elevation and season strongly influence mean monthly temperature ranging from -11° at Salang (3,366 m) in January to +34° at Farah (700 m) in July.

Table 2 shows WMO Global Standard Normals for mean monthly precipitation (mm) at seven stations. Like temperature, precipitation is strongly influenced by elevation, with the highest precipitation measured at Salang (3,366 m) and the lowest at Farah (700 m). The strongly seasonal nature of precipitation is obvious with almost none falling in summer and most precipitation falling as snow in the winter and early spring.

Table 1 World Meteorological Office Global Standard Normal Mean Monthly Temperature (C) from seven Afghan Stations

	m elevation	J	F	M	A	M	J	J	A	S	O	N	D	Mean
Herat	964	3	6	10	16	22	30	30	28	23	16	9	4	16
Farah	700	7	10	16	22	27	32	34	32	27	20	13	9	21
Chagcharan	2183	-9	-7	2	9	13	17	19	18	12	7	2	-4	6
Kandahar	1010	5	8	14	20	26	30	32	29	23	18	11	7	19
Kabulk	1791	-2	2	6	13	17	23	25	24	19	13	6	1	12
Salang	3366	-11	-9	-6	0	3	8	9	8	4	1	-4	-8	0
Faizabad	1200	0	2	8	14	18	24	27	26	21	8	8	3	13

Table 2 World Meteorological Office Global Standard Normal Mean Monthly Precipitation (mm) from seven Afghan Stations

	m elevation	J	F	M	A	M	J	J	A	S	O	N	D	Mean
Herat	964	51	46	56	28	10	0	0	0	0	3	10	36	239
Farah	700	25	23	23	8	3	0	0	0	0	3	3	10	97
Chagcharan	2183	30	33	41	36	20	0	0	0	0	10	15	18	203
Kandahar	1010	53	43	41	18	3	0	3	0	0	3	8	20	191
Kabulk	1791	36	61	69	71	23	0	5	3	3	3	18	23	312
Salang	3366	109	142	185	198	124	10	8	8	8	30	69	104	996
Faizabad	1200	48	66	91	99	76	8	5	0	3	23	30	33	483



Dasht-e-Nawar Flamingo and Waterfowl Sanctuary, Ghazni Province, Southern Afghanistan

The source of most of Afghanistan's surface water is winter snow falling at high elevations. Freitag (1971) argues that the long period of summer drought limits Afghanistan's vegetation much more than does mean annual precipitation. Vegetation flourishes in areas receiving summer monsoon rains.

There are eight water basins flowing radially out from the Hindu Kush System. Three join the Indus River in Pakistan while the other five have no outflow and dry up in closed basins either inside or outside the country. Coad (1981) provides the following information on Afghanistan's hydrologic basins:

- Kabul River Basin—The Kabul River arises in the Paghman Mountains west of Kabul and joins the Indus at Attock 350 km downstream. Major tributaries are the Panjshir, Laghman, Logar and Kunar Rivers.
- Chamkani (= Kurram) River Basin—the Chamkani River arises in the Safed Kho south of Jalalabad and flows southeast for 320 km before reaching the Indus in Pakistan.
- Zhob-Gowmal Basin—the Gowmal River arises in Paktika Province and flows south-southeast into Pakistan where it joins the Zhob River and flows into the Indus.
- Pishin Lora Basin—the Pishin Lora arises in Pakistan in the Toba Kakar Range and flows southwest for about 400 km through Afghanistan before re-entering Pakistan and flowing into the Hamun-i-Lora.
- Helmand-Siestan Basin—The Helmand River arises in the Koh-i-Baba Range not far from the source of the Kabul River. It flows southwest for 1,300 km before turning north and emptying into marshes and salt flats of the Hamun-i-Helmand, mostly in Iran. The Helmand is Afghanistan's largest basin and drains about 40% of the country's area.
- Hari Rud Basin—the Hari Rud arises in Bamiyan Province and flows west for 490 km, passing Herat, before turning north to form the Afghanistan-Iran border.
- Murgab Basin—The Murgab River arises in the north-western Hindu Kush and flows west then north into Turkmenistan where it dries up near Merv.
- Amu Darya Basin—the Amu Darya (Oxus) River arises in the Pamirs near the Chinese border as the Pamir and Wakhan Rivers. The Amu Darya forms the northern border of Afghanistan for 1,300 km before it flows into Turkmenistan. At one time, it flowed into the Aral Sea, but it now dries up in the delta. Numerous rivers flow north into the Amu Darya from the northern Hindu Kush.

Afghanistan is particularly susceptible to global warming and its effects on precipitation and snowmelt patterns because almost all its water is derived from precipitation falling within the country rather than flowing in from surrounding countries (UNEP 2003a).

## 6 Biogeography and Ecological Classification

Plant and animal species are not homogeneously distributed across the face of the Earth. Early in the 19<sup>th</sup> century, biologists began to notice geographical patterns in species assemblages from one area to another. It was noticed that closely related species tend to occur in the same general areas and that groups of endemic but unrelated plant and animal species tend to show up in the same places. These two patterns allow bio-geographers to identify regions with distinctive biotas and histories.

Numerous schemes have been developed over the past 150 years to categorize and describe the bio-geographical regions of the world. Many such systems exist for plants and animals, with differing and overlapping typologies, nomenclatures and approaches. Many secondary sources do not reference the system used, so it is often difficult to determine which approach is being used.

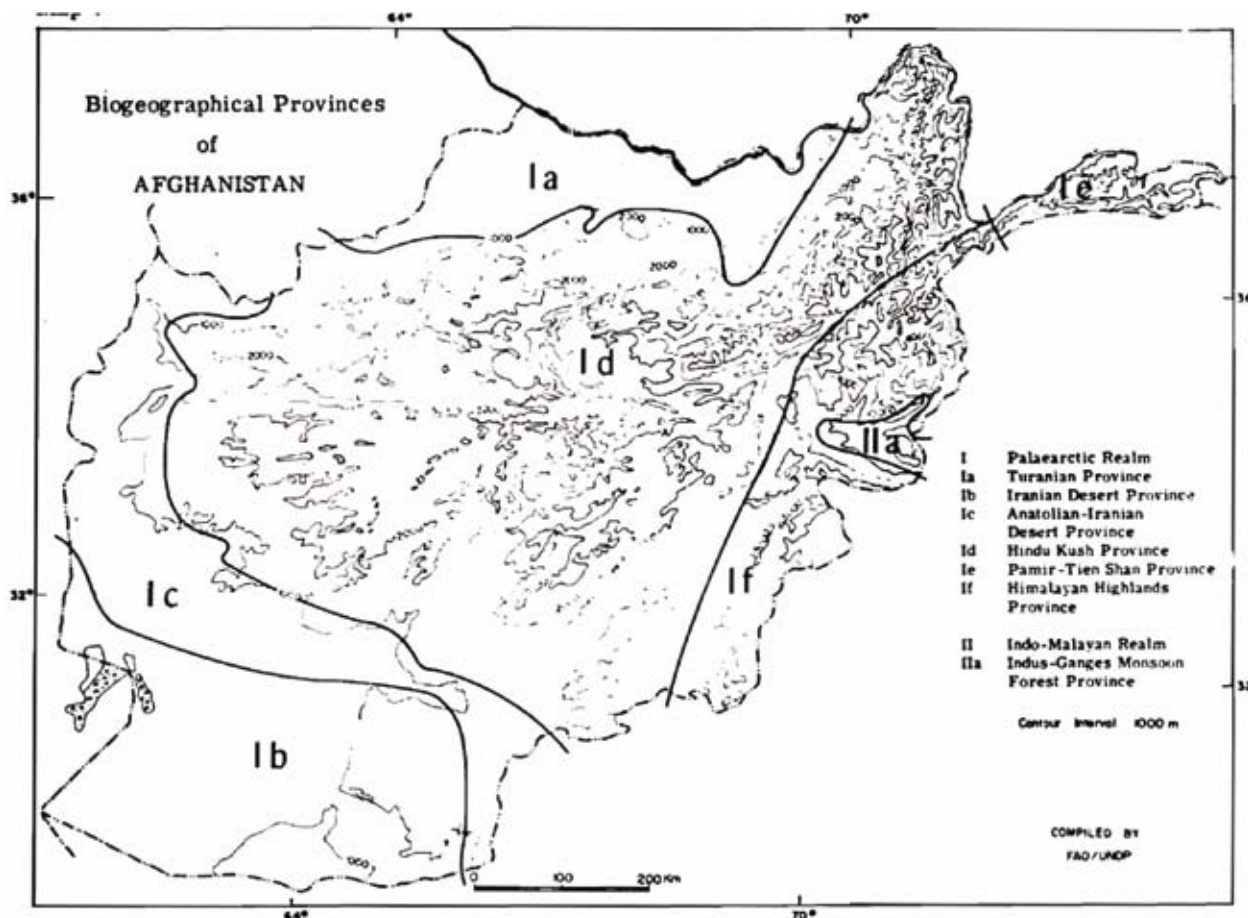
The remarkable correspondence between plant and animal distributions allowed Udvardy (1975) to develop an influential synthesis of all life-forms. Udvardy's scheme has often been criticized but is still used in conservation applications by the World Conservation Union (IUCN), the World Protected Areas Database (WPAD) and BirdLife International. The Udvardy approach breaks down the world into eight unique, continent-size "Realms" and 193 nested and unique, country-sized "Provinces". Each of these Provinces is then assigned one of 14 universal biome types describing the general climatic and topographical condition.

According to the Udvardy classification, Afghanistan is represented by seven Provinces in two Realms representing four global biomes (see Table 3, p.16).

Figure 1 shows the approximate boundaries of Udvardy's biotic Provinces in Afghanistan as represented by Sayer and Van der Zon (1981).

The transition to Udvardy's Indo-Malayan Realm lies between the eastern border of Afghanistan and

Figure 1 Map of Udvardy Provinces in Afghanistan (from Sayer and Van der Zon [1981])



**Table 3** Udvardy Realms, Provinces and Biomes Present in Afghanistan

Realms/Provinces	Biomes
<b>Palaeartic Realm</b>	
Hindu Kush Highlands Province	Mixed Mountain and Highland Biome
Anatolian-Iranian Desert Province	Cold Continental Desert and Semidesert Biome
Pamir-Tian-Shan Highlands Province	Mixed Mountain and Highland Biome
Turanian Province	Cold Continental Desert and Semidesert Biome
Iranian Desert Province	Warm Desert and Semidesert Biome
Himalayan Highlands Province	Mixed Mountain and Highland Biome
<b>Indo-Malayan Realm</b>	
Indo-Ganges Monsoon Province	Tropical and Subtropical Moist Broadleaf Forests

the Indus River. This boundary corresponds to the interface of the Indian and Palaeartic tectonic plates that first collided 15 million years ago. The Indian plate is still sliding northeast causing uplift resulting in the Himalaya, Hindu Kush, Karakorum and Tien Shan Ranges and in the frequent earthquakes in the region.

Most Afghan plant and animal species are Eurasian in origin, whereas just over the border in Pakistan species are predominantly Indo-Malayan. Nevertheless, many elements of the Indo-Malayan fauna and flora have dispersed into Afghanistan. The small area of the lower Kabul Valley is considered to be the Indus-Ganges Monsoon Forest Province (Tropical dry or deciduous forest biome) of the Indo-Malayan Realm.

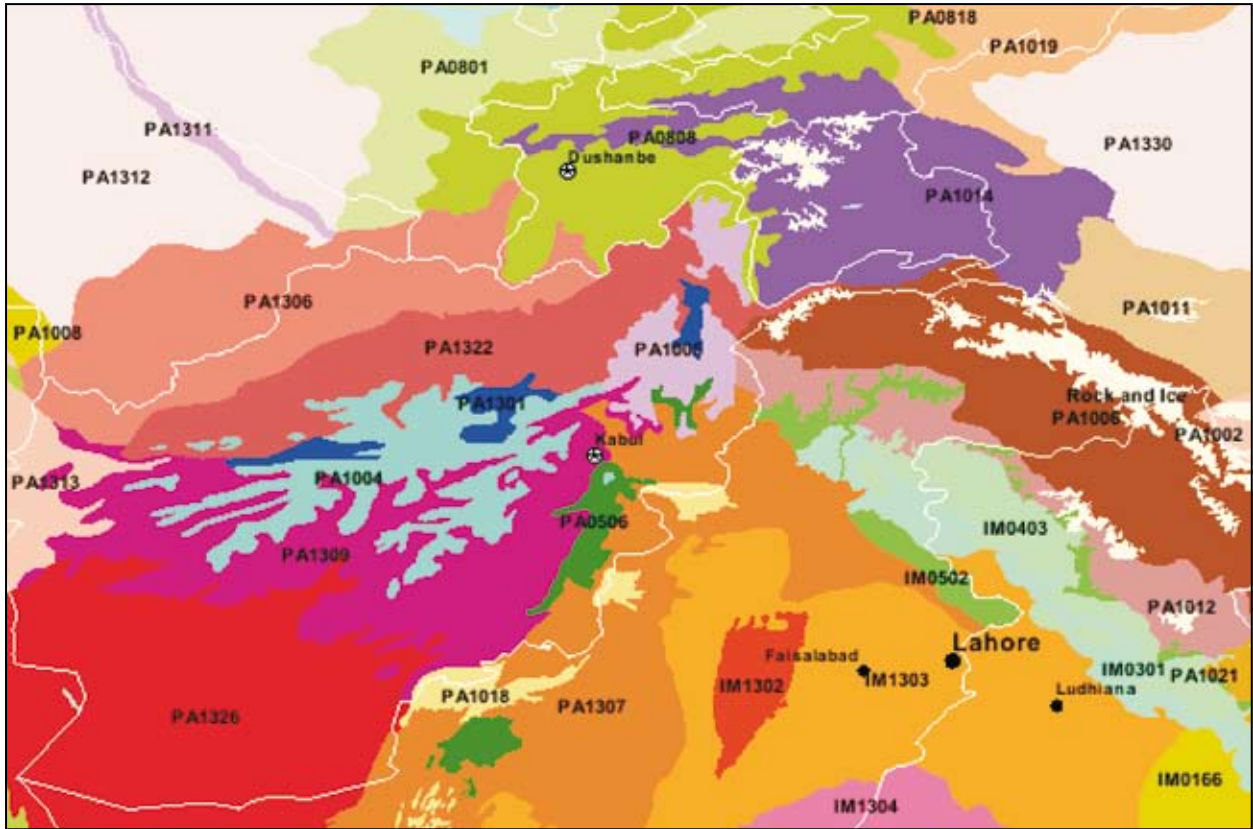
Habibi (2003 p. 10) presents a simplified map of Afghanistan's bio-geographic regions

**Table 4** Comparison of Differing Biogeographic Classifications for Afghanistan

Udvardy	Habibi	Takhtajan
Palaeartic Realm Himalayan Highland Province <i>The forested region of eastern Afghanistan under the influence of the monsoon and the Kabul River valley.</i>	Monsoon Forests <i>The forests of Kunar and Paktya coming under the influence of the monsoon.</i>	Holarctic Kingdom Irano-Turanian Region Western Himalayan Province
Palaeartic Realm Hindu Kush Region <i>The Hindu Kush and Koh-i-Baba Ranges.</i>	Central Highlands <i>The Hindu Kush, its auxiliary ranges (Koh-i-Baba, Spinghar and Paghman Ranges), and the Pamirs.</i>	Holarctic Kingdom Irano-Turanian Region Turkestanian Province
Palaeartic Realm Pamir-Tien Shan Region <i>Eastern half of the Wakhan Corridor.</i>		Holarctic Kingdom Irano-Turanian Region Tibetan Province
Palaeartic Realm Turanian Region <i>The open woodlands and desert north of the Hindu Kush and along the Amu Darya River.</i>	Not recognized	Holarctic Kingdom Irano-Turanian Region Turkestanian Province
Not recognized	Steppe Region <i>Stony deserts forming an extensive arc around the Central Highlands.</i>	Holarctic Kingdom Irano-Turanian Region Turkestanian Province
Palaeartic Realm Anatolian-Iranian Desert Region <i>North-western mid-altitude deserts.</i>	Not recognized	Holarctic Kingdom Irano-Turanian Region Armeno-Iranian Province
Palaeartic Realm Iranian Desert Region <i>Low-lying desert in the southwest centred on the Seistan basin and including the Registan desert.</i>	Southern Desert Region <i>The Dasht-i-Margo, Registan Desert and Seistan Basin in the southwest.</i>	Holarctic Kingdom Irano-Turanian Region Armeno-Iranian Province
Palaeartic Realm Indus-Ganges Monsoon Forest Region <i>Lower valley of the Kabul River east of Kabul to the Pakistan border.</i>	Eastern Intramontane Basin <i>Low elevation area of Mediterranean climate between the Hindu Kush and Spinghar Ranges.</i>	Holarctic Kingdom Irano-Turanian Region Province not recognized



Figure 2 WWF-US Eco-region Classification of Afghanistan and Neighbouring Countries (with permission of WWF-USA)



that broadly reflects the Udvardy approach, while Takhtajan (1986) presents a global floral classification. Table 4 compares the terminology and classifications employed in these approaches.

The World Wildlife Fund - USA (Olson et al 2001)<sup>1</sup> has refined Udvardy's (1975) system by classifying the Earth's terrestrial environment into 867 eco-regions. These eco-regions average 150,000 km<sup>2</sup> as opposed the 740,000 km<sup>2</sup> of Udvardy's Provinces. Eco-regions are defined as "relatively large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the

original extent of natural communities prior to major land-use change".

Figure 2 shows the WWF eco-region map available on the internet and zoomed in to Afghanistan. It shows Afghanistan with 15 eco-regions representing four biomes. Five of Afghanistan's 15 eco-regions are considered as globally "Critical/ Endangered" and eight are considered "Vulnerable". Only the "Sulaiman Range Alpine Meadows" and the "Northwestern Himalayan Alpine Shrub and Meadows" eco-regions are considered as "Stable/ Intact", and these eco-regions are barely represented in Afghanistan. This schema does not reflect the predominantly Indo-Malayan origin of the Jalalabad Valley's biota.

<sup>1</sup> Web access to an interactive site is at <http://www.worldwildlife.org/science/eco-regions.cfm>. One can search for individual eco-regions, and find information about each eco-region, including species lists.

**Table 5 Description of WWF-US Eco-regions Found in Afghanistan**

Biome	Eco-region "Zip-Code"	Eco-region Name	Global Status
Temperate Coniferous Forests			
	PA0506	East Afghan Montane Conifer Forests	Vulnerable
Temperate Grasslands, Savannahs and Shrublands			
	PA 0808	Gissaro-Alai Open Woodlands (minor occurrence in Afghanistan)	Critical/Endangered
Montane Grasslands and Shrublands			
	PA1006	Karakoram-West Tibetan Plateau Alpine Steppe	Vulnerable
	PA 1014	Pamir Alpine Desert And Tundra	Vulnerable
	PA 1005	Hindu Kush Alpine Meadow	Vulnerable
	PA 1004	Ghorat-Hazarajat Alpine Meadow	Vulnerable
	PA 1012	Northwestern Himalayan Alpine Shrub and Meadows (minor occurrence in Afghanistan)	Relatively Stable/ Intact
	PA 1018	Sulaiman Range Alpine Meadows (minor occurrence in Afghanistan)	Stable/Intact
Deserts and Xeric Shrublands			
	PA1307	Baluchistan Xeric Woodlands	Critical/Endangered
	PA 1309	Central Afghan Mountains Xeric Woodlands	Critical/Endangered
	PA 1301	Afghan Mountains Semi-Desert	Critical/Endangered
	PA 1306	Badkhiz-Karabil Semi-Desert	Critical/Endangered
	PA 1313	Central Persian Desert Basins	Vulnerable
	PA 1326	Registan-North Pakistan Sandy Desert	Vulnerable
	PA 1322	Paropamisus Xeric Woodlands	Vulnerable

## 7 Afghanistan's Land Cover

Afghanistan has been subjected to impacts by people and their livestock for thousands of years. There are no parts of the country, apart from high alpine areas, that have not been affected. An understanding of so-called "natural" ecological conditions (i.e. prior to major modification by humans) is useful as a benchmark indicating the potential of the land.

Freitag (1972) suggests that much of Afghanistan would be dominated by oak woodlands if the summer dry period was only 3 – 4 months long, rather than the current 5 – 7 months. It is interesting to speculate whether human activity over the past several thousand years may have had an impact on the Afghan climate. Reducing vegetative cover over large regions through overgrazing, shrub collection and forest destruction increases the proportion of sunlight that is reflected back into the sky — the albedo. Some researchers suggest that a mechanism termed the "Charney effect" can result in a feedback loop in which increased albedo augments the quantity of short- and long-wave radiation escaping back to space, thereby lowering the ground surface temperature and cloud-convective activity, cooling the atmosphere, and facilitating a process called "Hadley Cell subsidence" (Anonymous, 1997), typically characterizing the atmosphere above the subtropical deserts. In essence, removal of vegetation over an entire region might change

the patterns of air flow and the moisture retention capacity of the air, resulting in drier climates. It is highly speculative, but perhaps Afghanistan enjoyed a somewhat moister climate prior to widespread habitat alteration. A search of the World Data Centre for Paleoclimatology website (<http://www.ncdc.noaa.gov/paleo/ftp-search.html>) indicate that there have been no studies on the past climate of Afghanistan except for lake levels in the Sistan and at Kandahar.

There are several land cover classifications of Afghanistan, all of which provide slightly different results depending upon the methodology and date of analysis. The following classification by the Earthtrends (2003) uses the Global Land Cover Classification (GLCC) results. GLCC data is derived primarily from the Advanced Very High Resolution Radiometer (AVHRR), with a resolution of 1 x 1 km. Consequently, the resolution is fairly coarse and small habitat fragments are not detected.

Other land cover classifications are by the Afghanistan Information Management Services (AIMS) (nd), UNOSAT (nd), and Earth Observatory (nd). They all show the largest expanses of dense vegetation in the country to be the forests along the Kunar-Nuristan border. Otherwise, dense vegetation is largely limited to watercourses and irrigated croplands. Large expanses of moderate density vegetation are found throughout the central and northern Hindu Kush. Otherwise, the country is very sparsely vegetated.

<b>Forest</b>	Defined as canopy cover >60% and height > 2 m.	0%
<b>Shrubland, savannah and grassland</b>	Defined as lands dominated by woody vegetation less than 2 metres tall and with shrub canopy cover greater than 10%.	73%
<b>Cropland and crop/natural mosaics</b>	Croplands are defined as lands covered with temporary crops followed by harvest and a bare soil period (e.g., single and multiple cropping systems). Cropland/natural vegetation mosaics are lands with a mosaic of croplands, forests, shrublands, and grasslands in which no one component comprises more than 60% of the landscape.	11%
<b>Urban</b>	Defined as buildings and other man-made structures. This class was developed from the Digital Chart of the World's "populated places layer" (Defence Mapping Agency, 1992).	0.1%
<b>Sparse or barren vegetation, snow and ice</b>	Defined as exposed soil, sand, rocks, or snow with never more than 10% vegetative cover during any time of the year. Snow and ice covered areas are lands under snow and/or ice cover throughout the year.	15%
<b>Wetlands and waterbodies</b>	Defined as lands with a permanent mixture of water and herbaceous or woody vegetation that cover extensive areas.	0%

## 8 Afghanistan's Eco-regions

The most complete vegetation classification for Afghanistan is that of Freitag (1971, 1972) in Figure 3. Following is an attempt to place Freitag's vegetative community types into the context of the Olson et al's (2003) eco-regions with additional information for Sayer and Van der Zon (1981).

### 8.1 Closed Forest Vegetation

Closed forests of oak and conifers were probably always limited to the eastern part of the country where the westernmost extension of the Indian monsoon breaks the summer drought that limits plant life throughout most of the country. Examination of the potential vegetation maps of Freitag (1971, 1972) suggests that closed forests (not including northern juniper communities) may once have covered about 5% of the country<sup>2</sup>, or about 34,000 km<sup>2</sup>. Sayer and Van der Zon (1981) estimated that there was 3,600 km<sup>2</sup> of closed canopy forest (i.e. Coniferous, *Quercus* and *Olea-Reptonia*) remaining in the late 1970s. If the

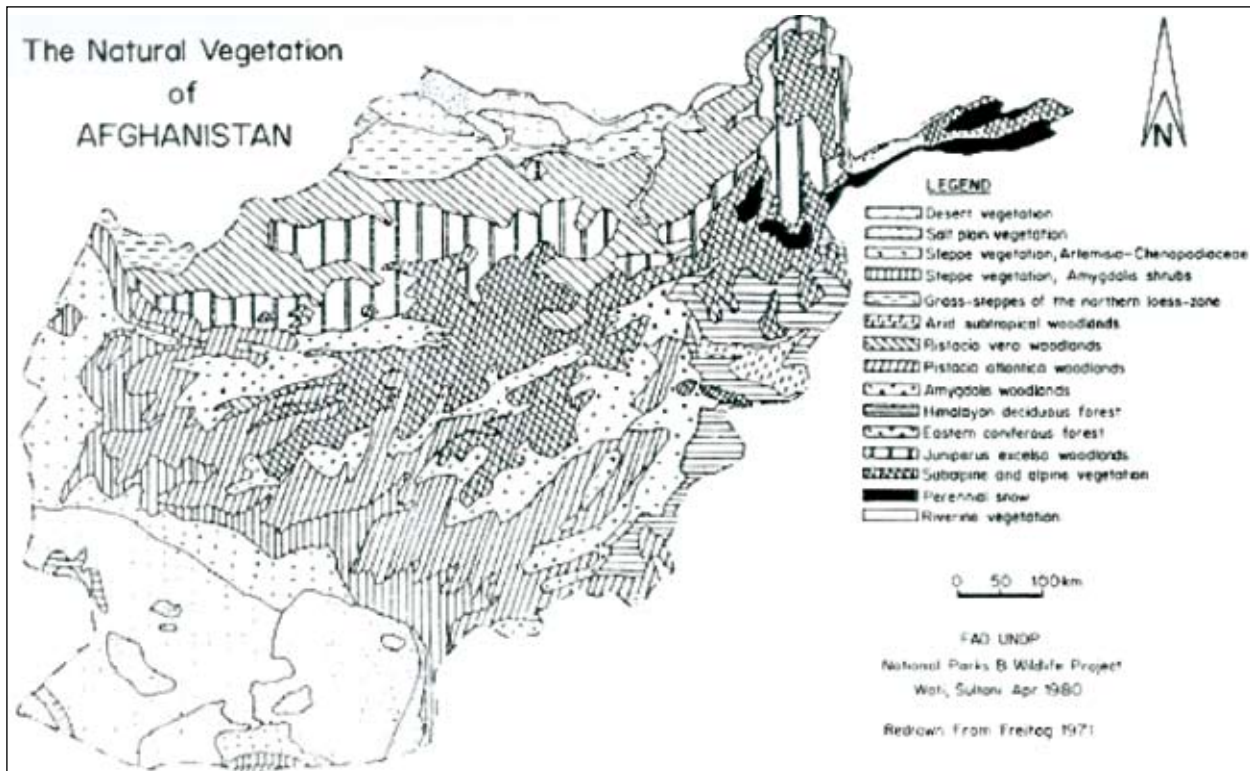
<sup>2</sup> Based on proportion of points on a regular grid of 344 points laid over Freitag's 1972 vegetation map.

estimates of UNEP's (2003a) satellite image analysis can be extrapolated, half of that has been lost since 1980 leaving some 1,800 km<sup>2</sup>. Based on these assumptions, Afghanistan is currently left with roughly 5% of its pristine closed forest vegetation, representing about 0.25% of the country's area. Forests that have been cut do not regenerate, largely because of livestock grazing pressure and high soil temperatures and therefore they revert to shrubland.

#### 8.1.1 East Afghan Montane Conifer Forests (PA0506)

The *East Afghan Montane Conifer Forest* eco-region (PA0506) corresponds to the majority of Freitag's *Immergrüne Nadelwalder und Offenwälder* (1971) or *Evergreen Coniferous Forest and Woodlands* (1972). Sayer and Van der Zon (1981) term the community *Temperate Coniferous Forests*. These forests are found in the areas of eastern Afghanistan receiving summer monsoon rains and are dominated by *Quercus* (oak), *Pinus* (pine), *Cedrus* (cedar), *Picea* (spruce) and *Abies* (fir). *East Afghan Montane Conifer Forests* are found primarily in Nuristan, Kunar and Nangahar, Paktya, Khost and Paktika Provinces. Precipitation

Figure 3 Freitag's (1972) Classification of the Potential Vegetation of Afghanistan Prior to Alteration by Human Activity. Redrawn by Sayer and Van der Zon (1981)





Although increasingly under threat from illegal logging, large tracts of natural conifer forest can still be found in the inaccessible Nuristan Province, Eastern Afghanistan

is higher here than elsewhere in Afghanistan, is more evenly distributed throughout the year, and is less erratic between years.

Between 2,100 and 2,500 m elevation, *Quercus baloot* grades into *Pinus gerardiana* (Chilgoza pine) stands. In natural forests, shrubs are a minor component of this community, but develop quickly when trees are cut. Between 2,500 and 3,100 m, *Cedrus deodara* (Deodar cedar) begins to dominate. This is the most economically important forest type in Afghanistan with trees 6 – 35 m in height and a ground cover of up to 80%. In very moist areas (>800 mm), *Picea smithiana* (Himalayan spruce) and *Abies webbiana* (Himalayan fir) dominate up to 2,900 – 3,000 m. The trees are 15 – 30 m tall and create a dense, closed forest. In drier areas, *Juniperus* species are evident.

*East Afghan Montane Conifer Forests* are currently being illegally harvested at a rapid rate. Analyses by UNEP (2003a) show that between 1977 and 2002 52% of the existing forest was lost in three

provinces. Nangarhar was the most affected, with a 71% decrease in forest cover. Nuristan lost 53% and Kunar 29%. Similar losses for the other Paktya, Khost and Paktika were predicted. Deodar cedar is the primary species harvested.

### 8.1.2 Baluchistan Xeric Woodlands (PA1307)

Freitag (1972) terms this type the Evergreen *Sclerophyllous Forests and Woodlands* community (sclerophyllous: small, leathery leaves). Sayer and Van der Zon (1981) refer to it as *Himalayan Deciduous Forest*. The eco-region is located along the Pakistan border in Laghman, Nuristan, Kunar, Khost and Paktika Provinces. It is well represented in neighbouring Pakistan. Freitag (1972) suggests that much of Afghanistan would be dominated by this forest type if the summer dry period lasted for 3 – 4 months rather than 5 – 7 months. In eastern Afghanistan, the summer monsoon rains break the long summer dry period just long enough to allow these forests to develop. Petocz and Larsson (1977)

provide a detailed summary of the *Baluchistan Xeric Woodland* vegetation in central Nuristan.

At lower elevations (800 – 1,300 m), a *Reptonia buxifolia* (Gurgura) community develops. Numerous small tree species cover 30 – 75 % of the ground. *Quercus baloot* (Holly Oak) dominates at elevations between 1,200 and 2,000 m. Depending upon local rainfall levels, *Q. baloot* stands can be scattered trees 3 – 6 m tall or pure stands of trees over 15 m in height. In areas with heavy summer rainfall, the *Q. baloot* community is replaced by a *Quercus dilatata* at 1,900 – 2,000 m and *Quercus semecarpifolia* becomes dominant at 2,400 – 2,900 m. Both species of *Quercus* form rich forests 8 – 20 m in height.

## 8.2 Open Woodland Vegetation

Open forests have a naturally low density of trees, creating a savannah-like landscape. Open forests originally formed a wide crescent around the north, west and south flanks of the Hindu Kush. Sayer and Van der Zon (1981) present information from archaeological sites indicating, between 2,000 – 3,000 years ago, a much greater diversity of trees and other woody plants than is present in current open woodlands. Very roughly, open woodlands originally comprised some 38% (ca. 250,000 km<sup>2</sup>) of the Afghan landscape (calculated as the 48% cited by Earthtrends (2003) less 10% closed forests). In the late 1970s, approximately 32,000 km<sup>2</sup> remained, representing about 13% of the original open woodland and 5% of the Afghan landscape. UNEP's (2003a) satellite image analysis could detect no remaining open woodland in two provinces, suggesting that open woodlands are now on the verge of extinction as a viable ecosystem throughout much of Afghanistan.

### 8.2.1 Central Afghan Mountains Xeric Woodlands (PA1309)

This eco-region is comprised of two of Freitag's (1971 and 1972) community types and forms a broad, crescent shaped belt surrounding the eastern and southern sides of the central mountains. *Pistacia atlantica* (Mount Atlas pistache) communities are found at an altitude of 1,150 – 1,800 m where precipitation amounts to 250 – 400 mm. *Pistacia atlantica* trees grow to four to six meters in height

and under natural conditions cover 15 – 20% of the ground. At altitudes of 2,000 – 2,800 m, where 300 – 350 mm of precipitation falls, *Amygdalus* (almond) communities form the transition between *Pistacia atlantica* communities and subalpine vegetation.

### 8.2.2 Paropamisus Xeric Woodlands (PA1322)

On the north side of the central mountains, increasing altitude and greater precipitation (250 – 300 mm) allows open, xeric woodlands to replace the semi-desert shrublands. These woodlands are characterized by scattered trees, relatively low shrub density and a significant amount of herbaceous cover. This eco-region includes Freitag's *Pistacia vera* and northern *Juniperus* communities.

*Pistacia vera* communities occur in a band along the northern mountains at altitudes of 600 – 1,500 m. *Pistacia vera* (Pistachio) and *Amygdalus bucharica* (Bukhara almond) trees originally covered as much as 40% of the ground. Shrubs are generally poorly represented and meadow-like ground cover occurs. UNEP (2003a) undertook a satellite image analysis of *Pistacia vera* communities. In 1977, woodlands comprised of 40 – 100 trees per ha were found over 55% of the land in Badghis Province and 37% of Takhar Province. In 2002, no woodlands were detected in either province, indicating that tree density had declined below 40 trees per ha. UNEP (2003a) reports that most of the trees were cut for fuel and also in order to reduce hiding and ambush cover during the years of war. UNEP (2003a) found no regeneration of pistachio trees as a result of seedling destruction by grazing animals and intensive collection of pistachio nuts for sale by local residents.

Above the *Pistacia vera* communities at elevations of 1,500 – 3,200 m is a band of *Juniperus* communities. UNEP (2003a) reported that at least 50% of juniper woodlands in Herat Province have been lost in the last 30 years and as much as 80% in Badghis Province.

## 8.3 Semi-Desert Vegetation

Semi-deserts are characterized by precipitation below 250 – 300 mm. Generally, ground cover is less than 25% and trees are absent. Semi-deserts

occur primarily in a broad arc around the Hindu Kush at lower elevations than open woodlands.

### 8.3.1 Afghan Mountains Semi-Desert (PA1301)

This eco-region is comprised of small, dry interior valleys of the northern Hindu Kush. The eco-region corresponds to the northern portion of Freitag's *Amygdalus Semi-Desert* community type. Under Freitag's scheme, the *Amygdalus Semi-Desert* extends in a narrow band around the western and southern Hindu Kush and forms a transition between the extreme semi-desert of the *Badkhis-Karabil* eco-region and the open woodland of the *Central Afghan Mountains Xeric Woodlands*. The eco-region is characterized by various thorny shrubs 0.5 – 1.5 m in height and covering 10% of the ground surface.

### 8.3.2 Badkhis (Badghis)-Karabil Semi-Desert (PA1306)

This eco-region is a composite of several of Freitag's (1971- 1972) semi-desert communities lying between the Amu Darya River and *Parapomilus Xeric Woodlands*.

A *Calligonum-Aristida* community occurs as a thin band along the Amu Darya River where there are mobile sand dunes and precipitation is < 150

mm. Vegetation covers 1 – 25% of the land. The *Calligonum-Aristida* community is bounded on the south by a *Chenopodium Rich* community and an *Ephemeral Semi-Desert* community on loess soil. The *Ephemeral Semi-Desert* is characterized by lush, shallow-rooted herbaceous vegetation early in the year, but by the middle of May the vegetation dries up and dies. Very few woody plants occur.

### 8.3.3 Central Persian Desert Basins (PA1313)

This eco-region lies in the extreme north-western corner of the country and corresponds to the majority of Freitag's (1971) *Chenopodium Rich* community complex. The family Chenopodiaceae is comprised most of xerophytic (dry-loving) and halophytic (salt-loving) shrubs and herbs. This community develops in areas with <150 mm of precipitation and on non-sandy, salt-laden soils.

### 8.3.4 Registan-North Pakistan Sandy Desert (PA1326)

The eco-region covers the large semi-desert region of southern Afghanistan including the Registan Desert and the Siestan Basin. It combines all of Freitag's (1971, 1972) semi-desert communities in the south-western part of the country. This includes the *Haloxylon salicornicum Semi-desert*,



Dasht-e-Nawar Flamingo and Waterfowl Sanctuary is not legally protected by the Afghan Government and the insecurity that characterizes the area limits the realization of practical conservation measures



Alpine landscape in the Wakhan Corridor, Badakhshan Province, Northern Afghanistan. The Wakhan Corridor is the site of two proposed protected areas and a possible international “Peace Park” that encompasses neighboring areas of China, Tajikistan and Pakistan

*Calliginum-Artistida Semi-Desert*, *Chenopodium Rich* and *Amygdalus Semi-Desert* communities.

## 8.4 Subalpine and Alpine Vegetation

Alpine and subalpine vegetation develops at elevations of 2,800 – 2,900 m in the central mountains and between 3,000 and 3,500 m in the east. In the eastern Hindu Kush, subalpine vegetation is dominated by juniper while in central Afghanistan it is largely comprised of cushion shrublands. True alpine vegetation is generally found at elevations > 4,000 m. The central Hindu Kush is not as species-rich as alpine areas further to the east and north.

### 8.4.1 Karakoram-West Tibetan Plateau Alpine Steppe (PA1006)

This eco-region is represented in Afghanistan only on the south side of the Wakhan Corridor and is the westernmost extension of an extensive eco-region in the Himalayas and Karakorum Mountains to the east. Freitag (1971, 1972) labels this eco-region as a nival (snow-covered) zone and does not describe the vegetation.

### 8.4.2 Pamir Alpine Desert And Tundra (PA1014)

This eco-region is represented in Afghanistan only on the north side of the Wakhan corridor and is the southern extension of the extensive eco-

region through the Pamir Mountains. Freitag (1971, 1972) labels this eco-region as a combination of the *Subalpine Thickets and Cushion Shrublands* community and a nival zone.

### 8.4.3 Hindu Kush Alpine Meadow (PA1005)

This eco-region corresponds to the eastern and northern extension of Freitag’s *Subalpine Knieholz-Gesellschaften und Dornpolster-Fluren* (1971) or *Subalpine Thickets and Cushion Shrublands* (1972). Unlike the remainder of the Hindu Kush subalpine, this area receives enough precipitation to allow development of subalpine thickets of juniper at 3,000 m.

### 8.4.4 Ghorat-Hazarajat Alpine Meadow (PA1004)

This eco-region corresponds to the western extension of Freitag’s *Subalpine Knieholz-Gesellschaften und Dornpolster-Fluren* (1971) or *Subalpine Thickets and Cushion Shrublands* (1972). Lack of summer moisture limits vegetation to woody cushion shrubland species, such as *Ononbrychis*, *Astragalus*, *Acantholimon*, *Cousinia*, *Artemisia* and *Ephedrus*. Dieterle (1973, in Larsson 1978) considers the original vegetation to have been grass steppe, but centuries of heavy grazing have resulted in a shrubland community. Larsson (1978) provides a general overview of vegetation and management issues in this eco-region.



## 9 Eco-region Status

Ecosystems can be characterized by three primary attributes: composition, structure and function. Ecosystem composition relates primarily to the species that are present in an ecosystem and their population sizes. Ecosystem structure relates to the spatial arrangement of species on the ground. Vertical structure refers primarily to the growth form of the dominant plants (e.g., trees, shrubs, grass) while two-dimensional structure refers to the recurring spatial patterns. Ecosystem function relates primarily to how an ecosystem transfers energy and materials and addresses issues such as hydrological control, pollution and productivity.

There is little current information allowing an objective and accurate determination of how Afghanistan's ecosystems are faring with respect to composition, structure and function. However, it is possible to assess subjectively and roughly how each of the WWF eco-regions rank in each category. Table 6 ranks ecosystem attributes subjectively for the 11 eco-regions that are extensively represented in Afghanistan. The assessment refers to the entire eco-region and does not address localized effects, for example, along rivers or near settlements.

A number of patterns are evident in this table:

- The species composition of all eco-regions has been significantly reduced through a combination of overgrazing, fuel collection and exploitation by large herbivorous animals. Open woodland types have probably been most affected, over millennia of habitat alteration. The species composition of alpine regions has probably been least affected.
- Ecosystem structure has been most affected in forest and open woodland types as a result of tree cutting. To a lesser extent, the structure of semi-deserts has been affected by shrub collection and cutting of *Pistacia* trees. Deserts have little structure to begin with and are therefore not significantly affected.
- Ecosystem function is very difficult to assess, but it appears that highly altered forests have been most affected and deserts the least affected. The effects of accelerated loss of monsoon influenced forest on ecosystem function is not known, but expected to be significant.

Table 6 Subjective Classification of Human Impact on Composition, Structure and Function of WWF-US Eco-regions in Afghanistan

IMPACTS ON ATTRIBUTES OF AFGHAN ECO-REGIONS			
	Composition	Structure	Function
Forests			
East Afghan Montane Conifer Forests	High	High	Medium
Baluchistan Xeric Woodlands	Very High	Very High	High
Open Woodlands			
Central Afghan Mountains Xeric Woodlands	High	Very High	High
Paropamisus Xeric Woodlands	High	Very High	Medium
Semi-Desert			
Afghan Mountains Semi-Desert	Medium	High	Medium
Badkhiz(Badhgis)-Karabil Semi-Desert	High	High	High
Central Persian Desert Basins	High	Medium	Low
Registan-North Pakistan Sandy Desert	High	High	High
Montane Grasslands and Shrublands			
Pamir Alpine Desert And Tundra	Medium	Medium	High
Hindu Kush Alpine Meadow	High	Medium	Medium
Ghorat-Hazarajat Alpine Meadow	Medium	Medium	Medium

## 10 Afghanistan's Wetlands

Afghanistan is an arid country and the few wetlands that do exist are therefore of great significance to biodiversity. Wetlands provide habitat for many migrating water birds. They are also teeming with numerous species of aquatic plants and invertebrates, fish, and amphibians. Artificial lakes are generally not as ecologically

valuable as natural lakes because of fluctuating water levels and because natural plant and animal assemblages have not had time to develop. Nevertheless, they can provide important habitat for some species. Table 7 lists the Afghan wetlands that are known or suspected to be important for biodiversity. Examination of a map of Afghanistan suggests that there are other wetlands that could be investigated for ecological significance.

Table 7 List of Afghan wetlands known or expected to be biologically significant

Wetland Name	Wetland Type	Location	Province	Source
Hamun-i-Puzak	Natural lake and marsh	31° 29' 44"N; 61° 42' 55"E	Nimroz	Sayer and Van der Zon (1981), Scott 1995
Hamun-i-Saburi	Natural lake and marsh	31° 31' 24"N; 61° 17' 23"E	Farah	K. Habibi (pers. com. 2006)
Arghandab Reservoir	Artificial lake	31° 51' 21" N, 65° 53' 45' E	Kandahar	Sayer and Van der Zon (1981)
Kajaki Reservoir	Artificial lake	32° 19' 59" N, 65° 11' 07' E	Helmand	Sayer and Van der Zon (1981)
Ab-i-Estada	Natural saline lake	32° 28' 53" N, 67° 54' 36' E	Ghazni	Sayer and Van der Zon (1981); Scott 1995
Dashti-Nawar	Seasonal saline lake	33° 38' 00"N; 67° 43'05"E	Ghazni	Sayer and Van der Zon (1981); Scott 1995
Sardeh Reservoir	Artificial lake	33° 29' 37"N; 68° 28' 22' E	Ghazni	Sayer and Van der Zon (1981)
Qargha Lake	Artificial lake	34° 33' 18"N; 69° 01' 59' E	Kabul	Sayer and Van der Zon (1981)
Kol-i-Hashmat Khan	Natural lake and reed swamp	34° 29' 29"N; 69° 12' 13' E	Kabul	Sayer and Van der Zon (1981); Scott 1995
Darunta Lake	Artificial lake	34° 29' 31"N; 70° 21' 34' E	Nagarhar	Sayer and Van der Zon (1981); Scott 1995
Sarobi Lake	Artificial lake	34° 23' 55"N; 69° 41' 33' E	Kapisa	Sayer and Van der Zon (1981); Scott 1995
Darqad	Swamp woodlands on Amu Darya	37° 26' 39"N; 69° 32'E	Takhar	Sayer and Van der Zon (1981); Scott 1995
Imam Sahib	Swamp woodlands on Amu Darya	37° 12' 22"N ; 68° 44' 46"E	Kunduz	Sayer and Van der Zon (1981); Scott 1995
Band-i-Amir	Six natural lakes	34° 52' 40"N; 67° 16' 51"E	Bamiyan	Sayer and Van der Zon (1981); Scott 1995
Dagh-i-Tondi	Intermittent lake	Dagh-i-Tondi at 32°27'41"N; 60° 56'49"E	Farah	K. Habibi (pers. comm.)
Kowl-i-Namaksar	Salt lake	34°04'11"N; 60° 39'56"E	Herat	K. Habibi (pers. comm.)
Gawd-i-Zereh	Seasonal lake	29°43'44"N; 61° 42'41"E	Nimroz	K. Habibi (pers. comm.)
Zor Kol	High mountain lake	37°25'54"N; 73° 43'04"E	Badakhshan	Scott (1995)
Chaqmaqtin	High Mountain lake	37°13'48"N; 74° 10'29"E	Badakhshan	Scott (1995)
Ay Khanum	River, Marshy reedbeds, small ponds, and grassy meadows	37°12'17"N; 69° 26'35"E	Darqad	Khan (2005)
Weghnon	High mountain lake	36°01'45"N; 74° 00'45"E	Takhar	Khan (2005)

## 11 Afghanistan's Riparian Areas

*Tugai* is a special type of riparian forest found in the floodplains and valleys of Central Asian deserts. It is characterized by poplar and willow trees and shrubs of various genera such as tamarisk (*Tamarix*), oleaster (*Elaeagnus*), and sea buckthorn (*Hippophae*), along with a patchwork of tall reedgrass (*Phragmites australis*) and grassland clearings. Tugai ecosystems are critical to many species and are increasingly threatened by conversion to agriculture along the Amu Darya (Ahmad Khan, pers. comm., 2006). There is little information about the original and current extent of tugai forest in Afghanistan.



© WILDLIFE CONSERVATION SOCIETY

The Argali or Marco Polo sheep (*Ovis ammon poli*) inhabits the mountain areas of central Asia above 1,000m. The Argali is a vulnerable species (IUCN 2000) threatened by hunters for their highly prized horns and habitat loss from the grazing of domestic sheep

## 12 Afghanistan's Species

Afghanistan is not a global biodiversity "hotspot". Groombridge and Jenkins (1994) calculated a comparative index of biodiversity for all countries over 5,000 km<sup>2</sup> based on the number of mammals, birds, reptiles, amphibians, vascular plants and endemic species. The index is scaled, to account for the different sizes of countries. A score of 0 is the median with half the countries having a higher biodiversity index and half a lower one. Afghanistan's index is -0.296 indicating that its biodiversity index is somewhat lower than the median. Indices of neighbouring Pakistan (-0.121) and Iran (-0.194) are somewhat higher, but still below the median. Indices for Turkmenistan (-0.572), Tajikistan (-0.536), Uzbekistan (-0.413), and Kazakhstan (-0.581) are all lower than Afghanistan's. Globally, the countries with the highest scores are Indonesia (+1.844) and Mexico (+1.621). The areas with the lowest scores are Antarctica (-3.261) and Greenland (-2.821). Much of Afghanistan's relatively low score results from the lack of endemics.

A number of factors influence species richness and number of endemic species in Afghanistan:

1. More species are found at the equator and the number tends to decrease towards the poles. Afghanistan lies at mid-latitudes (i.e. 30° – 38° North) and is therefore predisposed to having a biota not as rich as tropical countries or as poor as more northerly ones.
2. Afghanistan's mountains result in numerous habitat types. Temperature and precipitation change dramatically with elevation differences, resulting in a variety of habitats and differing suites of species adapted to them.
3. Afghanistan's mountains also act as a barrier to precipitation, resulting in higher moisture in the eastern part of the country, considerable snow at higher elevations, and a rain shadow to the north and west. The result is a variety of species adapted to the entire gamut of moisture regimes, ranging from desert to monsoon forest.
4. Afghanistan is on the boundary of Palaearctic

and Indo-Malayan Realms. Although the majority of species are Palearctic in origin, many Indo-Malayan species have dispersed into Afghanistan.

5. The size of a country influences the number of species found in its borders. Thus neighbouring Iran, which is nearly twice as large as Afghanistan, will tend to have more species.
6. The number of species in an ecosystem tends to be greatest at moderate levels of productivity, with fewer species in areas of very high or very low productivity. Afghanistan is a dry, high altitude and human disturbed country with low primary productivity. Consequently, Afghanistan is predisposed to having relatively few species.
7. Afghanistan is a continental country with no major mountain barriers to the north and west, allowing the free mixing of species of Palearctic origin with neighbouring countries. Consequently, Afghanistan has relatively few endemic animal species.
8. Afghanistan is a land-locked country and therefore lacks marine biodiversity.

A number of databases list the number of Afghan species, but they differ from one another and are usually not explicit on their data sources. Appendices 1 - 8 are checklists of Afghan mammals, birds, reptiles, amphibians, insects, lichens and fungi, incorporating the latest available information and taxonomy. The vertebrate checklists are very

conservative in that they include only species for which there are citable references for occurrence in Afghanistan. Many other species are suspected to occur in Afghanistan, but no authority citing first-hand evidence could be found. Table 7 is a summary of these checklists. It suggests that there are 789 - 916 species of vertebrates in Afghanistan and 3,500 – 4,000 species of vascular plants.

## 12.1 Mammals

The definitive work on Afghan mammals is Habibi's *Mammals of Afghanistan* (2003), also available in Dari. Habibi notes that knowledge of Afghanistan's mammal fauna is quite limited, having resulted largely from a series of zoological expeditions and by the Food and Agriculture Organisation of the United Nations (FAO). Little work has been done since the outbreak of war in 1978.

Appendix 1 is a complete listing of known mammalian species in Afghanistan. Considerable revision of mammalian nomenclature has occurred in recent years, particularly for bats and rodents. The standardized order of listing families is based on Dunn and Lawson (2004). A total of 137 species are known to occur in Afghanistan with another 13 species having uncertain status. There are no mammal species known to be endemic to Afghanistan.

Sixteen of Afghanistan's mammal species are listed on the IUCN Red List as being globally at threat. Most of these species are carnivores and artiodactyls. Twelve Afghan mammal species are on CITES Appendix I, and 13 are on Appendix II. Many more Afghan species are threatened at the national scale, but no formal process has assessed the status of Afghan species. Two species (the cheetah and tiger) are known to be extirpated in Afghanistan, but a detailed assessment would probably extend this list. Appendix 1 includes Habibi's (2003) subjective assessment of national scale risk status as well as CITES and IUCN Red List status.

Habibi (2003) provides distribution maps and collection localities for each species. It is evident, though, that the distribution maps are based on very few collection or observation sites. As well, the only data are now decades old and Habibi's distribution maps are best considered as "potential" or "historical" ranges. The expectation

Table 8 Number of Species Known to Exist in Afghanistan

	Known Species	Uncertain Species	Estimates
Mammals	137	13	
Birds	428	87	
Reptiles	92	20	
Amphibians	6	2	
Fish	101	38	
Insects			10s of 1,000s
Vascular Plants			3,500 – 4,000
Lichens	208	?	
Fungi			1,000s

is that current ranges have been much reduced for many species. Carnivores and large herbivores have been the species most affected.

## 12.2 Birds

Afghanistan has a rich avian diversity, largely as a result of the combination of many Indo-Malayan species in the eastern part of the country and the predominantly Palaearctic avifauna over the remainder of the country (Evans 1994). The list of Afghan species in Appendix 2 estimates the number of known Afghan bird species at 428, with another 87 classed as uncertain. The majority of the 87 species listed as uncertain may in future be demonstrated to occur in Afghanistan. This list is dependent on the taxonomic authorities cited. Dickinson (2004) was the authority cited here. Evans (1994) suggests that as many as 235 species may breed in Afghanistan.

Most of the data on Afghan birds is more than 30 years old and probably does not reflect the current situation. Rasmussen and Anderton (2005, Vol. 2 p. 627) review the history of Afghan ornithological research. Habibi (nd) reviewed the pre-war literature and produced a list of over 450 species based on published observations.

Five species are on the IUCN Red List as globally Critically Endangered, two are listed as Endangered and 14 as Vulnerable. Nine Afghan bird species are listed on CITES Appendix I and 55 on Appendix II. There has been no examination of risk status at the national level. The last reliable sighting in Afghanistan of the Critically Endangered Siberian Crane (*Grus leucogeranus*) was one shot in 2000 by a hunter in the Shurtepa District of Balkh Province near the Amu Darya River (Qais Agah of Save the Environment Afghanistan, pers. comm., April 2006). The subpopulation of Siberian Cranes that migrated through Afghanistan is now extinct.

There is only one bird species considered as endemic to Afghanistan, the Afghan Snowfinch (*Montifringilla (Pyrgilauda) theresae*), although a part of the population winters in Turkmenistan (Rasmussen and Anderton 2005). There are also six “near-endemics” (*Columba eversmanni*, *Phylloscopus neglectus*, *P. subviridis*, *Oenanthe picata* and *Passer moabiticus*) meaning that

Afghanistan represents a large proportion of their breeding range (Evans 1994). Of particular significance is the Yellow-eyed Pigeon (*Columba eversmanni*) which is listed as “Vulnerable” by IUCN. Afghanistan also likely supports significant numbers of breeding Lammergeiers (*Gypaetus barbatus*), Egyptian Vultures (*Neophron percnopterus*), Cinereous Vultures (*Aegypius monachus*) and other birds of prey (Evans 1994).

The entire Himalayan uplift region presents a formidable barrier to migrant small birds traveling between wintering grounds in the Indian subcontinent and breeding areas in central and northern Asia. Afghanistan is situated at the lower, western end of the Himalayan chain and therefore receives a large passerine migration (BirdLife International nd). Afghanistan also lies in the path of the Central Asian Flyway and receives migratory “waterbirds” breeding in Central and western Siberia.

Table 9 Important Bird Areas (IBAs) in Afghanistan Listed by Evans (1994)

Name	Area (ha)	Latitude and Longitude
Ab-i-Istada	27 000	32° 28' 53" N, 67° 54' 36' E
Band-i-Amir	41 000	34° 52' 40"N; 67° 16' 51"E
Darqad	20 000	37° 26' 39"N; 69° 32'E
Dasht-i-Nawar	70 000	33° 38' 00"N; 67° 43'05"E
Hamun-i-Puzak	35 000	31° 29' 44"N; 61° 42' 55"E
Hari Rud valley	35 000	34° 16' 15"N; 62° 25' 58"E
Imam Sahib	20 000	37° 12' 22"N ; 68° 44' 46"E
Jalalabad valley	25 000	34° 27' 00"N ; 70° 25' 12"E
Khost	150 000	33° 22' 12"N ; 70° 01' 12"E
Kol-i-Hashmat Khan	191	34° 29' 29"N; 69° 12' 13' E
North-western steppe	80 000	35° 10' 12"N; 62° 00' 00' E
Pamir-i-Buzurg	67 938	35° 10' 12"N; 73° 00' 00' E
Pech and Waygal valleys	120 000	35° 00' 00"N; 70° 49' 48' E
Registan Desert	3 000 000	30° 30' 00"N; 65° 00' 00' E
Safed Koh	20 0000	34° 00' 00"N; 69° 49' 48' E
Salang Kotal	2 000	35° 24' 00"N; 69° 07' 48' E
Small Pamir	200 000	37° 04' 48"N; 74° 19' 48' E



Storks captured by people for meat in Pol-e-Sayaad, Kapisa Province, Central Afghanistan

The few large Afghan wetlands (e.g. Ab-i-Istada, Dasht-i-Nawar, Hamun-i-Puzak, Hamun-i-Saberi) are critical migration stopover points. Water-dependent species may be seen along the banks of the rivers and in the flooded floodplains.

Using a consistent set of criteria, Evans (1994) has proposed 17 areas in Afghanistan as internationally Important Bird Areas (IBAs) (Table 9). Nine of these areas have been separately proposed as protected areas (See Section 16).

Other areas of major significance to Afghan birds, suggested by Khushal Habibi (pers. com. 2006), are the Konar River (35°00'00"N; 70°24'45"E), Hamun-i-Saberi (31° 31' 24"N; 61° 17' 23"E), Dagh-i-Tondi (32°27'41"N; 60° 56'49"E), Kol-i-Namaksar (34°04'11"N; 60° 39'56"E), Gawd-i-Zereh (29°43'44"N; 61° 42'41"E), and Zor Kol (37°25'54"N; 73° 43'04"E).

### 12.3 Reptiles

The authoritative work on Afghan reptiles is Leviton and Anderson (1970), who compiled and cited all known previous records of Afghan reptiles. They note (p. 164) that knowledge of the Afghan herptofauna is very incomplete with many species yet to be discovered, particularly in the Hindu Kush.

Appendix 3 lists the 92 reptile species currently known from Afghanistan. A further 20 species are considered as "Uncertain". One of these 112 species is a tortoise, 75 are lizards and 36 are snakes. Appendix 3 is based primarily on Leviton and Anderson's (1970) work with updated taxonomy, nomenclature and records from the EMBL Reptile Database (European Molecular Biology Laboratory 2006). The EMBL Reptile Database provides information on published authorities for each species.

Only one Afghan reptile species, the Afghan Tortoise (*Testudo horsfeldii*), is on the IUCN Red List as being globally at risk. Two species are listed by CITES as

Appendix I and nine are listed on Appendix II. It is unknown how many species are nationally at risk.

Based on the distributions provided by the EMBL database, there are four endemic Afghan reptiles. Two are glass lizards (*Asiocolotes levitoni* and *Cyrtopodion voraginosus*) and two are wall lizards (*Eremias afghanistanica* and *E. aria*).

## 12.4 Amphibians

Amphibians require water bodies and moderate temperature conditions. Considering that Afghanistan is characterized by high altitude and xeric conditions, it is unsurprising that the amphibian fauna of the country is scant.

AmphibiaWeb (Anonymous 2006a) lists eight species of amphibians found in Afghanistan (Appendix 4). Four are toads, three are frogs and one is a salamander. Two species (*Bufo latastii*, *Bufo oblongus*) are considered to be uncertain for Afghanistan. The Family Ranidae has undergone extensive revision recently and two of the three *Rana* species cited by Leviton and Anderson (1970) have been assigned to other genera.

The Afghan Mountain Salamander (*Batrachuperus mustersi*) is Afghanistan's only endemic amphibian. It exists in only one stream in the Paghman Mountains and is considered by IUCN to be "Critically Endangered". No Afghan amphibians are listed by CITES.

## 12.5 Fish

Appendix 5 is a checklist of the fish of Afghanistan based on Coad (1981) as updated by FishBase (Anonymous 2006b). The taxonomy and nomenclature have changed considerably since Coad's (1981) publication and remains in flux. The checklist contains 101 species of known Afghan fish species, with another 38 species suspected to occur in the country. The list is dominated by the Cyprinidae (minnows and carps-- 54% of species) and the Balitoridae (loaches-- 25% of species).

UNEP (2003a p. 26) states, without reference, that as many as eight fish species may be endemic to the Helmand River system. However, a search of FishBase suggests that only one species of fish (*Trypophysa*

*farwelli*) is known to be endemic to Afghanistan. Coad (1981) states that many species have been described as endemic to Afghanistan, particularly in the genera *Schizothorax* and *Nemacheilus* (= *Noemacheilus*), but that the taxonomy of these genera is so uncertain that these may prove synonymous with more widely distributed species.

According to Coad (1981) the fish fauna of Afghanistan is impoverished as a result of isolation and the high altitude of many drainages. The greatest fish diversity is found in the Kabul River where species are mostly derived from the Indus River and therefore are Indo-Malayan in origin. All of the *Cyprinidae* are found in the Kabul drainage except for the *Schizothorax*, *Schizocypris* and *Schizothoraichthys* which are found at higher elevations in both the Helmand and Kabul drainages (Coad 1981, Habibi 2002). The Kabul drainage also contains almost all the Bagrid and Silurid catfishes and all three of Afghanistan's snakehead species (Coad 1981).

The Amu Darya is the second most diverse watershed and is characterized by affinities with the Caspian Basin and by a largely Palaearctic fauna. The fish fauna of the upper Amu Darya is impoverished in relation to the lower reaches closer to the Aral Sea. Some species, such as the Turkestan catfish (*Glyptosternum reticulatum*,) are shared with the Kabul drainage. The native brown trout, *Salmo trutta*, locally known as *kalmahi*, is limited to the Amu Darya drainage on north slopes of the Hindu Kush (Habibi 2002).

The Helmand River Basin, despite being Afghanistan's largest watershed, is the least diverse of the three major drainages because it has not had an historical connection with the Kabul or Amu Darya Basins. The smaller Murgab and Hari Rud drainages have faunal similarities to the Amu Darya suggesting a former connection. The minor Indus-linked drainages (Chamkani-Kurram and Zhob-Gowmal show strong affinities to the Indus Basin fauna. Coad suggests that approximately equal numbers of Indo-Malayan and Palaearctic fish species occur in Afghanistan.

Mirza (1986) states that Palaearctic fish species are restricted to the areas north of the Hindu Kush and Koh-i-Baba ranges while the so-called "High Asian" genera are mainly distributed in the upper

reaches of almost all the main rivers. Fishes of South Asian origin predominate in the Indus drainage system while the West Asian forms are dominant in the south-western Afghanistan.

Afghanistan has a long history of introduced fish stocking. A rainbow trout hatchery was established in 1967 at Qargha Dam near Kabul. In the 1970s, it produced about 30,000 fingerlings which were stocked in Qargha Reservoir and the Panjshir, Bamiyan, Salang and Sarde Rivers. In the 1970s, another trout hatchery was located near Paghman west of Kabul. From 1987 – 1989, efforts were made by UNDP/FAO to rehabilitate the Qargha hatchery, but the venture was abandoned because of the deteriorating security situation (Petr 1999). Rainbow trout are considered by the IUCN Invasive Species Specialist Group as one of the “100 Worlds’ Worst Alien Invasive Species” (Lowe et. al. 2000). It is unknown how detrimental the release of rainbow trout has been to the stream ecosystems of Afghanistan.

## 12.6 Invertebrates

The vast majority of the world’s species are invertebrate animals, yet very little investigation has been made of Afghanistan’s invertebrate fauna and the information that is available has not been collated. It is likely that there are several tens of thousands of insect species in Afghanistan.

Butterflies are the most readily identifiable and best known of the insects. Appendix 6 is a checklist of 233 Afghan butterfly species in nine families compiled by Koçak and Kemal (2001). No collection records were provided, so it is not possible to assess the accuracy of this list.

Appendix 7 is a checklist of the mosquito species of Afghanistan taken from Ward (1972). This work was undertaken in the cause of malaria prevention.

Solem (1979) studied the mollusc specimens collected by the Street Expedition and from the archaeological site at Aq Kupruk Cave (Solem 1972). Of the 37 species collected by the two expeditions, Solem (1979) found 10 to be new to Afghanistan suggesting that “only the tip of Afghanistan molluscan diversity has been sampled”. His review concluded that there were 73 mollusc species known from Afghanistan in 1979.

Only one Afghan invertebrate, the butterfly *Parnassius autocrator* from the Pamirs, is on the IUCN Red List as being globally threatened. No Afghan invertebrates are listed by CITES. However, a website (<http://www.comch.ru/~sob/Papilionidae.html>) offers *P. autocrator* specimens for \$75 – 120. The Pamirs are especially attractive to butterfly hunters (<http://dinets.travel.ru/parnassius.htm>).

The number of invertebrate species endemic to Afghanistan is not known, but is likely to be substantial.

## 12.7 Plants

There is a large amount of information on the vascular plants of Afghanistan, but little attempt has been made to consolidate the information. The most comprehensive work is the *Flora Iranica* begun in 1963 and now comprised of 174 separate volumes dealing with individual plant families. Afghanistan is within the *Flora Iranica* region. The number of Afghan vascular plants is variously cited as between 3,500 (Groombridge 1992) and 4,000 (Groombridge and Jenkins 2002).

Afghanistan’s Hindu Kush is located in an area of high vascular plant diversity extending through the Pamirs and Tian Shan Ranges (Map 5.3 in Groombridge and Jenkins (2002)). However, plant diversity declines as one moves west through the Hindu Kush and its western extensions.



Natural vegetation in the Wakhan Corridor, Badakhshan Province





The more accessible conifer forests of Nuristan Province are increasingly being threatened by illegal logging. Timber is often illegally transported to Pakistan where it is sold to traders and on to carpentry workshops for secondary transformation

Liverworts are the most primitive true plants and consist of moss-like or ribbon-like leaves. They tend to grow in moist areas. Appendix 9 lists the 16 Afghan species noted by Frey (1977).

Only one plant species, *Ulmus wallichiana*, the Himalayan elm, is on the IUCN Red List. Eight plant species are listed on CITES Appendix II.

## 12.8 Lichens and Fungi

Fungi are plant-like organisms that lack chlorophyll and absorb food from their habitats. They do not require sunlight for their growth and can therefore live in dark places. Only three very preliminary

papers (see Appendix 12) were found treating the fungi of Afghanistan. There are probably thousands of Afghan fungi species.

Lichens are combinations of a fungus and an algae growing together in a symbiotic relationship. In Afghanistan, there are 208 known species of lichens (Appendix 10). *Xanthoria elegans* is the most common lichen in Afghanistan. *X. elegans* is an orange-red, nitrogen-loving lichen with a worldwide distribution and is often associated with bird and mammal urine. Other common lichens are *Lecanora muralis* and *Caloplaca biatorina*. Genera widespread elsewhere in the world, such as *Cladonia*, *Alectoria*, *Hypogymnia* and *Usnea*, do not appear to occur in Afghanistan (Steiner & Poelt 1986).

## 13 Afghanistan's Species at Risk

### 13.1 IUCN Red List of Threatened Species

Appendix 11 is a list of all Afghan species included on the 2006 IUCN Red List of Threatened Species (IUCN 2006) as *Extinct*, *Critically Endangered*, *Endangered*, or *Vulnerable*. Not included are species listed as *Data Deficient*, *Near Threatened* or *Least Concern*. In total, 39 species and eight subspecies are listed as being globally threatened. Sixteen of the listed species are mammals and 19 are birds. All listed subspecies are mammals. One Afghan taxon (i.e. species or subspecies) is considered globally Extinct (the Caspian tiger), seven are Critically Endangered, eight are Endangered, and 31 are Vulnerable.

The 2001 Categories and Criteria (ver 3.1) provide the following definitions of threat categories:

- **EXTINCT (EX):** A taxon is extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
- **CRITICALLY ENDANGERED (CR)** - A taxon is critically endangered when the best available evidence indicates that it meets any of the criteria A to E for critically endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.
- **ENDANGERED (EN)** - A taxon is endangered when the best available evidence indicates that it meets any of the criteria A to E for endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.

- **VULNERABLE (VU)** - A taxon is vulnerable when the best available evidence indicates that it meets any of the criteria A to E for vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.

An assessment of the conservation status of Afghan species at the national scale has not yet been undertaken. Numerous species considered to be globally secure are certainly at risk within Afghanistan.

### 13.2 Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)

The Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES) is an international agreement between governments with an intention to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES lists wild species on a series of Appendices.

CITES Appendix I includes species threatened with extinction. International trade in specimens of CITES Appendix I species is permitted only under exceptional circumstances. An import permit issued by the State of import is required. This may be issued only if the specimen is not to be used for primarily commercial purposes and if the import will be for purposes that are not detrimental to the survival of the species.

CITES Appendix II includes species not necessarily threatened with extinction. However, international trade must be controlled in order to avoid utilization incompatible with the survival of Appendix II species. An export permit is required from the exporting State and may be issued only if the specimen was legally obtained and if the export will not be detrimental to the survival of the species.

Currently, there are 23 confirmed or unconfirmed Afghan species on CITES Appendix I and 88 species on Appendix 2. Appendix 12 is a list of Afghan species on CITES Appendices I and II.

## 14 Afghanistan's Endemic Species

Afghanistan is not geographically isolated from neighbouring countries and consequently has very few endemic species. Only seven vertebrate species are known to be endemic, or near endemic, to Afghanistan. Coad (1981) suggests that the taxonomy of Afghan fish is so uncertain that there may be many endemic fish species. The situation for plants is even less clear. Groombridge and Jenkins (2002) indicate 20% of Afghanistan's vascular plants as being endemic and Wendelbo (1966) cites 30%, but it is not known how these estimates were derived. Nothing is known about invertebrates endemic to the country.

Table 10 Species Known to be Endemic to Afghanistan

<b>Endemic Mammals</b>	
None	
<b>Endemic Birds</b>	
Afghan Snow Finch ( <i>Montifringilla [Pyrgilauda] theresae</i> )	
<b>Endemic Reptiles</b>	
Leviton's Gecko ( <i>Asiocolotes levitoni</i> )	
<i>Cyrtopodion voraginosus</i>	
<i>Eremias aria</i>	
Point-snouted Racerunner ( <i>Eremias afghanistanica</i> )	Uncertain in Afghanistan
<b>Endemic Amphibians</b>	
Paghman Mountain Salamander ( <i>Batrachuperus mustersi</i> )	
<b>Endemic Fish</b>	
<i>Triplophysa farwelli</i>	
<b>Endemic Invertebrates</b>	
Unknown	
<b>Endemic Plants</b>	
Estimated at 20 - 30% of 3,500 - 4,000 species	

## 15 Afghanistan's Protected Areas

The IUCN recognizes six categories of protected areas:

- Category Ia: Strict nature reserve/wilderness protection area managed mainly for science or wilderness protection.
- Category Ib: Wilderness area: protected area managed mainly for wilderness protection.
- Category II: National park: protected area managed mainly for ecosystem protection and recreation.
- Category III: Natural monument: protected area managed mainly for conservation of specific natural features.
- Category IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention.
- Category V: Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation or recreation.
- Category VI: Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural resources.

The World Database of Protected Areas (UNEP-WCMC 2006) lists 15 protected areas in Afghanistan (Table 11). Seven were provided with some level of recognition by the Government of Afghanistan in the 1970s and are recognized by IUCN (one Category II national park and six Category IV wildlife or waterfowl reserves). However, none has ever been given full legal status or official or otherwise recognized boundaries. They are not managed as protected areas.

The World Database of Protected Areas lists two protected areas twice. The Ajar Valley and Ab-i-Estada are listed as a Wildlife Reserve and a Waterfowl Reserve (Category IV) respectively and are also listed as proposed national parks (Category II).

Daraqad, Imam Sahib, North-western Afghanistan and Registan Desert were all proposed as unspecified protected areas by Sayer and van der Zon (1981). No further efforts have been made to designate these as protected areas.

Two areas (Small Pamir and Waghjir Valley) have been proposed as protected areas by the Wildlife Conservation Society, but do not appear in the World Database of Protected Areas.

The World Database of Protected Areas also lists Zadran, Bamiyan National Heritage, and Khulm Landmark as protected areas based on a letter from Dr. Tahir Enayat in 1990. No justification was provided in the letter. Bamiyan and Khulm are likely of more cultural interest than environmental.

A description of 12 of the 15 protected areas contained in the World Database of Protected Areas is given below. The apparently cultural areas proposed by Enayat (1990) are not shown. Figure 4 (p.36) shows the location and approximate boundaries of proposed protected areas.

Table 11 UNEP-WCMC's World Database on Protected Areas Information on Afghanistan's Protected Areas

Name	Designation	IUCN CAT	Min Elev (m)	Max Elev (m)	Latitude	Longitude	Udvardy Province	Biome	Event	Area (ha)	Data Source
Band-i-Amir	National Park	II	2900	3832	34° 52' 40"N (34.878°)	67° 16' 51"E (67.281°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Designated 1 January 1973	41,000	
Ajar Valley	National Park		2000	3800	35° 21' 21"N (35.356°)	67° 19' 17"E (67.322°)	Hindu Kush Highlands (37)	Mixed mountain systems (12)	Proposed	40,000	
Ab-i-Estada	National Park		1900	2100	32° 28' 58"N (32.483°)	67° 56' 14"E (67.937°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Proposed	27,000	
Nursitan	National Park		4876	6293	36° 34' 43"N (32.483°)	70° 50' 16"E (70.838°)	Himalayan Highlands (38)	Mixed mountain systems (12)	Proposed		
Ab-i-Estada	Waterfowl Sanctuary	IV	1950	2100	32° 28' 58"N (32.483°)	67° 56' 14"E (67.937°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Designated 1 January 1977	27000	
Dasht-i-Nawar	Waterfowl Sanctuary	IV	3200	3210	33° 49' 48"N (33.830°)	67° 45' E (67.750°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Designated 20 December 1977	7500	
Hamun-i-Puzak	Waterfowl Sanctuary	IV	1620	1731	31° 29' 44"N (31.496°)	61° 42' 55"E (61.715°)	Iranian Desert (24)	Cold-winter deserts (08)	Designated 1 January 1973	35,000	
Kol-i-Hashmat Khan	Waterfowl Sanctuary	IV	1792	1974	34° 30' N (34.500°)	69° 11' 59"E (69.200°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Designated 1 January 1973	191	
Ajar Valley	Wildlife Reserve	IV	2000	3800	35° 21' 21"N (35.356°)	67° 19' 17"E (67.322°)	Hindu Kush Highlands (37)	Mixed mountain systems (12)	Designated 1 January 1978	40,000	

## 15.1 Band-i-Amir National Park

Band-i-Amir's six lakes of crystal-clear azure water, separated by travertine dams and surrounded by spectacular red cliffs, comprise one of the world's most uniquely beautiful natural landscapes. Band-i-Amir National Park is located in the western Hindu Kush in Bamiyan Province. It lies about 225 km north-northwest of Kabul and 55 km west of Bamiyan town. The Band-i-Amir lakes lie in an east-west trending valley at approximately 2,900 m elevation. From west to east, the lakes are Gholaman, Qambar, Haibat, Panir, Pudina and Zulfiqar. The travertine dams separating the

lakes form when gaseous carbon dioxide from calcium-rich spring water is driven out by bacterial or algal activity causing the dissolved calcite ( $\text{CaCO}_3$ ) to precipitate out, forming the mineral deposits. Because of the high calcium content of the water, the lakes are extraordinarily clear and blue. The lakes are bounded by sheer limestone cliffs topped by a high plateau.

The individual lakes differ markedly in character. Band-i-Gholaman is shallow, has extensive reedbeds and is commonly used by waterfowl. Band-i-Qambar is filled only seasonally and forms a large, wet marshy area. Band-i-Haibat has deep

Name	Designation	IUCN CAT	Min Elev (m)	Max Elev (m)	Latitude	Longitude	Udvardy Province	Biome	Event	Area (ha)	Data Source
Pamir-i-Buzurg	Wildlife Reserve	IV	3250	6103	37° 8' 3"N (37.134°)	73° 3' 3"E (73.051°)	Himalayan Highlands (38)	Mixed mountain systems (12)	Designated 1 January 1978	67,938	
Darqad (Takhar) Wildlife Managed Reserve	Other		2000	4000	37° 26' 39"N (37.444°)	69° 32'E (69.634°)	Pamir-Tian-Shan Highlands (36)	Mixed mountain systems (12)	Proposed		Sayer and von der Zon (1981)
Imam Sahib (Kunduz) Wildlife Managed Reserve	Other		1900	2095	37° 12' 22"N (37.206°)	68° 44' 46"E (68.746°)	Hindu Kush Highlands (37)	Mixed mountain systems (12)	Proposed		Sayer and von der Zon (1981)
Northwest Afghanistan Game Managed Reserve	Other		1200	2000	35° 9' 47"N (35.163°)	61° 52' 26"E (61.874°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Proposed		Sayer and von der Zon (1981)
Registan Desert Wildlife Managed Reserve	Other		800	1200	30° 30'N (30.500°)	65° 0'E (65.000°)	Iranian Desert (24)	Cold-winter deserts (08)	Proposed		
Zadran	National Reserve				33° 16' 45"N (33.279°)	69° 14' 5"E (69.235°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Proposed		Enayat (1990)
Bamiyan National Heritage	Protected Area				34° 49' 59"N (34.833°)	67° 49' 59"E (67.833°)	Anatolian-Iranian Desert (20)	Cold-winter deserts (08)	Proposed		Enayat (1990)
Khulm Landmark	Protected Area				36° 40' 8"N (36.669°)	67° 43' 7"E (67.719°)	Hindu Kush Highlands (37)	Mixed mountain systems (12)	Proposed		Enayat (1990)

Figure 4 Map of Afghanistan's Protected Areas



waters and a narrow, vertical-sided travertine dam on the eastern end. The dam on Band-i-Panir has a broad, smooth and undulating creamy-white surface. Band-i-Pudina is very small but surrounded by a labyrinth of small, interconnected potholes and dense vegetation. Band-i-Zulfiqar is large, deep and surrounded by steep cliffs virtually devoid of vegetation.

Band-i-Amir was declared as Afghanistan's first and only National Park on September 30, 1973, in response to a petition from the Afghan Tourist Organization. This declaration was not published in the official government Gazette by the Ministry of Justice and, therefore, has no legal status (Sayer and van der Zon 1981, IUCN 1993). The World Database on Protected Areas lists Band-i-Amir as IUCN Category II, but indicates that there is currently no active management. The boundaries of the National Park were defined by the Afghan Tourist Organization in the 1970s as being between 67°05' to 67°20'E and 34°45' to 34°55'N. However, these

boundaries were never officially gazetted. Shank and Rodenburg (1977) proposed boundaries for Band-i-Amir National Park delineated by the lakes' headwaters, and these boundaries were reflected in UNEP's (2003a) map of the park.

The UNEP Post-Conflict Assessment Team visited the area in 2002 and found the Band-i-Amir lakes largely unchanged ecologically from their condition prior to the period of conflict, which began in 1978 (UNEP 2003a). The lakes were full of water, despite the worst drought in living memory. Although no water quality testing was done, the water remains crystal clear and strikingly blue. The travertine dams appeared to be intact and the vegetation was little changed.

UNEP (2003a) found that a number of threats exist, however. Vehicles are not remaining on marked roads causing erosion. Garbage is being dumped into the lakes. Fishing with electricity and explosive devices was reported as common. Populations

of urial and ibex were reported to have declined dramatically through over-hunting. Despite a dramatic decline in livestock numbers, range conditions did not appear to have improved. Finally, Band-i-Amir was the front-line for fighting between Taliban and Northern Alliance forces during much of 2001, and large areas remained mined in 2002.

Considerable development has occurred at Band-i-Amir since 2002. The Asia Development Bank constructed an architecturally pleasing Ranger Station in 2006. The poorly-sited bazaar that had sprung up after the war was removed in late 2007 and associated clean-up activities were supported by the Afghan Conservation Corps (ACC). With assistance of WCS, the Band-i-Amir Protected Area Committee was formed in 2007. This cooperative management committee is chaired by the Bamiyan Governor and has elected representatives from all Band-i-Amir communities. This committee approved a preliminary management plan paving the way for Band-i-Amir to be legally designated as a Provisional National Park.

## 15.2 Ajar Valley Wildlife Reserve

The Ajar Valley Wildlife Reserve is a mountainous area in Afghanistan's central Hindu Kush that was protected for many years as a royal hunting reserve. Prior to the outbreak of hostilities in 1979, the area surrounding the Ajar Valley was ecologically undisturbed compared with most Afghan rangelands and contained large populations of ibex (*Capra ibex*) and smaller numbers of urial (*Ovis orientalis*), feral yaks (*Bos grunniens*), and introduced Bactrian deer (*Cervus elaphus bactrianus*).

The rulers of Afghanistan used the Ajar Valley as a royal hunting area for many years. Amir Habibullah built a lodge in Dara-i-Jawzari in the early 1900s and constructed the current trail into the valley. King Zahir Shah's government bought about 200 ha of land at the mouth of Dara-i-Jawzari in the 1950s and built a hunting lodge near the Ajar River.

The Ajar Valley (*Dara-i-Ajar*) is located in Bamiyan and Baghlan Provinces 70 km northwest of the town of Bamiyan. The eastern portion of the area is

in Kahmard woleswali (i.e. district) while the central and western portions are located in the woleswali of Yakowlang.

The Ajar Valley is comprised of east-west trending ridges with peaks rising to an elevation of 3,800 m. The spectacularly sheer-sided Jawzari Canyon (Dara-i-Jawzari) was cut by the Ajar River and bisects the area from east to west. The river now runs underground for most of the length of Jawzari and flows directly from the canyon wall at the spring of Chiltan. Downstream, a natural dam has created picturesque Lake Chiltan.

In the 1970s there was very little hunting, farming and livestock grazing within the locally understood reserve boundaries. As a result, the high pastures were considered to be among the least disturbed rangelands in the country.

During the mid-1970s, FAO project staff estimated ibex numbers at approximately 2,350 based on actual survey results, but accepted an estimate of 5,000 made by a local hunter as being feasible. Urial were found to be much rarer, but no



Although Band-i-Amir was declared as Afghanistan's first National Park in 1973, the fact that the declaration was not published in the official Government Gazette means that it does not have any legal status. Efforts are currently underway to secure legal protection (National Park) and effective management of the area

population estimates were provided. Bactrian deer were introduced in 1955 from the Darqad wetlands on the Amu Darya River and were reported to number 26 animals in 1976. As a consequence of relatively undisturbed habitat, birds were more diverse than FAO staff saw elsewhere in the central Hindu Kush. Common leopard (*Panthera pardus*), lynx (*Lynx lynx*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), river otter (*Lutra lutra*), and marten (*Martes foina*) were all found in the reserve area, although no population estimates were available.

The Ajar Valley was gazetted as a Wildlife Sanctuary in June 1977 (FAO 1981) and IUCN recognizes the area as a Class IV reserve (World Database on Protected Areas). There appear to be no official records documenting the exact boundaries of the reserve. Shank et al. (1977) suggested that the reserve comprised approximately 50,000 ha while the World Database on Protected Areas lists the size as 40,000 ha.

Since 2006, WCS has been undertaking field surveys of the Ajar Valley and working with local communities towards establishing the area as a legally recognized Wildlife Reserve. Heavy

hunting persists and only an estimated 100 – 200 ibex remain in Ajar Valley. Bactrian deer, yaks, and leopards are now gone and urial are very rare. Only one family lives and farms above Lake Chiltan, but the entire area is once again being heavily grazed. Juniper and shrubs are being heavily harvested. The hunting lodge was destroyed during the war and ownership of the royal lands near the Ajar villages is contested.

### 15.3 Ab-i-Estada

Ab-i-Estada is a large, saline lake occupying a flat depression on the southern edge of the Hindu Kush Mountains in Ghazni Province. The lake is a critical stopover point for thousands of migratory birds that once included the endangered Siberian Crane. Ab-i-Estada is also an important breeding ground for thousands of Greater Flamingoes (*Phoenicopterus ruber*) and other wetland-dependent birds. Ab-i-Estada was visited by the UNEP Post-Conflict Assessment team in 2002. Because of the security situation, little information is available about recent conditions at Ab-i-Estada.



Eurasian cranes (*Grus grus*) in Hajian Village, Parwan Province, Central Afghanistan. These cranes have been captured for their valued meat



Ab-i-Estada was reported by Förstner and Bartsch (1970) to have a normal spring volume of 270 million m<sup>3</sup>, falling to about 140 m<sup>3</sup> in the autumn and exposing many km<sup>2</sup> of mudflats in the process. It is fed by the Ghazni, Gardez and Nahara Rivers collectively draining eastern Ghazni Province and the extreme northwest of Paktika Province. The Gardez River is now dammed at Band-i-Sardeh and the Ghazni River at Band-i-Sultan. Influx of water from the rivers is primarily from snowmelt and is largely limited to the spring. Throughout the rest of the year, the water level of Ab-i-Estada is dependent on ground water (IUCN 1993). Förstner and Bartsch (1970) characterized it as primarily a ground-water lake. During very wet years, water flows out of Ab-i-Estada through the Lora from the west side of the lake. The Lora ultimately joins the Helmand River through the Arghastan and the Dori (Khan 2002). There are currently about 30 water pumps on the west side of the lake and as many as 150 in Nawa woleswali. Typically, water pumps are run by diesel engines and water is transported through 4-inch (9-cm) diameter galvanized steel pipe (Khan 2002). According to locals, the water table is falling and the quality of the water is declining. Ab-i-Estada also experiences periodic droughts, the last one extending from 1998 to 2003. The lake is reported to have again been dry in 2004 (Omran and Leeman 2005, pp. 706).

Using information based on previous reports, Khan (2002) estimated the bird diversity of Ab-i-Estada and surroundings to be 122 species. Ab-i-Estada is remarkable for the large numbers of greater flamingoes that breed on the islands. Flamingoes arrive at high water levels in late March or April and depart when water levels decline in late September or early October. Shank and Rodenburg (1977) summarized data on numbers of flamingoes breeding between 1947 and 1976. Numbers varied from none to more than 9,000. No estimates have been available since the mid-1970s. Flamingoes and other waterfowl have always been hunted by locals, but hunting was reported to be especially heavy during the period 1979-1991 when a military garrison was stationed near the lake (Jamil 1994).

Ab-i-Estada was once a critical stopover for the central population of Siberian cranes. These cranes bred in the Russian tundra and wintered in north-central India. In 1977, the western population

was estimated at only 57 individuals (Sauey 1985). The last reliable report of a Siberian Crane at Ab-i-Estada was one shot in 1986 (Khan 2000). In 2002, falcon trappers were observed working the dry flats of Ab-i-Estada targeting peregrine falcons (*Falco peregrinus*). There were reportedly 12 teams working the lake, each with 5-6 members.

Historically there were no settlements in the semi-desert around Ab-i-Estada, although nomads from Qandahar visited the area in summer. In the recent past, nomadic Ghelzai Taraki nomads settled at Ab-i-Estada and throughout Nawa (UNHCR 1990). Currently, there are eight villages lying within 10 kilometres of Ab-i-Estada, with a population of approximately 5,000 (Khan 2002). Population levels are increasing rapidly with the return of refugees and internally displaced persons, and natural population growth.

Ab-i-Estada was declared a National Waterfowl and Flamingo Sanctuary in late 1974 by the Directorate of Wildlife and National Parks in the Ministry of Agriculture. The Head of State approved its status as a waterfowl sanctuary on December 20, 1977 (Order no. 707) based on petition no. 1765 dated June 6, 1977. Ten game guards were appointed in 1974 to stop hunting. Six guards came from the Republican Guard (Guard-i-Jamuriat) and four came from the local community (Khan 2002). Ab-i-Estada currently enjoys no institutional protection and the game guards have long since disappeared. Ab-i-Estada has never been officially recognized as a Ramsar wetland site of international importance.

## 15.4 Dasht-i-Nawar

Dasht-i-Nawar is a vast (ca. 600 km<sup>2</sup>), high-altitude plain in the Koh-i-Baba range of the Hindu Kush Mountains most famous for seasonal occupation by large numbers of Greater Flamingoes (*Phoenicopterus ruber*). The plain (*dasht*) is surrounded by largely barren mountains rising to an elevation of more than 4,800 m. In the dasht there is a brackish lake (Ab-i-Nawar) approximately 14 km in length and 3 km in width with a complex of 40 islands in the range of 35 to 500 m<sup>2</sup> (Shank and Rodenburg 1977). The area's ecological significance is primarily as an important stopover and breeding ground for a variety of waterfowl and wader species.



Camels in Dasht-i-Nawar Waterfowl Sanctuary, Ghazni Province. This Sanctuary has no legal or effective protection and is increasingly being affected by heavy grazing

Dasht-i-Nawar is located in south-central Afghanistan in Nawur woleswali of Ghazni Province. The wetland can be reached by the unpaved Jaghatoo road (ca. 112 km) from the town of Ghazni via the Shamsuddin Pass. An alternative and shorter route (ca. 65 km) follows an unpaved road that breaks away from the Ghazni-Kandahar highway near the town of Moqur. The dasht is located at ca. 3,350 m elevation.

The hydrology of the Nawar catchment is very poorly known and no water flow data exist (Petocz 2006). Water in Lake Ab-i-Nawar is almost completely dependent on snow melt from the surrounding mountains. The water volume of Ab-i-Nawar was estimated to vary annually between 2 - 20 million m<sup>3</sup> in the early 1970s (Nogge 1974 in Shank and Rodenburg 1977). In recent years, the lake has often dried up entirely by summer or autumn. However, water is retained in small ponds and streams created by spring waters located near villages on the west side of the dasht. A small permanent dam, the Bahae dam (500m x 150m x 12m), was constructed and completed in 2005 by the Ghazni Provincial Rehabilitation Team (PRT) in the upper reaches of the Khafak River valley. In April 2006 the dam held a reservoir of about 424,000 cu metres of water. All of the water from the reservoir is currently channeled and directed

by canal systems for irrigation and local use, and no longer supplies Ab-i-Nawar (Petocz 2006a).

Dasht-i-Nawar serves as an important breeding and staging ground for a large number of migratory waterfowl and waders. There are records of breeding populations of avocets (*Recurvirostra avocetta*), redshanks (*Tringa totanus*), greater sandpipers (*Charadrius leschenaultia*), and common terns (*Sterna hirundo*) (Klockenhoff and Madel 1970 in Shank & Rodenburg 1977). The area is the world's highest elevation breeding ground for the Greater Flamingo. Flamingo presence and breeding success is highly variable and dependent upon water levels. Petocz and Habibi (1975) report seeing 1,200 adults in 1974. UNEP (2003a) stated that flamingoes had not bred between 1998 and 2002 because of drought conditions. Petocz (2006a) reported seeing 2,500 flamingoes in April 2006, but by June the water had dried up and no birds were seen.

Freitag (1986) reports a remarkable case of plant endemism from Dasht-i-Nawar. He found four species (*Cousinia ammophila*, *Fibigia compacta*, *Astragalus (Aegacantha) antheliophorus* and *Pipatherum rechingeri*) confined to a 1 km<sup>2</sup> sand field. He concluded that these psammophytic (i.e. sand-loving) endemics evolved from nearby

alpine vegetation and not from pre-adapted psammophytes, as is common elsewhere. This suggests that Dasht-i-Nawar has experienced highly effective and long-lasting ecological isolation. Further investigations may discover other species to have evolved *in situ* making Dasht-i-Nawar a potential evolutionary hotspot.

According to local reports, the mountains to the west of Dasht-i-Nawar area still support a small population of Himalayan ibex and urial. Locals indicated that ungulates can sometimes be sighted with binoculars in the nearby mountains during winter months. Some big game hunting is undertaken by locals, but it appears to be minimal. Locals do almost no waterfowl hunting. They are particularly averse to hunting flamingoes because they associate the pink colour of the plumage with the blood of the martyred Imam Hussain.

In the 1970s, Shank and Rodenburg (1977) roughly estimated the settled Hazara population living around the *dasht* to be about 1,200 – 1,500 people. Currently, there are about 3,500-households and approximately 24,000 people living in 38 villages distributed mostly on the east side of the *dasht* (Petocz 2006a).

In the 1970s, Shank and Rodenburg (1977) estimated that about 1,300 nomadic people (*kuchis*) grazed approximately 5,000-7,000 sheep and goats and 700 camels on the *dasht* during the summer months. The *kuchis* claimed to have *farmans* (permits) endorsed by former Afghan kings giving them grazing rights in Dasht-i-Nawar. The traditional movement patterns of the nomadic people were disrupted during 25 years of war. The settled Hazaras initially expelled the nomads, but the *kuchis* returned when the dominantly Pashtun Taliban took power. Reportedly, 1,000 *kuchi* families now graze as many as 100,000 head of livestock in the area during the summer months. Animosity currently runs so high between the residents and the nomads that it sometimes erupts into violence (Petocz 2006a).

Dasht-i-Nawar was declared as a National Flamingo and Waterfowl Sanctuary by the Directorate of Wildlife and National Parks in 1974 (FAO 1978). This designation was approved by the Head of State on December 20, 1977 vide Order No. 707 on the basis of Petition no. 1765

dated June 6, 1977 (IUCN 1993). Game guards were stationed at Dasht-i-Nawar in 1976, but their legal authority was questionable. The protection previously afforded Dasht-i-Nawar is no longer in effect. Dasht-i-Nawar is not currently on the international list of 1,198 recognized Ramsar sites, although nomination documents were presented to the Afghan Parliament for approval of accession.

## 15.5 Hamun-i-Puzak

Hamun-i-Puzak was proposed as a national park by Sayer and van der Zon (1981). It is a large, shallow, permanent lake located in the Seistan Basin along the border with Iran. It is part of a larger complex of shallow, intermittent lakes that includes Baringak, Chonge Sorkh, Hamun-i-Hirmand, Hamun-i-Saberi, and Hamun-i-Puzak. Although the lake complex is fed almost entirely from snow melt originating in Afghanistan, only Hamun-i-Puzak is largely Afghan; approximately 1,453 km<sup>2</sup> lies in Afghanistan and 61 km<sup>2</sup> in Iran (UNEP 2006). At high water, the Hamun-i-Puzak is characterized by huge expanses of tall reeds (*Phragmites australis*). At one time, it was a significant wetland for waterfowl with 357,000 counted in January, 1976 (Petocz et al. 1976).

UNEP (2003a) provides a series of satellite image analyses showing how the Siestan Basin dried up between 1976 and 2001. However, periodic desiccation is natural phenomenon and recovery of the ecosystem may be possible if water flows are restored. A recent analysis (UNEP 2006) indicates that there have been four recent phases in the hydrology of the hamun system:

1. A low-water period in 1985-1988.
2. A high-water period in 1989-1993.
3. A medium-water period in 1994-1999.
4. A dry period in 2000-2004.

At least 40% of Hamun-i-Puzak was inundated from 1985 – 2000 at which time the lake went dry until the 2005. Vegetative biomass remained fairly constant until 1999 when it collapsed sharply. There have been no recent assessments of waterfowl populations or of other aspects of biodiversity.

IUCN (World Database of Protected Areas, nd) records Hamun-i-Puzak as a Category IV Waterfowl Sanctuary, however, the area has never been recognized or gazetted by the Government of Afghanistan. No boundaries have been proposed.

## 15.6 Kol-i-Hashmat Khan

Kol-i-Hashmat Khan is a shallow, reed-covered lake uniquely situated at the southwest edge of the metropolis of Kabul. Kol-i-Hashmat Khan is significant as an important stopover for vast numbers of migratory birds and as a significant natural landscape within a predominantly urban setting.

Kol-i-Hashmat Khan was first mentioned in the memoirs of the Moghul Emperor Babur Shah in the 16<sup>th</sup> century. Amir Abdul Rahman Khan used the lake as a royal hunting area between 1880 and 1901. His successor, Amir Habibullah Khan (1901-1919), constructed the fort Qala-i-Hashmat Khan as a guesthouse and hunting lodge on the southeast shore of the lake. He also built an elevated brick road to the fort directly across the lake. In the 1930s, King Zahir Shah declared the area as a waterfowl reserve and afforded its protection by the royal garrison. Following the 1973 coup, Kol-i-Hashmat Khan was under the protection of the Guard-i-Jumuriat (Republican Guard) attached to the presidential office.

The area around Kol-i-Hashmat Khan contains many historical sites, including Latif's Garden, formerly located to the northwest of the lake, the shrine of Jabur Ansar built in 645 AD, and the Jabar Ansar Wali Cemetery. To the northwest lies the imposing fort of Bala Hissar overlooking the lake from a high hill.

According to Rahim and Larsson (1978), the lake proper was state property in the 1970s and was administered by the Department of Ceremonies of the President's Office. The fields to the south of the lake were property of the public baths while the fields on the northern part of the lake were owned by local residents. Ownership of other lands surrounding the lake was not registered. Rahim and Larsson (1978) noted that there were only a dozen houses between the east side of the lake and the Kabul-Gardez highway.

Historically, Kol-i-Hashmat Khan was part of a much larger marsh system on the Logar River. Rahim and

Larsson (1978) reported the lake as being about 190 ha in size and that it becomes "nearly dry" during the summer months.

Kol-i-Hashmat Khan's primary importance is as a stopover location for waterfowl migrating through the Logar Valley to and from breeding grounds to the north. Only a few species actually use the lake for breeding, although their numbers are significant. Rahim and Larsson (1978) provide a list of species observed at Kol-i-Hashmat Khan by FAO project staff and Niethammer (1967 in Rahim and Larsson 1978). Niethammer saw nearly 33,000 individual birds at the lake over a period of two years in the 1960s.

Originally, Kol-i-Hashmat Khan was part of an extensive marsh system created as the Logar River emptied into the broad plain south of Kabul (Scott 1995). A series of irrigation channels were developed over the years. The Kamari canal has first priority for water allocation, followed by the Shewaki canal. Water demands are increasing leading to reduced water levels in Kol-i-Hashmat Khan. In the first half of the 20<sup>th</sup> century, the lake covered much of what is now Karte Naw and Chaman-i-Huzuri. Pressure for diverting water from Kol-i-Hashmat Khan increases almost every year. As well, tube wells are proliferating around the lake for irrigation purposes, doubtlessly drawing down the water table.

*Phragmites* reeds in the middle of the lakebed were being harvested for sale as roof thatch reducing wildlife habitat. In 2002, UNDP implemented a Ministry of Agriculture sponsored project in which an 8-km ditch was dug completely around Kol-i-Hashmat Khan as a means of delineating the boundaries and keeping livestock out. Netting of quail and migratory birds occurs regularly at Kol-i-Hashmat Khan.

Qala-i-Hashmat Khan, Amir Habibullah Khan's hunting retreat and guesthouse, was destroyed during fighting over control of Kabul. Encroachment of houses has occurred in areas where there were once only agricultural fields and a dozen houses. Also lying between the lake and the Kabul-Gardez highway is a very large carpentry and wood bazaar. In 2002, a community of *gujars* is living in tents on the south end of the lake.

Petocz (2006c) chronicles the current abuses inflicted on Kol-i-Hashmat Khan. Influential settlers have illegally built homes and small businesses on

government land, in many cases right to the water's edge, and have reduced the size of the lake from its former size of 191 ha to about 150 ha. Other settlers have illegally built houses on the hillside above the lake adding to the population expansion in the area and pressure on the water resources. Tube wells have been drilled along the lake shore to service the needs of the expanding population adding to the depletion of lake waters. Car washers have set up illegal businesses just below the Bala Hissar and are polluting the lake with the run-off. Hospital waste and garbage has been dumped into the lake itself, sometimes by government owned trucks from Kabul municipality. Local people continue to cut reeds and grasses in the lake, and women launder clothes and household goods at the lake shore. Hunting and harassment of birdlife is still common but now is mainly the prerogative of children and teenagers. Recently, the historical Qala-i-Hashmat Khan on the southwestern shore of the lake, once used as a guest house by former royalty and earmarked to be developed into reserve education and awareness centre was been sold and removed. Latif's garden below the Bala Hissar was once a beautiful site but is severely degraded.

Kol-i-Hashmat Khan has never received legal status as a protected area, although it has long been protected by Afghan rulers. The lake proper

is currently administered and managed by the Department of Natural Resource Management (DNRM), Ministry of Agriculture, Irrigation and Livestock (MAIL). The agricultural fields south of the lake are private property, and the northern fields are owned by local residents. Other land claims are either suspect, not registered or perhaps even forged land title documents (Petocz 2006c). A new government multi-agency coalition has been formed spearheaded by the National Environmental Protection Agency (NEPA) and MAIL to deal with the most immediate issues that threaten the integrity and survival of the Kol-e Hashmat Khan wetland. A workshop was hosted by the NEPA Director General and facilitated by UNEP on 6 June 2006 to discuss the future of Kol-i-Hashmat Khan (Petocz 2006c). An interim management plan (Petocz 2006c) has been prepared.

## 15.7 Wakhan

The Wakhan Corridor is a long (200 km) and narrow (20 - 60 km) panhandle of alpine valleys and high mountains stretching eastward from the province of Badakhshan. It borders Tajikistan to the north, Pakistan to the south, and China to the east. The Wakhan is part of the "Pamir Knot" from which radiate the Hindu Kush, Karakorum, Himalayan, and Tien Shan Ranges. The rich biodiversity of the



Herd of yaks (*Bos grunniens*) in the Wakhan Corridor, Badakhshan Province. The yaks are frequently used by local people for transportation, milk and meat

Wakhan was described in most detail by Petocz (1978a) and appears to be largely intact after 25 years of war and instability (UNEP 2003 a and b).

UNEP (2003b) divides the Wakhan into three geographical areas:

- The narrow Wakhan Valley, running approximately 110 km from Ishkishim to Qala-i-Panja, bordering Pakistan on the south and Tajikistan to the north,
- The Big Pamir, lying between the Pamir and Wakhan Rivers in the north-central portion of the Corridor and bordering Tajikistan,
- The Small Pamir consists of two mountain blocks at the eastern end of the Wakhan, separated by the Waghjir River and borders on Pakistan, China and Tajikistan.

The fabled Silk Road ran through the Wakhan and the archaeological, historical, and cultural characteristics of the area are unique. The Wakhan Valley and Big Pamir are inhabited by sedentary Wakhi people while the Small Pamir is home to the transhumant Kirghiz herders.

The Pamir-i-Buzurg, or "Big Pamir", is a high mountain and plateau area rising to 6,100 m and dominated by alpine vegetation with grasses and sedges in the valley bottoms. The area is most famous for the magnificent Marco Polo sheep (*Ovis ammon poli*). In 1973, Petocz (1978b) counted 500 Marco Polo sheep in the Big Pamir. In the 1950s, King Zaher Shah ordered that wild sheep be protected in a single valley of the Big Pamir and in the 1970s this protection was extended to four major valleys comprising 679 km<sup>2</sup> (Petocz 1978c). A successful tourist hunting program was run in the Big Pamir by the Afghan Tourist Organization from 1968 – 1979. The Pamir-i-Buzurg was gazetted as a Wildlife Reserve in 1978, but it currently does not enjoy protected status.

UNEP (2003b) found the Marco Polo sheep (especially females and young) were competing intensively with livestock in the wintering areas of the western Big Pamir. The UNEP team found that livestock is being overwintered in the area and that trampling had caused considerable degradation of the pastures between 4,000 to 4,300 m. Wild

sheep were also hunted opportunistically for meat. Besides Marco Polo sheep, there is also a diverse mountain fauna including ibex (*Capra siberica*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), lynx (*Lynx lynx*) and snow leopard (*Uncia uncia*) remaining in the Big Pamir (UNEP 2003b).

Since 2006, WCS has been studying birds, mammals, and livestock/wildlife interactions in the Big Pamir with the ultimate goal of creating a legally recognized wildlife reserve. Rough estimates are that about 150 Marco Polo sheep remain in the Big Pamir. More detailed population estimates are underway using a DNA-based estimation technique. WCS has also been working with local Wakhan to foster community-based conservation in the Big Pamir.

The Small Pamir has never had protected status. In 1973, Petocz (1978b) saw 760 Marco Polo sheep in the Small Pamir, not including the Waghjir Valley. Intensive surveys have not been undertaken in recent years, but the UNEP team (2003b) considered that the Small Pamir population remained larger than that of the Big Pamir. WCS biologists observed 545 Marco Polo sheep in the Small Pamir in 2004 and 106 in Waghjir in 2007. WCS has recently recommended that an area of ca. 250 km<sup>2</sup> at the eastern tip of the small Pamir (east of 74° 40'E) be designated a strictly protected area (P. Zahler, pers. comm., April 2006). This area is at present not used by the local Kirghiz herdsmen, and thus the habitat is in excellent condition and does not conflict with human use patterns. There is also no barrier between it and the proposed Shaymak Reserve in Tajikistan, enabling Marco Polo sheep to move freely back and forth. The eastern tip of the Waghjir Valley (about 300 km<sup>2</sup>), east of 74° 20'E, is at present uninhabited and used only for yak grazing in winter. WCS has recommended both the Small Pamir and Waghjir Valleys be designated as protected areas.

Marco Polo sheep move freely across the international borders of the Wakhan. Accordingly, the noted wildlife biologist, George Schaller, has long been promoting the concept of a four-country (Afghanistan, Pakistan, China and Tajikistan), transboundary protected area centring on the Wakhan. Much of the area under consideration for such a park is already or may soon be in reserves. The transboundary protected area would build upon Pakistan's Khunjerab National Park

(6,150 km<sup>2</sup>) and the contiguous Taxkorgan Nature Reserve (about 14,000 km<sup>2</sup>) in China. Other reserves with Marco Polo sheep in this border region are the Zorkul Strictly Protected Area (870 km<sup>2</sup>) in Tajikistan and the Big Pamir Wildlife Reserve (679 km<sup>2</sup>) in Afghanistan. In addition, there are two trophy hunting areas for Marco Polo sheep, one in Tajikistan and one in China, with a measure of protection. China is considering another reserve along the Tajik border, and recent WCS surveys in Tajikistan and Afghanistan suggest further additions to the system. A preliminary planning meeting was held in Urumchi, China in September 2006 with another meeting tentatively scheduled for 2008.

## 15.8 Nuristan

Sayer and van der Zon (1981) proposed that Nuristan National Park be created in Laghman and Kunar Provinces centred on the Paron and Kantiwa Valleys. They provided a map showing the proposed, approximate extent of the Park. The major value of the area was suggested as being the largely undisturbed monsoon-influenced forests and the unique species assemblage in the area including Himalayan black bear, markhor, leopard and snow leopard. As well, the traditional way of life is of great cultural value. Petocz and Larsson (1977) described the ecology of the area and made recommendations for management. Remote sensing analysis undertaken by UNEP indicated that 52% of forest cover was lost in Nuristan, Laghman and Nangarhar Provinces between 1977 and 2002 (UNEP 2003). WCS is currently undertaking wildlife studies in Nuristan and have confirmed the identity and distribution of mammal species through snow tracking, scat identification and camera trapping. The National Park remains a proposal and has had no formal recognition.

## 15.9 Zadran

Little information is available for Zadran. It was proposed in 1990 as a letter from Dr. Tahir Enayat, then Rector of Kabul University, to the World Conservation Monitoring Centre. Omrani and Leeman (2005) state that the main interest of the area is the coniferous and deciduous forests that once flourished there. They note that the area saw fighting during the Soviet war (1979 – 1989) and

during the civil wars in 1990 and again in 2001 – 2002. In 2006, the area remains unstable.

## 15.10 Imam Sahib

Imam Sahib is a floodplain complex of islands and river banks in the Amu Darya River. The area derives its name from an historic mosque and shrine reputed to contain the head of Hazrat Imam Hussein, the Prophet's grandson (Omrani and Leeman 2005). It was proposed as a wildlife management or nature reserve by Sayer and van der Zon (1981). Measurements using Google Earth indicate the area to be approximately 50 km in length and as much as 12 km wide. Together with Darqad, it may represent the last significant remnants of tugai vegetation in Afghanistan. The tugai in and around Imam Sahib is the last remaining habitat for the endangered Bactrian deer (*Cervus elaphus bactrianus*) in Afghanistan.

The UNEP Post-Conflict team visited in 2002 and reported apparently intact forests. It was reported that 300 families settled on the islands during Taliban times with about 100 remaining. These people are cutting fuelwood and clearing land for agriculture. Anthony Fitzherbert visited the area in 2004 and was told that elites commonly crossed to the island to go hunting (Omrani and Leeman 2005). Local people reported to him that some smaller wildlife, and possibly Bactrian deer, still exist on the islands. Ahmad Khan (pers. comm. 2006) visited Imam Sahib in 2005 on behalf of the Asia Development Bank and found the area almost completely converted to agricultural lands.

UNEP (2003a) reports that Imam Sahib was declared as a Royal Hunting Reserve sometime in the 20th century with restrictions on land use. The area may have been declared a government reserve in the mid-1990s, but considerable uncertainty remains (UNEP 2003a). Regardless, the area has never been gazetted or provided with formal boundaries.

## 15.11 Darqad

Darqad is the sister reserve to Imam Sahib and located some 25 km upstream. Sayer and van der Zon (1981) proposed it as a wildlife management or

nature reserve. Rough measurements using Google Earth indicate the area to be approximately 40km in length and as much as 20m wide. Like Imam Sahib, Darqad is significant for its *tugai* vegetation. The last sign of tigers in Afghanistan were seen at Darqad in 1967 (Habibi 2003). Ahmad Khan (pers. comm., 2006) visited Darqad in 2005 on behalf of the Asia Development Bank and found the area to be severely degraded.

Like Imam Sahib, Darqad was declared as a Royal Hunting Reserve sometime in the 20<sup>th</sup> century with restrictions on land use. However, the area has never been gazetted or provided with formal boundaries.

### 15.12 Northwest Afghanistan

Northwest Afghanistan was proposed as a wildlife management reserve or nature reserve by Sayer and Van der Zon (1981). It is located in the extreme north-western corner of the country along the Turkmenistan and Iranian borders. Its conservation value is primarily as a representative of *Pistacia vera* forests at higher elevations and *Artemisia* steppes in lower areas. Wild ass were reported as being hunted in the area as late as 1975, but they are almost certainly gone now (Omrani and Leeman 2005). Little current information exists on the area. It has never received any level of formal recognition and the boundaries have not been delineated. At one time, a government horse pasture existed on Hazrat Baba (33°38'46"N, 62°14'21"E), a north-western spur of the Feroz Koh about 30 km north of Herat. In the late 1970s, Hazrat Baba had some of the best range

conditions in Afghanistan (pers. obs.). This area should be investigated to determine its current status and suitability for inclusion in any future Northwest Afghanistan Wildlife Reserve.

The area has never received any level of formal recognition and the boundaries have not been delineated.

### 15.13 Registan Desert

Registan Desert was proposed as a wildlife management or nature reserve by Sayer and Van der Zon (1981). It is located in Kandahar and Helmand Provinces in the south-eastern corner of the country. The Registan Desert is comprised of a variety of landscapes from moving sand dunes to gravel flats. Its conservation value is as a representative of Afghanistan's desert region and for protection of its rich floral, reptile and rodent diversity.

Large herbivores (onager, chinkara, goitered gazelles) and their predators (cheetah, hyaena) were once common, but are now largely, if not completely, gone. Omrani and Leeman (2005) report that during the Taliban years, wealthy Arabs built an airstrip to provide access to gazelle and bustard hunting and that these species are now rarely seen. Toderich and Tsukatani (2005) provide some recent plant species lists and productivity estimates for the area, but little other information seems to be available.

The area has never received any level of formal recognition and the boundaries have not been delineated.



## 16 Afghanistan's Agricultural Biodiversity

Agricultural biodiversity refers to the variety of species of crops and livestock that farmers employ, the genetic variability within each of those species as indicated by the diversity of varieties raised, and the genetic variability of the wild progenitors of domesticated species.

### 16.1 The Significance of Agricultural Biodiversity

Agricultural biodiversity is important because it provides the farmer with the flexibility to adapt to changing conditions. Under any given set of stable conditions, the best single variety of the best species will provide the greatest yield per unit of land, labour and money invested. Consequently farmers often concentrate their efforts on raising the most favourable species and variety to the exclusion of others. When times are good, this monocropping strategy can result in large yields. However, the strategy is risky because if the rains do not come, if an insect attacks the crops, or if a disease strikes the livestock, the farmer who depends on one species or variety can lose everything. Monocropping is therefore a high yield/high risk approach to agriculture.

The risks of monocropping are illustrated dramatically by the disastrous Irish Potato Famine of 1845 – 1848. Potatoes grow well in Ireland and much of the population came to depend solely on large harvests from a particular variety of potato. In 1845, the fungus blight (*Phytophthora infestans*) struck and destroyed the potato crop for three years in a row. So dependent on potatoes were the poor people of Ireland that an estimated one million people died and more than 1.5 million people emigrated. Blight resistant potato varieties were subsequently developed, with many incorporating resistance genes from species of wild potato. The Irish Potato Famine illustrates the importance of maintaining a diversity of species and genetic varieties and in preserving the reservoir of genetic diversity existing in the wild.

### 16.2 Varieties of Agricultural Species

"Landraces" are varieties of a crop or livestock species developed by farmers through conscious or unconscious selective breeding. Landraces are highly adapted to local conditions. Different landraces incorporate a huge amount of genetic variability and are the source of most genetic resistance incorporated into improved seed sources. Mountainous regions, such as Afghanistan, are rich in landraces because of the isolation and differing conditions in nearby mountain valleys. Landraces often do not produce yields as large as new, "improved" varieties, although they almost always require fewer chemicals and less land preparation and they are more resistant to the specific environmental challenges found in the local environment. Planting landraces is often less expensive and risky compared to planting high-tech imported seed. In Afghanistan, most crops planted in rainfed areas are still local landraces while improved seed is increasingly being used in irrigated areas (ICARDA 2002). Experiments in Afghanistan showed that improved, foreign breeds of sheep could not survive the poor ranges that local breeds were able to utilize (Yalcin, 1979 in Adil 2000).

Many traditional varieties and landraces of cultivated species are being lost. Several hundred years ago, carrots grew in a rainbow of colors—red, purple, yellow, white and orange, but now only orange and reddish carrots remain. Early farmers had to plant many varieties of each crop so at least something would make it to harvest through the vagaries of drought, flood and disease during the growing season. The development of hybrid seeds, improved livestock breeds, veterinary drugs, pesticides, chemical fertilizers and farm machinery gives farmers more control over growing conditions allowing the use of only few of the most productive varieties. Consequently, many landraces of plants and animals are in danger of being lost along with their genetic resources.

The value of genetic variability encompassed by farmer-developed landraces of crop plants has long been known. Consequently, there are many seed banks around the world that preserve as wide a diversity of genetic adaptations as

possible. Prior to the war, Afghanistan had a world-renowned crop seed collection. Unfortunately, it was destroyed in 1992 by *mujahadeen* factions. Researchers then re-collected samples of the country's major food and cash crops. During the Taliban era, scientists quietly stockpiled hundreds of seed samples and hid these collections in private homes. Sometime prior to 2002, these collections were again ransacked, apparently to steal the plastic containers in which the seed was stored. The destroyed seed collection included varieties descended from many wild ancestors, representing a rich genetic diversity that may have contained rare traits for things such as disease and pest resistance and drought tolerance (Future Harvest 2002).

### 16.3 Wild Species as the Ancestors of Agricultural Species

All agricultural plants and animals were developed by early hunter-gatherers, farmers and herders from wild species through a process of selection of the most favourable types over a process of millennia.

There are about 200,000 species of flowering plants. Of these, thousands are edible, but humans have domesticated only a few hundred species. Only 12 species (wheat, maize, rice, barley, sorghum, soybean, potato, manioc, sweet potato, sugar cane, sugar beet and banana) provide 80% of the biomass eaten by humans worldwide. Just three species, wheat, maize and rice, account for half the calories consumed by the world's population. Even more surprising than the lack of diversity in our food crops is the fact that no new crops of any significance have been developed in the past several thousand years (Diamond 1999).

Those animal species most likely to be domesticated are terrestrial, herbivorous mammals weighing more than 100 pounds (45 kg). There are 148 such species in the world that are candidates for domestication. However, only 14 livestock species have ever been truly domesticated and only five of these (sheep, goats, cows, pigs and horses) are widespread around the world (Diamond 1999).

The pioneering Russian plant geneticist N.V. Vavilov discovered in the 1920s that there are

seven major regions in the world in which almost all of humanity's crop plants were developed by early farmers from wild species. All of them are concentrated between 20 and 45 degrees latitude and are associated with mountain ranges; conditions that describe Afghanistan perfectly. Indeed, Vavilov considered Afghanistan and its nearest neighboring countries to be the third most important centre of crop origin in the world and the original home of bread wheat, rye, barley, chickpeas, peas, flax, alfalfa, clover, apple, pear, pomegranate, quince, sweet cherry, melons, grapes, pistachio and some vegetables. Preserving the genetic diversity of these wild ancestors humanity's crop species is therefore a global imperative.

### 16.4 Afghanistan's Crop and Livestock Species and Varieties

Table 12 (p.48) is a summary of the food and commodity crops known to be grown in Afghanistan. Plant information is adapted from an unattributed table found on Afghanistan Online (nd) with some additions (FAO 2003) and some deletions. The list is almost certainly not complete.

Afghanistan's cereal production is heavily skewed towards production of wheat. In 2006, Afghanistan's predicted cereal production was 5.5 million tonnes of which 80% is wheat, 7% is rice, 6% maize and 7% barley (FAO 2006).

Bread wheat (*Triticum aestivum*) was first created about 4,700 years ago by hybridizing emmer wheat (*Triticum turgidum*) and wild goat grass (*Aegilops squarrosa*) to create a hexaploid wheat (i.e. six sets of chromosomes). It is thought by some experts that Afghanistan has more native bread wheat varieties than anywhere else in the world and is therefore likely to be the cradle of its birth (Fedak nd). Vavilov himself collected 110 landraces of wheat from Afghanistan. The Vavilov Institute in Moscow currently records 1,721 varieties from Afghanistan while the U.S. Department of Agriculture's Genetic Resources Information Network (GRIN) database lists 1,892 accessions from Afghanistan (ICARDA 2002). It is not known how many of these varieties are still in use. Less information is available on Afghan landraces of other cultivated crops.

**Table 12 Species Diversity of Afghanistan's Agriculture**

Fruit and Nuts	Cereals	Vegetables	Pulses	Fodder	Commodities	Livestock
Figs	Rice	Beets	Lentils	Clover	Cotton	Sheep
Plums	Rye	Sesame	Chick pea	Alfalfa	Tobacco	Cattle
Bananas	Wheat	Spinach	Broad bean	Vetch	Opium poppy	Goats
Dates	Barley	Radish			Flax	Donkey
Pears	Maize	Pumpkin			Rape	Horse
Peaches	Millet	Potatoes			Sugarcane	Bactrian camel
Apricots		Lettuce			Castor oil plant	Dromedary camel
Mulberries		Cabbage				Water buffalo
Grapes		Garlic				Yak
Pomegranates		Leeks				Chicken
Apples		Turnips				Turkey
Quince		Asparagus				
Oranges		Brussels sprouts				
Cherries		Eggplants				
Strawberries		Squash				
Walnuts		Cauliflower				
Almonds		Garden pea				
Pine nuts		Onions				
Pistachio nuts		Mustard				
Jujube		Cucumbers				
Loquat		Carrots				
Persimmon		Watermelons				
Mandarin		Melons				
Lemon		Sunflowers				
Quince		Artichoke				
		Tomatoes				
		Pepper				
		Broccoli				
		Cabbage				

Grapes were probably first domesticated in Herat. Currently, there are reported to be 72 – 76 local varieties of grapes in the Herat region (Oliver 2004). Some of these Afghan landraces are being used by plant breeders in the US to develop new varieties (Bohan 2003).

A March 2003 livestock census carried out by the MAIL and the FAO indicated that there are an estimated 3.7 million cattle, 8.8 million sheep, 7.3 million goats and 177,000 camels in Afghanistan (RAMP nd).

There are at least nine landraces of sheep raised in Afghanistan (Baluchi, Panjshir Gadik, Wakhan Gadik, Ghiljai, Hazaragi, Kandahari, Karakul,

Afghan Arabi , and Turki), eight breeds of cattle (Afghan Kabuli, Badakhshani Bouy, Badakhshani Dasnier, Kandahari, Konari, Shankhansurri, Systani and hybrids of Friesian, Jersey and Brown Swiss), seven breeds of goats (Asmari, Kabuli, Kandahari, Kashmiri, Rahnama, Tajjiki, and Watani), six horse breeds (Herati, Mazari, Qatgani, Turkistani, Waziri and Yabu) and four varieties of chickens (Khasaki, Kulangi, Rangin and Sabw) (Khan and Iqbal nd). Although they were not first domesticated in Afghanistan, the wild progenitors of domestic sheep, goats and donkeys (urial, wild goat and onagers respectively) still exist in Afghanistan, although all are threatened with extinction.

## 17 Recommended Priority Actions for Conserving Afghanistan's Biodiversity

This review of the current state of Afghanistan's biodiversity suggests a number of specific actions that should be instituted in the near future to protect known biodiversity priorities and to fill key knowledge gaps.

1. Establish priority and feasible protected areas as legally recognized and effectively managed entities. Priority areas should be Band-i-Amir, Ajar Valley, Pamir-i-Buzurg, and Dashte Nawar.
2. Develop a protected areas system plan for Afghanistan designed to protect representative areas of high biodiversity in all major eco-regions.
3. Survey all wetlands and potential protected areas listed in this document to determine current status and suitability for inclusion into the protected areas system plan.
4. Initiate a national Red-Listing process for Afghan mammals with the technical assistance of IUCN, incorporating targeted surveys to

establish current status of priority species.

5. Encourage national and international scholars to develop a comprehensive flora of Afghanistan.
6. Develop effective plans to intervene in the destruction of the remaining monsoon-dependent forests of eastern Afghanistan.
7. Develop effective plans for preserving and recovering remnant pistachio and juniper forests in northern Afghanistan.
8. Develop programs to preserve native Afghan landraces of crop plants and livestock.

These detailed actions must be undertaken within the context of broader institutional initiatives to conserve biodiversity including:

1. Improving the capacity of government institutions to effectively manage biodiversity.
2. Increasing public awareness of biodiversity and its value to the Afghan people.
3. Developing a National Biodiversity Strategy and Action Plan for Afghanistan.



© INAYAT ALI

Owl species, Wakhan Corridor, Badakhshan Province

## 18 Acknowledgements

Thanks to Peter Zahler and Tim Bean of the Wildlife Conservation Society for use of the protected areas map. Denis LePage of AVIBASE advised on bird taxonomy. Wali Modaqiq, Khushal Habibi and Ron Petocz made many valuable additions and corrections to the manuscript.

## 19 Literature Cited

- Adil, A.W. 2000. National Biodiversity Strategies and Action Plans (NBSAP): Afghanistan. 1st Workshop on National Biodiversity Strategies & Action Plans in Northeast and East Central Asia: Experience and Lessons. 26 - 28 April, Beijing, China. <http://bpcsp-neca.brim.ac.cn/calendars/workshop-1/8.html>
- Afghanfl Online. nd. Domestic plants found in Afghanistan. <http://www.afghan-web.com/fauna/domestic.html>
- AIMS. Nd. [www.aims.org.af/home/ssroots.asp?seckeyz=z2&secido=8&seckeyt=a48&seckeyth=b46](http://www.aims.org.af/home/ssroots.asp?seckeyz=z2&secido=8&seckeyt=a48&seckeyth=b46)
- Anonymous. 1997. Why are deserts dry? <http://ag.arizona.edu/~lilich/dry.html>. Accessed April 2006.
- Anonymous. 2006a. AmphibiaWeb. Checklist for Afghanistan. [http://amphibiaweb.org/cgi-bin/amphib\\_query?query\\_src=aw\\_maps\\_geo-asia&rel-isocc=like&orderbyaw=Family&where-isocc=Afghanistan](http://amphibiaweb.org/cgi-bin/amphib_query?query_src=aw_maps_geo-asia&rel-isocc=like&orderbyaw=Family&where-isocc=Afghanistan) Accessed April 2006.
- Anonymous. 2006b. FishBase. Checklist for Afghanistan. [http://www.fishbase.org/Country/CountryCheckList.cfm?c\\_code=004](http://www.fishbase.org/Country/CountryCheckList.cfm?c_code=004). Accessed April 2006.
- BirdLife International. nd. Afghanistan. <http://www.birdlifemed.org/Contries/afghanistan/afghanistan.html>. Accessed April 2006.
- Bohan, S. 2003. UC Davis agricultural team will go back to fruits' roots: Officials to visit Afghanistan to repatriate plants. San Francisco Chronicle, Dec 1, 2003. <http://www.sfgate.com/cgi-bin/article.cgi?file=/chronicle/archive/2003/12/01/MNG0A3CNS91.DTL>
- CIA World Factbook. <http://www.cia.gov/cia/publications/factbook/geos/af.html#People>. Accessed February 2006
- Coad, B.W. 1981. Fishes of Afghanistan, an annotated checklist. Ottawa: National Museum of Canada; 1981 Publications in Zoology No. 14.
- Diamond, J. 1999. Guns, germs and steel: the fates of human societies. W.W. Norton & Co., New York. 494 pp.
- Diamond, J. 2005. Collapse: How societies choose fail or succeed. Viking. New York. 575 pp.
- Dickenson, E.C. 2004. (Ed). The Howard and Moore Complete Checklist of the Birds of the World. 3rd ed., Christopher Helm, London.
- Dieterle, A. 1973. Vegetations kundliche untersuchungen im gebiete von Band-i-Amir (Zentral Afghanistan). Inaug. Diss. Univ. München. 24 pp.
- Duff, A. and Lawson, A. 2004. Mammals of the World: A Checklist. A&C Black, London. 312 pp.
- Earthtrends. 2003. Forests, grasslands and drylands—Afghanistan. [http://earthtrends.wri.org/pdf\\_library/country\\_profiles/for\\_cou\\_004.pdf](http://earthtrends.wri.org/pdf_library/country_profiles/for_cou_004.pdf). Accessed April 2006.
- Earth Observatory. nd., Vegetation maps. <http://earthobservatory.nasa.gov/Study/Afghanistan/afghanistan2.html>. Accessed April 2006.
- Enayat, T. 1990. Letter to World Conservation Monitoring Centre.
- European Molecular Biology Laboratory. 2006. EMBL Reptile Database. <http://www.embl-heidelberg.de/~uetz/LivingReptiles.html>. Accessed April 2006.
- Evans, M.I. 1994. Important bird areas of the Middle East. BirdLife International Conservation Series No. 2. Cambridge.
- FAO 1978. National parks and utilization of wildlife resources: Afghanistan. Project findings and recommendations. FO: DP/AFG/74/016.

- FAO 2004. Afghanistan: Survey of the horticultural sector 2003. [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/007/y5163e/y5163e00.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/007/y5163e/y5163e00.htm)
- FAO 2006. Afghanistan's agricultural prospects for the year ahead. [http://www.unama-afg.org/docs/\\_UN-Docs/\\_fact-sheets/06may15-FAO-Factsheet-eng.pdf](http://www.unama-afg.org/docs/_UN-Docs/_fact-sheets/06may15-FAO-Factsheet-eng.pdf)
- Fedak, G. nd. From a single seed: Tracing the Marquis wheat success story in Canada to its roots in the Ukraine. [http://res2.agr.ca/publications/marquis/page01\\_e.htm#early\\_history](http://res2.agr.ca/publications/marquis/page01_e.htm#early_history)
- Förstner, U. and G. Bartsch. 1970. Die Seen von Banda-Amir, Datscht-i-Nawar, Ob-i-Istada und Hamun-i-Puzak (Zentral und Südwestafghanistan). *Science (Kabul)* 6: 19 – 23. Cited in Shank, C.C. and W.F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. FO: DP/AFG/74/016.
- Freitag H. 1971. Die natürliche Vegetation Afghanistans. Beiträge zur Flora und Vegetation Afghanistans I. *Vegetatio. Acta Geobotanica.* 22: 285-349.
- Freitag H. 1971. Studies in the natural vegetation of Afghanistan. P.H. Davis. *Plant life of South-West Asia.* Edinburgh: Royal Botanic Garden. p 89-106.
- Freitag, H. 1986. Notes of the distribution climate and flora of the sand deserts of Iran and Afghanistan. *Proc. Royal Soc. of Edinburgh Section B (Biological Sciences)* 89: 135 – 146.
- Frey, W. 1977. Die Lebermoose des Iran und Afghanistans. *Bryologist* 77, No. 1: 48 – 56.
- Future Harvest. 2002. Looters Destroy Afghanistan's Seed Collections. International Genebanks Launch Major Effort to Rebuild Lost Crop Collection. [http://www.futureharvest.org/news/genebanks\\_0902.shtml](http://www.futureharvest.org/news/genebanks_0902.shtml)
- Groombridge, B. (ed.) 1992. *Global Biodiversity: Status of the Earth's Living Resources.* A report compiled by the World Conservation Monitoring Centre. Chapman and Hall, London.
- Groombridge, B. and M. Jenkins, (eds). 1994. *Biodiversity Data Sourcebook.* Compiled by the World Conservation Monitoring Centre. World Conservation Press, Cambridge, UK.
- Habibi, K. nd a. Checklist of the birds of Afghanistan. <http://fwie.fw.vt.edu/afghanistan/BirdChecklist.html>. Accessed April 2006.
- Habibi. K. 2002. The vertebrate fauna of Afghanistan. <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>. Accessed April 2006.
- Habibi, K. 2003. *Mammals of Afghanistan.* Zoo Outreach Organization, Coimbatore, India, 168 +iv pp.
- ICARDA. 2002. Afghanistan seed and crop improvement situation assessment. Draft document. [http://www.icarda.org/seed\\_unit/pdf1/FINAL-DRAFT.pdf](http://www.icarda.org/seed_unit/pdf1/FINAL-DRAFT.pdf)
- IUCN 2004. 2004 IUCN Red List of Threatened Species. <[www.iucnredlist.org](http://www.iucnredlist.org)>. Accessed April 2006.
- IUCN. 1993. *Nature Reserves of the Himalaya and the Mountains of Central Asia.* Compiled by Michael J.B. Green. 481 pp.
- Jamil, A. 1994. Mission to the Ab-i-Istada, Ghazni Province, Afghanistan, 23.10.93 to 23.11.93. Unpubl. Report. Cited in Scott, D.A. 1995. *A directory of wetlands in the Middle East.* IUCN Gland, Switzerland and IWRB, Slimbridge, U.K.
- Khan, A. 2000. Research Feasibility Study at Lake Ab-i-Estada in preparation for M.S. degree course in Conservation Biology and Sustainable Development from the University of Wisconsin at Madison (USA). <http://fwie.fw.vt.edu/afghanistan/Lake%20Ab-i-Estada%20.pdf>. Accessed April 2006.
- Khan, A. 2002. Impact of exotic technology on physical Environment and cultural practices in Ab-i-Estada. MSc. Thesis, Geography Department, University of Wisconsin, Madison, WI.
- Khan, A. 2005. Conservation Strategy for Wetland Protected Areas of Afghanistan. Asian Development Bank. pp31. (not seen)

- Khan, U-u-N. and M. Iqbal. nd. Role and the size of livestock sector in Afghanistan. World Bank, Islamabad. 77pp. [http://lnweb18.worldbank.org/SAR/sa.nsf/Attachments/95/\\$File/afLvstk.pdf](http://lnweb18.worldbank.org/SAR/sa.nsf/Attachments/95/$File/afLvstk.pdf)
- Klockenhoff, H. and Madel G. 1970. Über die Flamingoes (*Pheonicopterus ruber*) der Dasht-i-Nawar in Afghanistan. *J. Ornithologie* 111: 78-84.
- Koçak, A.O. and M. Kemal. 2001. Checklist of the Butterflies of Afghanistan of Afghanistan. <http://www.members.tripod.com/entlep/Af.htm> Accessed March 2006.
- Kullberg, A. 2002. Bird report: Afghanistan 2002. [http://www.camacdonald.com/birding/me/afghanistan\(AnssiTripReport\).htm](http://www.camacdonald.com/birding/me/afghanistan(AnssiTripReport).htm). Accessed April 2006.
- Larsson, P.Y. 1978. Status of alpine rangelands in central Afghanistan with special reference to the Ajar Valley Wildlife Reserve. FAO, FO: DP/AFG78/007, Field Report No. 1. Kabul.
- Ledgard, J. 2004. The valley of the king. *Atlantic Monthly*, April, pp. 150 – 154.
- LePage, D. 2006. AVIBASE—Bird Checklists of the World: Afghanistan. <http://www.bsc-eoc.org/avibase/avibase.jsp?pg=checklist&region=af&list=howardmoore&lang=EN>. Accessed April 2006.
- Leviton, A.E. and Anderson, S.C. The amphibians and reptiles of Afghanistan, a checklist and key to the herptofauna. Series/Edition 4, Proceedings of the California Academy of Science, 38: 163 – 206.
- Library of Congress. nd. A country study: Afghanistan. <http://lcweb2.loc.gov/frd/cs/afoc.html>. Accessed May 2006.
- Lowe S., Browne M., Boudjelas S. and M. De Poorter (2000) 100 of the World's Worst Invasive Alien Species: A selection from the Global Invasive Species Database. Published by The Invasive Species Specialist Group (ISSG) a specialist group of the Species Survival Commission (SSC) of the World Conservation Union (IUCN), 12pp. First published as special lift-out in *Aliens* 12, December 2000. Updated and reprinted version: November 2004.
- Leviton, A. E. and S. C. Anderson, 1970. The amphibians and reptiles of Afghanistan, a checklist and key to the herpetofauna. Series/Edition 4, Proceedings of the California Academy of Science 38: 163-206.
- Malikyar, G.M. 2000. The status of environment in Afghanistan. Save the Environment Afghanistan (SEA) Annual Report for 1999. 67pp.
- Mirza, M.R. 1986. Ichthyogeography of Afghanistan and adjoining areas. *Pakistan Journal of Zoology* 18(4): 331 – 339.
- National Climatic Data Centre, <http://lwf.ncdc.noaa.gov/oa/climate/research/afghan/overview.html>. Accessed April 2006.
- National Geographic Society 1995. National Geographic Atlas of the World - Revised Sixth Edition. Washington, D.C.
- Niethammer, G. 1967. Zwei Jahre Vogelbeobachtungen an stehenden Gewässern bei Kabul in Afghanistan. *J. Ornithologie* 108: 119 – 164.
- Nogge, G. 1974. Beobachtungen an den Flamingobrutplätzen Afghanistans. *J. Ornithologie* 115: 142- 151.
- Oliver, M. 2004. Grape gardens in the desert. Roots of Peace website. <http://www.rootsofpeace.org/press/GRAPEGARDENSINTHEDESERT.htm>
- Olson, D.M. et al. 2001. Terrestrial eco-regions of the world: A new map of life on Earth. *BioScience* 51(11): 933- 937. See [http://www.worldwildlife.org/wildworld/profiles/terrestrial\\_pa.html](http://www.worldwildlife.org/wildworld/profiles/terrestrial_pa.html)
- Omrani, B. and M. Leeming. 2005. Afghanistan: A companion and guide. Odyssey Books and Guides, Hong Kong. 768 pp.
- Petocz, R.G. 1978a. Report on the Afghan Pamir. Part 1: Ecological reconnaissance. FAO FO:DP/AFG/74/016, Field Document No. 5. Kabul.
- Petocz, R.G. 1978b. Report on the Afghan Pamir. Part 2: Biology of Marco Polo Sheep. FAO FO:DP/AFG/74/016, Field Document No. 6. Kabul.

- Petocz, R.G. 1978c. Report on the Afghan Pamir. Part 23: Management Plan for the Big Pamir Wildlife Reserve. FAO FO: DP/AFG/74/016, Field Document No. 7. Kabul.
- Petocz, R.G. 2006a. Interim management plan for Dasht-e Nawar. Unpubl. Report submitted to UNEP.
- Petocz, R.G. 2006b. Information Sheet on Ramsar Wetlands Ramsar nomination document for Dashte Nawar.
- Petocz, R.G. 2006c. Interim management plan for Kol-e Hashmat Khan. Unpubl. Rept. Submitted to UNEP.
- Petocz, R.G. and K. Habibi. 1975. The flamingoes of Ab-i-Estada and Dashte Nawar. Ghazni Province, Afghanistan. FAO report. FO/DP/AFG/72/005.
- Petocz, R.G. and J.Y. Larsson. 1977. Ecological reconnaissance of western Nuristan with recommendations for management. FAO, FO:DP/AFG/74/016. Field Document #9, Kabul.
- Petocz, R.G., Rodenburg, W.F. and K. Habibi. 1976. The birds of Hamun-i-Puzak. Unpubl. FAO report.
- Petr, T. 1999. Coldwater fish and fisheries in Afghanistan. FAO Fish. Tech. Pap. No. 385. pages 138 - 148. [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/DOCREP/003/X2614E/x2614e08.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/X2614E/x2614e08.htm). Accessed April 2006.
- Population Reference Bureau. 2005. 2005 World Population Data Sheet. [http://www.prb.org/pdf05/05WorldDataSheet\\_Eng.pdf](http://www.prb.org/pdf05/05WorldDataSheet_Eng.pdf). Accessed February 2006.
- Rahim, A. and J.Y. Larsson. 1978. A Preliminary Study of Lake Hashmat Khan with Recommendations for Management. FO:DP/AFG/74/016.
- RAMP (Rebuilding Agricultural Markets Program). nd. Agriculture in Afghanistan. <http://www.ramp-af.com/agriculture/index.html#sectAfghanistan>
- Rasmussen, P.C. and J.C. Anderton. 2005. Birds of South Asia: The Ripley Guide. Vol. 1: Field Guide; Vol 2. Attributes and Status. Lynx Edicions and Smithsonian Institution. Washington D.C. and Barcelona.
- Sauey, R. 1985. The range, status and winter ecology of the Siberian Crane (*Grus leucogeranus*). PhD thesis, Cornell University, Ithaca, NY.
- Sayer, J. A. and Van der Zon, A. P. M. 1981. National Parks and Wildlife Conservation, Afghanistan. A Contribution to a Conservation Strategy. Rome: FAO; Technical Report.
- Scott, D.A. 1995. A directory of wetlands in the Middle East. IUCN Gland, Switzerland and IWRB, Slimbridge, U.K
- Shank, C. C. and W.F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. Kabul. UNDP, FAO and Department of Forests and Range, Ministry of Agriculture . 43 pp. FO: DP/AFG/74/016.
- Shank, C.C., Petocz, R.G. and K. Habibi. 1977. A preliminary management plan for the Ajar Valley Wildlife Reserve. FO: DP/AFG/74/016.
- Solem, A. 1979. The mollusks of Afghanistan. Fieldiana Zoology New Series 1(1), pp. 1 – 89.
- Steiner, M. & J. Poelt, 1986: Lichenotheca Afghanistanica. Faszikel 1. - Institut für Botanik, Graz.
- Takhtajan, A. 1986. Floristic regions of the world. University of California Press, Berkeley and Los Angeles. 522 pp.



- Toderich, K. and Tsukatani. 2005. Water/Pasture Assessment of Registan Desert (Kandahar and Helmand Provinces). Discussion Paper No. 606. Kyoto Institute of Economic Research, Kyoto University, Kyoto Japan. <http://www.kier.kyoto-u.ac.jp/DP/DP606.pdf>
- Udvardy, M.D.F. 1975. A classification of the biogeographic provinces of the world. IUCN Occasional Paper 18: 1-49.
- United Nations Environment Programme (UNEP). 2003a. Post-conflict environmental assessment: Afghanistan. UNEP, Geneva. 176pp.
- United Nations Environment Programme (UNEP). 2003b. Afghanistan Wakhan Mission Technical Report. UNEP, Geneva. 104 pp.
- United Nations Environment Programme (UNEP). 2006. History of Environmental Change in the Sistan Basin Based on Satellite Image Analysis: 1976 – 2005. UNEP, Geneva. 60 pp.
- United Nations Population Division. 2006. World Urbanization Prospects: The 2003 Revision Population Database. <http://esa.un.org/unup/p2k0data.asp>. Accessed April 2006.
- UNEP-WCMC. 2006. World Database on Protected Areas. <http://sea.unep-wcmc.org/wdbpa/>. Accessed April 2006.
- UNHCR Return to Afghanistan <http://www.unhcr.ch/cgi-bin/texis/vtx/afghan> Accessed February 2006.
- UNHCR. 1990. Background Report, Ghazni Province. Data Collection for Afghan Repatriation Project.
- UNOSAT nd. [http://unosat.web.cern.ch/unosat/asp/prod\\_free.asp?id=13](http://unosat.web.cern.ch/unosat/asp/prod_free.asp?id=13)
- Ward, R.A. 1972. The mosquitoes of Afghanistan – an annotated checklist. *Mosquito Systematics* 4, No. 3: 93 – 97.
- Wendelbo, P. 1966. Trekk av Afghanistanes plantegeografi. *Botanica Gothoburgensia*. Cited in Larsson, P.Y. 1978. Status of alpine rangelands in central Afghanistan with special reference to the Ajar Valley Wildlife Reserve. FO:DP/AFG78/007, Field Report No. 1.
- World Database on Protected Areas. <http://sea.unep-wcmc.org/wdbpa/>. Accessed April 2006.
- World Resources Institute. 2005. The wealth of the poor: managing ecosystems to fight poverty. Washington, D.C.
- Yalcin, B.C. 1979. The sheep breeds of Afghanistan, Iran and Turkey. FAO/UNEP, Project FP/1108-76-02 (833). In Khan and Iqbal (nd).

## Appendix 1 The Mammals of Afghanistan: A Checklist

Mammals of Afghanistan						
Taxonomy, nomenclature and order of families from						
Duff, A. and A. Lawson 2004. <i>Mammals of the World- A Checklist</i> . A&C Black, London						
Scientific Name	Common Name	Habibi's Threat Assessment	IUCN Red List	CITES	Authority	Notes
<b>Leporidae</b>	<b>Rabbits and Hares</b>					
<i>Lepus capensis</i>	Cape Hare	Common			Habibi (2003)	
<i>Lepus nigricollis</i>	Indian Hare	Unknown			Habibi (2003)	
<i>Ochotona macrotis</i>	Large-eared Pika	Common			Habibi (2003)	
<i>Ochotona rufescens</i>	Afghan Pika	Common			Habibi (2003)	
<b>Sciuridae</b>	<b>Squirrels</b>					
<i>Hylopetes fimbriatus</i>	Small Kashmir Flying Squirrel	Threatened			Habibi (2003)	
<i>Hylopetes baberi</i>	Afghan Flying Squirrel				Dunn and Lawson (2004)	Roberts (1997) disputes the recognition of <i>H. baberi</i> as a separate species from <i>H. fimbriatus</i> .
<i>Marmota caudata</i>	Long-tailed Marmot	Common			Habibi (2003)	
<i>Petaurista petaurista</i>	Giant Flying Squirrel	Threatened			Habibi (2003)	
<i>Spermophilus fulvus</i>	Ground Squirrel	Common			Habibi (2003)	
<i>Spermophilus leptodactylus</i>	Long-clawed Ground Squirrel	Unknown			Habibi (2003)	
<i>Funambulus pennantii</i>	Northern Palm Squirrel				Listed by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/8702/all">http://www.iucnredlist.org/search/details.php/8702/all</a> )	
<b>Dipodidae</b>	<b>Jerboas</b>					
<i>Allactaga elater</i>	Small Five-toed Jerboa	Common			Habibi (2003)	
<i>Allactaga euphratica</i>	Euphrates Jerboa	Unknown			Habibi (2003)	
<i>Allactaga hotsoni</i>	Hotson's Five-toed Jerboa	Unknown			Habibi (2003)	
<i>Jaculus blanfordi</i>	Greater Three-toed Jerboa	Unknown			Habibi (2003)	
<i>Salpingotus thomasi</i>	Thomas's Pygmy jerboa				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/19868/summ">http://www.iucnredlist.org/search/details.php/19868/summ</a> )	Uncertain in Afghanistan. Dunn and Lawson state that type locality (Afghanistan) is "doubtful".

<b>Muridae</b>	<b>Mice and relatives</b>					
<i>Dryomys nitedula</i>	Forest Dormouse	Unknown			Habibi (2003)	
<i>Alticola roylei</i>	Royal's High Mountain Vole	Unknown			Habibi (2003)	
<i>Apodemus sylvaticus</i>	Field Mouse	Unknown			Habibi (2003)	
<i>Apodemus wardi</i>	Ward's Field Mouse				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/1906/summ">http://www.iucnredlist.org/search/details.php/1906/summ</a> )	
<i>Blanfordimys afghanus</i>	Afghan vole	Common			Habibi (2003)	<i>Microtus afghanus</i> in Habibi (2003).
<i>Calomyscus bailwardi</i>	Long-tailed Hamster, Mouse-like Hamster	Unknown			Habibi (2003)	
<i>Calomyscus baluchi</i>	Baluchi Mole-like Hamster				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/3619/dist">http://www.iucnredlist.org/search/details.php/3619/dist</a> )	
<i>Calomyscus mystax</i>	Afghan Mouse-like Hamster				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/3621/dist">http://www.iucnredlist.org/search/details.php/3621/dist</a> )	
<i>Cricetulus migratorius</i>	Gray Hamster	Common			Habibi (2003)	
<i>Ellobius fuscocapillus</i>	Afghan Mole Vole	Unknown			Habibi (2003)	
<i>Ellobius talpinus</i>	Northern Mole Vole	Unknown			Habibi (2003)	
<i>Gerbillus aquilus</i>	Swarthy Gerbil				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/9106/dist">http://www.iucnredlist.org/search/details.php/9106/dist</a> )	Split from <i>G. cheesmani</i> . Habibi cites <i>G. cheesmani</i> from Afghansitan. Duff and Lawson cite <i>G. aquilus</i> from Afghanistan.
<i>Gerbillus nanus</i>	Baluchistan Gerbil	Unknown			Habibi (2003)	
<i>Meriones crassus</i>	Sundevall's Jird	Unknown			Habibi (2003)	
<i>Meriones hurrianae</i>	Indian Desert Gerbil	Unknown			Habibi (2003)	
<i>Meriones libycus</i>	Libyan Jird	Common			Habibi (2003)	
<i>Meriones meridanus</i>	Midday Gerbil	Unknown			Habibi (2003)	
<i>Meriones persicus</i>	Persian Jird	Unknown			Habibi (2003)	
<i>Meriones zarudnyi</i>	Zarudny's Jird	Unknown	EN		Habibi (2003)	
<i>Microtus arvalis</i>	Common Field Vole	Unknown			Habibi (2003)	
<i>Microtus juldaschi</i>	Pamir Vole	Common			Habibi (2003)	
<i>Microtus kirgisorum</i>	Tien Shan vole				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/13438/dist">http://www.iucnredlist.org/search/details.php/13438/dist</a> )	
<i>Microtus socialis</i>	Social Vole	Unknown			Habibi (2003)	
<i>Microtus transcaspicus</i>	Transcaspian vole				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/13459/dist">http://www.iucnredlist.org/search/details.php/13459/dist</a> )	

<b>Muridae</b>	<b>Mice and relatives (Continued)</b>					
<i>Millardia gleadowi</i>	Sand-coloured soft-furred rat				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/13522/dist">http://www.iucnredlist.org/search/details.php/13522/dist</a> )	
<i>Mus musculus</i>	House mouse	Common			Habibi (2003)	
<i>Nesokia indica</i>	Short-tailed Bandicoot Rat	Common			Habibi (2003)	
<i>Rattus rattus</i>	Black Rat	Common			Habibi (2003)	
<i>Rattus tanezumi</i>	Tanezumi rat				Listed for Afghanistan by Dunn and Lawson (2004) and by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/19366/dist">http://www.iucnredlist.org/search/details.php/19366/dist</a> )	
<i>Rattus turkestanicus</i>	Turkestan rat	Common			Habibi (2003)	<i>R. rattoides</i> in Habibi (2003)
<i>Rhombomys opimus</i>	Great Gerbil	Common			Habibi (2003)	
<i>Tatera indica</i>	Indian Gerbil	Common			Habibi (2003)	
<i>Gerbillus cheesmani</i>	Cheesman's gerbil	Unknown			Habibi (2003)	<i>G. cheesmani</i> split into <i>C. aquila</i> and <i>C. cheesmani</i> . Dunn and Lawson cite <i>G. cheesmani</i> from Iran west.

<b>Hystricidae</b>	<b>Old World Porcupines</b>					
<i>Hystrix indica</i>	Crested Porcupine	Common			Habibi (2003)	

<b>Viverridae</b>						
<i>Herpestes auropunctatus</i>	Small Indian Mongoose	Common			Habibi (2003)	Considered as included in <i>H. javanicus</i> by IUCN.
<i>Paguma larvata</i>	Masked Palm Civet				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/41692/dist">http://www.iucnredlist.org/search/details.php/41692/dist</a> )	
<i>Viverricula indica</i>	Small Indian Civet				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/41710/dist">http://www.iucnredlist.org/search/details.php/41710/dist</a> )	

<b>Felidae</b>	<b>Cats</b>					
<i>Acinonyx jubatus venaticus</i>	Cheetah	Extirpated	VU	I	Habibi (2003)	
<i>Caracal caracal</i>	Caracal	Threatened		I	Habibi (2003)	
<i>Felis chaus</i>	Jungle Cat	Threatened		II	Habibi (2003)	
<i>Felis sylvestris</i>	Wild Cat	Threatened		II	Habibi (2003)	Cited as <i>F. libyca</i> by Habibi (2003)
<i>Lynx lynx</i>	Lynx	Threatened		II	Habibi (2003)	
<i>Otocolobus manul</i>	Pallas' Cat	Threatened		II	Habibi (2003)	
<i>Panthera pardus</i>	Leopard	Threatened		I	Habibi (2003)	
<i>Panthera tigris</i>	Tiger	Extirpated	EN	I	Habibi (2003)	

<b>Felidae</b>	<b>Cats (Continued)</b>					
<i>Prionailurus bengalensis</i>	Leopard Cat	Unknown		II	Habibi (2003)	
<i>Uncia uncia</i>	Snow Leopard	Threatened	EN	I	Habibi (2003)	
<i>Felis margarita</i>	Sand Cat			II	Cited by IUCN as ? for Afghanistan ( <a href="http://www.iucnredlist.org/search/details.php/8541/dist">http://www.iucnredlist.org/search/details.php/8541/dist</a> ). Cited as an Afghan species by CITES	Unconfirmed for Afghanistan
<i>Panthera leo</i>	African lion		VU	I or II	Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/15951/dist">http://www.iucnredlist.org/search/details.php/15951/dist</a> )	No records for Afghanistan. Historic range suggests it may have been present.

<b>Herpestidae</b>						
<i>Herpestes edwardsii</i>	Common Grey Mongoose	Unknown			IUCN lists it for Afghanistan ( <a href="http://www.iucnredlist.org/search/details.php/41611/dist">http://www.iucnredlist.org/search/details.php/41611/dist</a> )	Uncertain in Afghanistan, see Habibi (2003)

<b>Hyaenidae</b>	<b>Hyaenas</b>					
<i>Hyaena hyaena</i>	Striped Hyena	Common			Habibi (2003)	

<b>Canidae</b>	<b>Dogs and foxes</b>					
<i>Canus aureus</i>	Jackal	Rare			Habibi (2003)	
<i>Canus lupus</i>	Wolf	Threatened		II	Habibi (2003)	
<i>Vulpes cana</i>	Blandford's Fox	Threatened	VU	II	Habibi (2003)	
<i>Vulpes corsac</i>	Corsac Fox	Threatened			Habibi (2003)	
<i>Vulpes ruelii</i>	Sand Fox	Threatened			Habibi (2003)	
<i>Vulpes vulpes</i>	Red Fox	Common			Habibi (2003)	

<b>Ursidae</b>	<b>Bears</b>					
<i>Ursus arctos</i>	Brown bear	Threatened		II	Habibi (2003)	
<i>Ursus thibetanus</i>	Asiatic Black Bear	Threatened	VU	I	Habibi (2003)	

<b>Mustelidae</b>	<b>Weasels</b>					
<i>Lutra lutra</i>	Common Otter	Threatened		I	Habibi (2003)	
<i>Martes flavigula</i>	Yellow-throated Marten	Threatened			Habibi (2003)	
<i>Martes foina</i>	Stone Marten	Threatened			Habibi (2003)	
<i>Mustela eriminea</i>	Ermine	Rare			Habibi (2003)	
<i>Mustela nivalis</i>	Weasel	Threatened			Habibi (2003)	
<i>Vormela peregusna</i>	Marbled Pole Cat	Rare			Habibi (2003)	

<b>Mustelidae</b>	<b>Weasels (Continued)</b>					
<i>Meles meles</i>	Badger	Unknown			Habibi (2003)	Uncertain in Afghanistan, see Habibi (2003)
<i>Mellivora capensis</i>	Ratel	Unknown			Cited for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/41629/dist">http://www.iucnredlist.org/search/details.php/41629/dist</a> )	Uncertain in Afghanistan, see Habibi (2003)

<b>Erinaceidae</b>	<b>Hedgehogs</b>					
<i>Hemiechinus auritus</i>	Long-Eared Hedgehog	Common			Habibi (2003)	<i>H. megalotis</i> , cited in Habibi (2003) is now included in <i>H. auritus</i> .
<i>Hemiechinus hypomelas</i>	Brandt's Hedgehog	Unknown			Habibi (2003)	

<b>Soricidae</b>	<b>Shrews</b>					
<i>Crocidura gmelini</i>	Gmelin's Shrew				Cited for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/41319/dist">http://www.iucnredlist.org/search/details.php/41319/dist</a> )	
<i>Crocidura pullata</i>	Dusky Shrew				Insectivore Specialist Group 1996. <i>Crocidura gmelini</i> . In: IUCN 2004. 2004 IUCN Red List of Threatened Species. Dunn and Lawson (2004)	
<i>Crocidura russula</i>	Common White-Toothed Shrew	Unknown			Habibi (2003)	
<i>Crocidura suaveolens</i>	Lesser White-Toothed Shrew	Unknown			Habibi (2003)	
<i>Crocidura zarudnyi</i>	Pale Gray Shrew	Unknown			Habibi (2003)	
<i>Suncus etruscus</i>	Etruscan pygmy shrew				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/29671/dist">http://www.iucnredlist.org/search/details.php/29671/dist</a> )	
<i>Suncus murinus</i>	House Shrew	Unknown			Habibi (2003)	
<i>Sorex minutus</i>	European Pygmy Shrew				Listed by IUCN as a ? For Afghanistan ( <a href="http://www.iucnredlist.org/search/details.php/29667/dist">http://www.iucnredlist.org/search/details.php/29667/dist</a> )	

<b>Emballonuridae</b>	<b>Sheath-tailed bats</b>					
<i>Taphozous nudiventris</i>	Naked-Rumped Tomb Bat	None			Habibi (2003)	

<b>Rhinopomatidae</b>	<b>Mouse-tailed bats</b>					
<i>Rhinopoma hardwickei</i>	Lesser Mouse-Tailed Bat	None			Habibi (2003)	
<i>Rhinopoma microphyllum</i>	Greater Mouse-Tailed Bat	None			Habibi (2003)	
<i>Rhinopoma muscatellum</i>	Small Mouse-Tailed Bat	None			Habibi (2003)	

<b>Megadermatidae</b>		<b>False vampires</b>				
<i>Magaderma lyra</i>	Greater False Vampire	None			Habibi (2003)	

<b>Rhinolophidae</b>		<b>Horseshoe bats</b>				
<i>Asellia tridens</i>	Trident Bat	None			Habibi (2003)	
<i>Hipposideros fulvus</i>	Bicolored Leaf-Nosed Bat	None			Habibi (2003)	
<i>Rhinolophus blasii</i>	Blasius' Horseshoe Bat	None			Habibi (2003)	
<i>Rhinolophus clivosus</i>	Geoffroy's horseshoe bat	None			Habibi (2003)	<i>R. bocharicus</i> cited by Habibi (2003) but now included in <i>R. clivosus</i>
<i>Rhinolophus ferrumequinum</i>	Greater Horseshoe Bat	None			Habibi (2003)	
<i>Rhinolophus hipposideros</i>	Lesser Horseshoe Bat	None			Habibi (2003)	
<i>Rhinolophus lepidus</i>	Blyth's Horseshoe Bat	None			Habibi (2003)	
<i>Rhinolophus mehelyi</i>	Mehelyi's Horseshoe Bat		VU		Koopman (1993)	

<b>Molossidae</b>		<b>Free-tailed bats</b>				
<i>Tadarida aegyptiaca</i>	Egyptian Free-Tailed Bat	None			Habibi (2003)	
<i>Tadarida teniotis</i>	European Free-Tailed Bat	None			Habibi (2003)	

<b>Vespertilionidae</b>		<b>Evening bats</b>				
<i>Barbastella leucomelas</i>	Eastern Barbastelle	Not indicated			Habibi (2003)	
<i>Eptesicus bottae</i>	Botta's Serotine	None			Habibi (2003)	
<i>Eptesicus nilssoni</i>	Northern Bat				<i>E. gobiensis</i> listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/41531/dist">http://www.iucnredlist.org/search/details.php/41531/dist</a> )	Cited by IUCN as <i>E. gobiensis</i> ; now included in <i>E. nilssoni</i>
<i>Eptesicus nasutus</i>	Sind Serotine Bat	None	VU		Habibi (2003)	
<i>Eptesicus serotinus</i>	Serotine Bat	None			Habibi (2003)	
<i>Miniopterus schreibersi</i>	Schreiber's Long-Fingered Bat	Not indicated			Habibi (2003)	
<i>Myotis blythii</i>	Lesser Mouse-Eared Bat	None			Habibi (2003)	
<i>Myotis emarginatus</i>	Geoffroy's Bat	None	VU		Habibi (2003)	
<i>Myotis formosus</i>	Hodgson's Bat	None			Habibi (2003)	
<i>Myotis frater</i>	Fraternal Bat				Chiroptera Specialist Group 1996. <i>Myotis frater</i> . In: IUCN 2004. 2004 IUCN Red List of Threatened Species. < <a href="http://www.iucnredlist.org">www.iucnredlist.org</a> >. Dunn and Lawson (2004)	
<i>Myotis longipes</i>	Kashmir Cave Bat	None	VU		Habibi (2003)	

<b>Vespertilionidae</b>	<b>Evening bats (Continued)</b>					
<i>Myotis mystacinus</i>	Whiskered Bat	None			Habibi (2003)	
<i>Nyctalus leisleri</i>	Lesser Noctule				Chiroptera Specialist Group 1996. <i>Nyctalus leisleri</i> . In: IUCN 2004. 2004 IUCN Red List of Threatened Species. < <a href="http://www.iucnredlist.org">www.iucnredlist.org</a> >. Dunn and Lawson (2004)	
<i>Nyctalus montanus</i>	Mountain Noctule	None			Habibi (2003)	
<i>Myotis muricola</i>	Whiskered Myotis				Chiroptera Specialist Group 1996. <i>Myotis muricola</i> . In: IUCN 2004. 2004 IUCN Red List of Threatened Species. Dunn and Lawson (2004)	
<i>Otonycteris hemprichii</i>	Hemprich's Long-Eared Bat	Not indicated			Habibi (2003)	
<i>Pipistrellus babu</i>	Himalayan Pipistrelle	Not indicated			Habibi (2003)	
<i>Pipistrellus coromandra</i>	Indian Pipistrelle	Not indicated			Habibi (2003)	
<i>Pipistrellus javanicus</i>	Javan Pipistrelle				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/17344/dist">http://www.iucnredlist.org/search/details.php/17344/dist</a> )	
<i>Pipistrellus kuhlii</i>	Kuhl's Pipistrelle	Not indicated			Habibi (2003)	
<i>Pipistrellus mimus</i>	Indian Pygmy Pipistrelle	Not indicated			Habibi (2003)	
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	Not indicated			Habibi (2003)	
<i>Pipistrellus savii</i>	Savi's Pipistrelle				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/44856/dist">http://www.iucnredlist.org/search/details.php/44856/dist</a> )	Cited by IUCN as <i>Hypsugo savii</i> . Now considered as <i>Pipistrellus savii</i> .
<i>Plecotus austriacus</i>	Grey Long-Eared Bat	Not indicated			Habibi (2003)	
<i>Scotophilus heathi</i>	Asiatic Greater Yellow House Bat	Not indicated			Habibi (2003)	
<i>Vespertilio murinus</i>	Particolored Bat	Not indicated			Habibi (2003)	
<i>Pipistrellus tenuis</i>	Least Pipistrelle				Listed for Afghanistan by IUCN ( <a href="http://www.iucnredlist.org/search/details.php/17368/dist">http://www.iucnredlist.org/search/details.php/17368/dist</a> )	Range maps show it to be restricted to SE Asia. ( <a href="http://www.funet.fi/pub/sci/bio/life/mammalia/chiroptera/vespertilionidae/pipistrellus/index.html">http://www.funet.fi/pub/sci/bio/life/mammalia/chiroptera/vespertilionidae/pipistrellus/index.html</a> )

<b>Cercopithecidae</b>	<b>Old World Monkeys</b>					
<i>Macaca mulatta</i>	Rhesus Macaque	Common		II	Habibi (2003)	



<b>Suidae</b>	<b>Swine</b>					
<i>Sus scrofa</i>	Wild Boar	Common			Habibi (2003)	

<b>Cervidae</b>	<b>Deer</b>					
<i>Cervus elaphus bactrianus</i>	Bactrian Deer	Threatened	VU	II	Habibi (2003)	Subspecies listed as Vulnerable by IUCN
<i>Moschus chrysogaster</i>	Himalayan Musk Deer, Alpine Musk Deer	Extremely rare		I	Habibi (2003)	<i>M. moschiferus</i> in Habibi (2003). This species occurs in NE Asia.

<b>Bovidae</b>	<b>Oxen and relatives</b>					
<i>Capra aegagrus</i>	Wild Goat or Bezoar Goat	Threatened	VU		Habibi (2003)	
<i>Capra falconeri</i>	Markhor	Threatened	EN	I	Habibi (2003)	Two subspecies in Afghanistan. <i>C.f.heptneri</i> is Red Listed as Critically Endangered. <i>C.f. megaceros</i> is Red Listed as Endangered.
<i>Capra siberica</i>	Siberian Ibex	Rare			Habibi (2003)	<i>Capra ibex</i> in Habibi (2003). Now usually considered <i>C. siberica</i> .
<i>Gazella bennettii</i>	Chinkara	Threatened			Habibi (2001)	May no longer exist in Afghanistan.
<i>Gazella subguterosa</i>	Goitered Gazelle	Threatened			Habibi (2003)	
<i>Ovis ammon</i>	Argali	Threatened	VU	II	Habibi (2003)	<i>A.a. poli</i> subspecies in Afghanistan. Subspecies listed as Vulnerable by IUCN
<i>Ovis vignei</i>	Urial	Unknown	VU	II	Habibi (2003)	Taxonomy is unsettled. IUCN and others consider this <i>O.orientalis</i> . Regardless, <i>cycloceros</i> is the only subspecies found in Afghanistan.

Bovidae		Oxen and relatives (Continued)				
<i>Naemorhedus goral</i>	Goral			I	Listed by IUCN as ? For Afghanistan ( <a href="http://www.iucnredlist.org/search/details.php/14296/dist">http://www.iucnredlist.org/search/details.php/14296/dist</a> )	“Hearsay” reports from Nangarhar and Kunar (Sayer and van der Zon 1981; p. 33). Range maps in Shackleton (1997) do not suggest occurrence in Afghanistan.
<i>Bos mutus</i>	Wild Yak		VU	I	Cited for Afghanistan by the CITES database. See Naumann 1970.	Uncertain for Afghanistan. Sometimes considered <i>Bos grunniens</i> .

Equidae		Horses				
<i>Equus onager</i>	Onager or Asian Wild Ass	Threatened		II	Habibi (2003)	Considered <i>E. hemionus</i> by Habibi (2003) and IUCN. Considered <i>E. onager</i> by IUCN and by Duff and Lawson (2004). Regardless, the Afghan subspecies are <i>onager</i> and <i>kulan</i> .

Rhinocerotidae						
<i>Rhinoceros unicornis</i>	Indian Rhinoceros			I	Fitzherbert (2005) says cited for Nangahar in early “namas”. Rookmaaker (2000) notes a 1556 report of rhinoceros on either the Afghan or the Pakistan side of the mountains.	Uncertain for Afghanistan.

Note: this list follows the McKenna-Bell sequence of mammalian orders (McKenna, M.C. and Bell S.K. 1997. Classification of Mammals Above the Species Level. New York, Columbia University Press)

### References:

- Duff, A. and Lawson, A. 2004. Mammals of the World- A Checklist. A&C Black, London
- Fitzherbert, A. 2005. Wildlife of Afghanistan. Pages 659 - 709 In Omrani, B. and M. Leeming. Afghanistan: A companion and guide. Pp. 659 - 709. Odyssey Books and Guides.
- Habibi, K. 2003. Mammals of Afghanistan. Zoo Outreach and US Fish and Wildlife Service. 168 pp.
- Habibi, K. 2001. Afghanistan. In: D.P. Mallon and S.K. Kingswood (compilers). Antelopes. Part 4: North Africa, the Middle East, and Asia. Global Survey and Regional Action Plans. pp.119-121. IUCN, Gland.
- Koopman, K. 1993. Order Chiroptera. In Wilson, D.E. and Reeder, D.M. Mammal species of the world: a taxonomic and geographic reference. 2nd edition. Smithsonian Pr., Washington. 1206 pp.
- Naumann, C. 1970. Ein ehemaliges Wildyak-vorkommen im afghanischen Pamir. Bonn. Zool. Beitr. 24: 249-253.
- Roberts, T.J. 1997. The mammals of Pakistan. 2nd ed: Ernest Benn Ltd., London, United Kingdom
- Rookmaaker, L.C. 2000. Records of the rhinoceros in Pakistan and Afghanistan. Pakistan J. Zool. 32(1):65-74.
- Sayer, J.A. and Van der Zon, A.P.M. 1981. National parks and wildlife conservation, Afghanistan: A contribution to a conservation strategy. FAO FO:DP/AFG/78/007, Rome. 2 vols.

## Appendix 2 The Birds of Afghanistan: A Checklist

<b>Afghanistan Bird Checklist</b>				
<b>Taxonomy and Order of Families Follows</b>				
<b>Dickenson, E.C. (ed). 2004. <i>The Howard and Moore Complete Checklist of the Birds of the World</i>. 3rd ed., Christopher Helm, London.</b>				
		IUCN Red List	CITES	Notes
<b>Phasianidae</b>	<b>Turkeys, Grouse, Pheasants and Partridges</b>			
Himalayan Snowcock	<i>Tetraogallus himalayensis</i>			
Chukar	<i>Alectoris chukar</i>			
See-see Partridge	<i>Ammoperdix griseogularis</i>			
Black Francolin	<i>Francolinus francolinus</i>			
Common Quail	<i>Coturnix coturnix</i>			
Koklass Pheasant	<i>Pucrasia macrolopha</i>			
Himalayan Monal	<i>Lophophorus impejanus</i>		I	
Ring-necked Pheasant	<i>Phasianus colchicus</i>			
Rock Partridge	<i>Alectoris graeca</i>			Unconfirmed. Cited by Habibi (nd)
Gray Francolin	<i>Francolinus pondicerianus</i>			Unconfirmed. Cited by Avibase
Rain Quail	<i>Coturnix coromandelica</i>			Unconfirmed. Cited by Habibi
Cheer Pheasant	<i>Catreus wallichi</i>	VU	I	Unconfirmed. Cited by Avibase
Red Junglefowl	<i>Gallus gallus</i>			Unconfirmed. Cited by Avibase. Possibly feral?

<b>Anatidae</b>	<b>Ducks, Geese and Swans</b>			
Mute Swan	<i>Cygnus olor</i>			Perhaps introduced.
Whooper Swan	<i>Cygnus cygnus</i>			
Greylag Goose	<i>Anser anser</i>			
Bar-headed Goose	<i>Anser indicus</i>			
Ruddy Shelduck	<i>Tadorna ferruginea</i>			
Common Shelduck	<i>Tadorna tadorna</i>			
Cotton Pygmy-goose	<i>Nettapus coromandelianus</i>			
Eurasian Wigeon	<i>Anas penelope</i>			
Falcated Duck	<i>Anas falcata</i>			
Gadwall	<i>Anas strepera</i>			
Eurasian Teal	<i>Anas crecca</i>			
Mallard	<i>Anas platyrhynchos</i>			
Northern Pintail	<i>Anas acuta</i>			
Garganey	<i>Anas querquedula</i>			
Northern Shoveler	<i>Anas clypeata</i>			
Marbled Teal	<i>Marmaronetta angustirostris</i>	VU		
Red-crested Pochard	<i>Netta rufina</i>			
Common Pochard	<i>Aythya ferina</i>			

<b>Anatidae</b>	<b>Ducks, Geese and Swans (Continued)</b>			
Ferruginous Pochard	<i>Aythya nyroca</i>			
Tufted Duck	<i>Aythya fuligula</i>			
Greater Scaup	<i>Aythya marila</i>			
Common Goldeneye	<i>Bucephala clangula</i>			
Smew	<i>Mergellus albellus</i>			
Red-breasted Merganser	<i>Mergus serrator</i>			
Common Merganser	<i>Mergus merganser</i>			
White-headed Duck	<i>Oxyura leucocephala</i>	EN	II	
Greater White-fronted Goose	<i>Anser albifrons</i>			Unconfirmed. Rasmussen and Anderton (2005) cite only undocumented sight reports from Afghanistan
Lesser White-fronted Goose	<i>Anser erythropus</i>	VU		Unconfirmed. Cited by IUCN Red List.
Baikal Teal	<i>Anas formosa</i>	VU	II	Unconfirmed. Cited by Avibase
Greater Scaup	<i>Aythya marila</i>			Unconfirmed. Cited by Avibase
White-winged Scoter	<i>Melanitta fusca</i>			Unconfirmed. Cited by Avibase

<b>Podicipedidae</b>	<b>Grebes</b>			
Little Grebe	<i>Tachybaptus ruficollis</i>			
Great Crested Grebe	<i>Podiceps cristatus</i>			
Horned Grebe	<i>Podiceps auritus</i>			
Eared Grebe	<i>Podiceps nigricollis</i>			
Red-necked Grebe	<i>Podiceps grisegena</i>			

<b>Phoenicopteridae</b>	<b>Flamingoes</b>			
Greater Flamingo	<i>Phoenicopus roseus</i>		II	
Lesser Flamingo	<i>Phoenicopus minor</i>		II	Unconfirmed. Cited by Avibase and Habibi. Rasmussen and Anderton (2005) suggest identification may be confounded with Greater Flamingo.

<b>Ciconiidae</b>	<b>Storks</b>			
Black Stork	<i>Ciconia nigra</i>		II	
White Stork	<i>Ciconia ciconia</i>			

<b>Threskiornithidae</b>	<b>Ibises and Spoonbills</b>			
Glossy Ibis	<i>Plegadis falcinellus</i>			
Eurasian Spoonbill	<i>Platalea leucorodia</i>		II	

<b>Ardeidae</b>	<b>Hérons and Bitterns</b>			
Gray Heron	<i>Ardea cinerea</i>			
Purple Heron	<i>Ardea purpurea</i>			
Great Egret	<i>Ardea alba</i>			
Little Egret	<i>Egretta garzetta</i>			
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>			
Little Bittern	<i>Ixobrychus minutus</i>			

<b>Ardeidae</b>	<b>Hérons and Bitterns (Continued)</b>			
Great Bittern	<i>Botaurus stellaris</i>			
Squacco Heron	<i>Ardeola ralloides</i>			Unconfirmed. Rasmussen and Anderton (2005) state only one sight report from Afghanistan

<b>Pelecanidae</b>	<b>Pelicans</b>			
Great White Pelican	<i>Pelecanus onocrotalus</i>			
Dalmatian Pelican	<i>Pelecanus crispus</i>	VU	I	

<b>Phalacrocoracidae</b>	<b>Cormorants</b>			
Great Cormorant	<i>Phalacrocorax carbo</i>			
Pygmy Cormorant	<i>Phalacrocorax pygmaeus</i>			
Little Cormorant	<i>Phalacrocorax niger</i>			Unconfirmed. Cited by Avibase and Habibi. Rasmussen and Anderton (2005) state that the only Afghan specimen was misidentified, but that the species may occur in Afghanistan.

<b>Falconidae</b>	<b>Falcons and Caracaras</b>			
Lesser Kestrel	<i>Falco naumanni</i>	VU	II	
Eurasian Kestrel	<i>Falco tinnunculus</i>		II	
Merlin	<i>Falco columbarius</i>		II	
Eurasian Hobby	<i>Falco subbuteo</i>		II	
Laggar Falcon	<i>Falco jugger</i>		I	
Saker Falcon	<i>Falco cherrug</i>	EN	II	
Barbary Falcon	<i>Falco pelegrinoides</i>		I	Rasmussen and Anderton (2005) consider <i>F. pelegrinoides</i> to be synonymous with <i>F. peregrinus</i>
Peregrine Falcon	<i>Falco peregrinus</i>		I	
Red-footed Falcon	<i>Falco vespertinus</i>		II	Unconfirmed. Cited by Habibi. Sight reports from Afghanistan needing verification (Rasmussen and Anderton 2005).
Amur Falcon	<i>Falco amurensis</i>		II	Unconfirmed. Cited by Avibase. Sometimes considered conspecific with <i>F. vespertinus</i> .
Gyr Falcon	<i>Falco rusticolus</i>		I	Unconfirmed. Cited by Habibi. Rasmussen and Anderton (2005) cite it as hypothetical for Afghanistan. No specimens were traced.

<b>Accipitridae</b>	<b>Secretary Bird, Osprey, Kites, Hawks and Eagles</b>			
Osprey	<i>Pandion haliaetus</i>		II	
Black-shouldered Kite	<i>Elanus caeruleus</i>		II	
Black Kite	<i>Milvus migrans</i>		II	Cited as <i>M. lineatus</i> in CITES. The <i>M. migrans</i> complex is likely to contain more than one species (Rasmussen and Anderton 2005)
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	VU	II	
White-tailed Eagle	<i>Haliaeetus albicilla</i>		I	
Lammergeier	<i>Gypaetus barbatus</i>		II	

<b>Accipitridae</b>	<b>Secretary Bird, Osprey, Kites, Hawks and Eagles (Continued)</b>			
Egyptian Vulture	<i>Neophron percnopterus</i>		II	
White-rumped Vulture	<i>Gyps bengalensis</i>	CR	II	
Himalayan Griffon	<i>Gyps himalayensis</i>		II	
Eurasian Griffon	<i>Gyps fulvus</i>		II	
Cinereous Vulture	<i>Aegypius monachus</i>		II	
Short-toed Eagle	<i>Circaetus gallicus</i>		II	
Western Marsh-Harrier	<i>Circus aeruginosus</i>		II	
Northern Harrier	<i>Circus cyaneus</i>		II	
Pallid Harrier	<i>Circus macrourus</i>		II	
Montagu's Harrier	<i>Circus pygargus</i>		II	
Shikra	<i>Accipiter badius</i>		II	
Eurasian Sparrowhawk	<i>Accipiter nisus</i>		II	
Northern Goshawk	<i>Accipiter gentilis</i>		II	
White-eyed Buzzard	<i>Butastur teesa</i>		II	
Long-legged Buzzard	<i>Buteo rufinus</i>		II	
Rough-legged Hawk	<i>Buteo lagopus</i>		II	Rasmussen and Anderton (2005) cite <i>B. lagopus</i> as a winter vagrant in Afghanistan
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	II	
Steppe Eagle	<i>Aquila nipalensis</i>		II	
Imperial Eagle	<i>Aquila heliaca</i>	VU	I	
Golden Eagle	<i>Aquila chrysaetos</i>		II	
Bonelli's Eagle	<i>Aquila fasciatus</i>		II	Cited as <i>Hieraetus fasciatus</i> in CITES
Booted Eagle	<i>Aquila pennatus</i>		II	
Indian Vulture	<i>Gyps indicus</i>	CR	II	Unconfirmed. Sometimes lumped as <i>G. bengalensis</i> . Sight reports for Afghanistan are unlikely and need verification (Rasmussen and Anderton 2005).
European Honey-buzzard	<i>Pernis apivorus</i>		II	Unconfirmed. Cited by Avibase and Habibi. Undetailed sight report from Afghanistan (Rasmussen and Anderton 2005).
Eurasian Buzzard	<i>Buteo buteo</i>		II	Cited by Avibase and Habibi. Rasmussen and Anderton (2005) consider only Afghan specimen actually a Long-legged Buzzard.

<b>Otididae</b>	<b>Bustards</b>			
Great Bustard	<i>Otis tarda</i>	VU	II	
Houbara Bustard	<i>Chlamydotis undulata</i>	VU	I	
Little Bustard	<i>Tetrax tetrax</i>		II	

<b>Turnicidae</b>	<b>Buttonquails</b>			
Andalusian Hemipode, Small Buttonquail	<i>Turnix sylvatica (sylvaticus)</i>			Unconfirmed. Cited by Habibi. Rasmussen and Anderton (2005) indicate range near Afghan-Pakistan border.

<b>Rallidae</b>	<b>Rails, Waterhens and Coots</b>			
Water Rail	<i>Rallus aquaticus</i>			
Corn Crake	<i>Crex crex</i>	VU		
Little Crake	<i>Porzana parva</i>			
Baillon's Crake	<i>Porzana pusilla</i>			
Spotted Crake	<i>Porzana porzana</i>			
Purple Swampphen	<i>Porphyrio porphyrio</i>			
Common Moorhen	<i>Gallinula chloropus</i>			
Eurasian Coot	<i>Fulica atra</i>			

<b>Gruidae</b>	<b>Cranes</b>			
Demoiselle Crane	<i>Anthropoides virgo</i>		II	
Siberian Crane	<i>Grus leucogeranus</i>	CR	I	Extirpated in Afghanistan
Common Crane	<i>Grus grus</i>		II	

<b>Burhinidae</b>	<b>Thick-Knees</b>			
Eurasian Thick-knee	<i>Burhinus oediconemus</i>			

<b>Haematopodidae</b>	<b>Oystercatchers</b>			
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>			

<b>Recurvirostridae</b>	<b>Stilts and Avocets</b>			
Black-winged Stilt	<i>Himantopus himantopus</i>			
Pied Avocet	<i>Recurvirostra avosetta</i>			

<b>Charadriidae</b>	<b>Plovers</b>			
Northern Lapwing	<i>Vanellus vanellus</i>			
Red-wattled Lapwing	<i>Vanellus indicus</i>			
Sociable Lapwing	<i>Vanellus gregarius</i>	CR		
White-tailed Lapwing	<i>Vanellus leucurus</i>			
Black-bellied Plover	<i>Pluvialis squatarola</i>			
Pacific Golden-Plover	<i>Pluvialis fulva</i>			
Common Ringed Plover	<i>Charadrius hiaticula</i>			
Little Ringed Plover	<i>Charadrius dubius</i>			
Snowy Plover	<i>Charadrius alexandrinus</i>			
Lesser Sandplover	<i>Charadrius mongolus</i>			
Greater Sandplover	<i>Charadrius leschenaultii</i>			

<b>Rostratulidae</b>	<b>Painted-Snipe</b>			
Greater Painted-snipe	<i>Rostratula benghalensis</i>			

<b>Jacanae</b>	<b>Jacanas</b>			
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>			

<b>Scolopacidae</b>	<b>Sandpipers and Snipe</b>			
Eurasian Woodcock	<i>Scolopax rusticola</i>			
Jack Snipe	<i>Lymnocyptes minimus</i>			
Solitary Snipe	<i>Gallinago solitaria</i>			
Common Snipe	<i>Gallinago gallinago</i>			
Black-tailed Godwit	<i>Limosa limosa</i>			
Bar-tailed Godwit	<i>Limosa lapponica</i>			
Whimbrel	<i>Numenius phaeopus</i>			
Eurasian Curlew	<i>Numenius arquata</i>			
Spotted Redshank	<i>Tringa erythropus</i>			
Common Redshank	<i>Tringa totanus</i>			
Marsh Sandpiper	<i>Tringa stagnatilis</i>			
Common Greenshank	<i>Tringa nebularia</i>			
Green Sandpiper	<i>Tringa ochropus</i>			
Wood Sandpiper	<i>Tringa glareola</i>			
Terek Sandpiper	<i>Xenus cinereus</i>			
Common Sandpiper	<i>Actitis hypoleucos</i>			
Ruddy Turnstone	<i>Arenaria interpres</i>			
Sanderling	<i>Calidris alba</i>			
Little Stint	<i>Calidris minuta</i>			
Temminck's Stint	<i>Calidris temminckii</i>			
Curlew Sandpiper	<i>Calidris ferruginea</i>			
Dunlin	<i>Calidris alpina</i>			
Ruff	<i>Philomachus pugnax</i>			
Red-necked Phalarope	<i>Phalaropus lobatus</i>			
Slender-billed Curlew	<i>Numenius tenuirostris</i>	CR	I	Unconfirmed. Rasmussen and Anderton (2005) state only unconfirmed breeding reports from Iranian Siestan
Broad-billed Sandpiper	<i>Limicola falcinellus</i>			Unconfirmed. Cited by Habibi.
Pintail Snipe	<i>Gallinago stenura</i>			Unconfirmed. Cited by Avibase

<b>Glareolidae</b>	<b>Coursers and Pratincoles</b>			
Cream-colored Courser	<i>Cursorius cursor</i>			
Collared Pratincole	<i>Glareola pratincola</i>			
Small Pratincole	<i>Glareola lactea</i>			

<b>Laridae</b>	<b>Gulls, Terns and Skimmers</b>			
Lesser Black-backed Gull	<i>Larus fuscus</i>			Rasmussen and Anderton (2005) note that the genus <i>Larus</i> is confused and subject to revision. May be best referred to as <i>L. heuglini</i> .
Great Black-headed Gull	<i>Larus ichthyaetus</i>			
Black-headed Gull	<i>Larus ridibundus</i>			
Slender-billed Gull	<i>Larus genei</i>			
Kittiwake	<i>Rissa tridactyla</i>			
Gull-billed Tern	<i>Sterna nilotica</i>			



<b>Laridae</b>	<b>Gulls, Terns and Skimmers (Continued)</b>			
Caspian Tern	<i>Sterna caspia</i>			
Common Tern	<i>Sterna hirundo</i>			
Little Tern	<i>Sterna albifrons</i>			
Whiskered Tern	<i>Chlidonias hybridus</i>			
Caspian Gull	<i>Larus cachinnans</i>			Unconfirmed. Split from <i>L. argentatus</i> . Cited as <i>L. argentatus</i> by Habibi. Records/specimens were misidentified and are probably <i>L. heuglini [barabensis]</i> (Rasmussen and Anderton 2005)
Mew Gull	<i>Larus canus</i>			Unconfirmed. Cited by Avibase. No specimens, but sight reports from Afghanistan (Rasmussen and Anderton 2005)
River Tern	<i>Sterna aurantia</i>			Unconfirmed. Cited by Habibi. Sight reports of immatures (Rasmussen and Anderton, 2005)
Brown-headed Gull	<i>Larus brunnicephalus</i>			Unconfirmed. Cited by Avibase.
White-winged Tern	<i>Chlidonias leucopterus</i>			Cited by Avibase. Sight record for Kabul (Rasmussen and Anderton, 2005)
Black Tern	<i>Chlidonias niger</i>			Unconfirmed. Cited by Avibase. Perhaps a very rare passage migrant, Rasmussen and Anderton (2005)

<b>Pteroclididae</b>	<b>Sandgrouse</b>			
Pin-tailed Sandgrouse	<i>Pterocles alchata</i>			
Spotted Sandgrouse	<i>Pterocles senegallus</i>			
Black-bellied Sandgrouse	<i>Pterocles orientalis</i>			
Crowned Sandgrouse	<i>Pterocles coronatus</i>			
Pallas's Sandgrouse	<i>Syrrhaptes paradoxus</i>			Unconfirmed. Cited by Habibi.
Tibetan Sandgrouse	<i>Syrrhaptes tibetanus</i>			Unconfirmed. Cited by Avibase.
Lichtenstein's Sandgrouse	<i>Pterocles lichtensteinii</i>			Unconfirmed. Rasmussen and Anderton (2005) say there is no evidence from Afghanistan, but the species might occur

<b>Columbidae</b>	<b>Doves and Pigeons</b>			
Rock Pigeon	<i>Columba livia</i>			
Snow Pigeon	<i>Columba leuconota</i>			
Stock Pigeon	<i>Columba oenas</i>			
Pale-backed Pigeon	<i>Columba eversmanni</i>	VU		Near endemic (Evans 1994)
Blue Hill Pigeon	<i>Columba rupestris</i>			
Common Wood-Pigeon	<i>Columba palumbus</i>			
Eurasian Turtle-Dove	<i>Streptopelia turtur</i>			
Oriental Turtle-Dove	<i>Streptopelia orientalis</i>			
Eurasian Collared-Dove	<i>Streptopelia decaocto</i>			
Spotted Dove	<i>Streptopelia chinensis</i>			One record from Jalalabad (Rasmussen and Anderton, 2005)
Laughing Dove	<i>Streptopelia senegalensis</i>			
Red-collared Dove	<i>Streptopelia tranquebarica</i>			Cited by Habibi. One sight report from Jalalabad is questionable. Rasmussen and Anderton (2005)

<b>Psittacidae</b>	<b>Cockatoos and Parrots</b>			
Alexandrine Parakeet	<i>Psittacula eupatria</i>		II	
Rose-ringed Parakeet	<i>Psittacula krameri</i>		II	
Slaty-headed Parakeet	<i>Psittacula himalayana</i>		II	

<b>Cuculidae</b>	<b>Cuckoos</b>			
Common Cuckoo	<i>Cuculus canorus</i>			
Pied Cuckoo	<i>Clamator jacobinus</i>			Unconfirmed. Cited by Avibase.
Lesser Cuckoo	<i>Cuculus poliocephalus</i>			Unconfirmed. Cited by Avibase and by Dickinson (2003). No evidence traced for Afghanistan (Rasmussen and Anderton, 2005)

<b>Strigidae</b>	<b>Owls</b>			
Pallid Scops-Owl	<i>Otus brucei</i>		II	
European Scops-Owl	<i>Otus scops</i>		II	
Eurasian Eagle-Owl	<i>Bubo bubo</i>		II	
Tawny Owl	<i>Strix aluco</i>		II	
Little Owl	<i>Athene noctua</i>		II	
Long-eared Owl	<i>Asio otus</i>		II	
Short-eared Owl	<i>Asio flammeus</i>		II	
Collared Owlet	<i>Glaucidium brodiei</i>		II	
Brown Fish-Owl	<i>Ketupa zeylonensis</i>		II	Unconfirmed. Cited for Afghanistan by Avibase and by Dickinson (2003)
Spotted Owlet	<i>Athene brama</i>		II	Unconfirmed. Cited by Avibase. One old record with uncertain provenance (Rasmussen and Anderton, 2005)

<b>Caprimulgidae</b>	<b>Nightjars</b>			
Eurasian Nightjar	<i>Caprimulgus europaeus</i>			
Egyptian Nightjar	<i>Caprimulgus aegyptius</i>			
Sykes's Nightjar	<i>Caprimulgus mahrattensis</i>			
Indian Nightjar	<i>Caprimulgus asiaticus</i>			Unconfirmed. Cited by Habibi. Needs substantiation (Rasmussen and Anderton, 2005)

<b>Apodidae</b>	<b>Swifts</b>			
Alpine Swift	<i>Tachymarptis melba</i>			
Common Swift	<i>Apus apus</i>			
Little Swift	<i>Apus affinis</i>			

<b>Coraciidae</b>	<b>Rollers</b>			
European Roller	<i>Coracias garrulus</i>			
Indian Roller	<i>Coracias benghalensis</i>			

<b>Alcedinidae</b>	<b>Kingfishers</b>			
Common Kingfisher	<i>Alcedo atthis</i>			
White-throated Kingfisher	<i>Halcyon smyrnensis</i>			
Pied Kingfisher	<i>Ceryle rudis</i>			
Crested Kingfisher	<i>Megaceryle lugubris</i>			Considered <i>Ceryle lugubris</i> by Rasmussen and Anderton (2005)

<b>Meropidae</b>	<b>Bee-eaters</b>			
Blue-cheeked Bee-eater	<i>Merops persicus</i>			Split from <i>M. superciliosus</i> . <i>M. superciliosus</i> cited by Habibi.
European Bee-eater	<i>Merops apiaster</i>			
Green Bee-eater	<i>Merops orientalis</i>			Unconfirmed. Cited by Avibase and Habibi. One questionable record from NE Afghanistan (Rasmussen and Anderton, 2005)

<b>Upupidae</b>	<b>Hoopoes</b>			
Hoopoe	<i>Upupa epops</i>			

<b>Indicatoridae</b>	<b>Honeyguides</b>			
Yellow-rumped Honeyguide	<i>Indicator xanthonotus</i>			Unconfirmed. Cited for Afghanistan Avibase and by Sibley and Monroe (1996).

<b>Picidae</b>	<b>Woodpeckers</b>			
Eurasian Wryneck	<i>Jynx torquilla</i>			
Brown-fronted Woodpecker	<i>Dendrocopos auriceps</i>			
White-winged Woodpecker	<i>Dendrocopos leucopterus</i>			
Himalayan Woodpecker	<i>Dendrocopos himalayensis</i>			
Scaly-bellied Woodpecker	<i>Picus squamatus</i>		II	Subspecies <i>flavivirostris</i> listed as CITES Appendix II. <i>P.s. flavivirostris</i> found in NW and SW Afghanistan (Rasmussen and Anderton 2005)
Speckled Piculet	<i>Picumnus innominatus</i>			

<b>Campephagidae</b>	<b>Cuckoo-shrikes</b>			
Long-tailed Minivet	<i>Pericrocotus ethologus</i>			
Rosy Minivet	<i>Pericrocotus roseus</i>			Unconfirmed. Cited for Afghanistan by Avibase and by Dickinson (2003). Listing for Afghanistan unsupported (Rasmussen and Anderton, 2005)

<b>Laniidae</b>	<b>Shrikes</b>			
Rufous shrike	<i>Lanius phoenicuroides</i>			<i>Lanius</i> taxonomy is unsettled. <i>L. phoenicuroides</i> sometimes included under <i>L. isabellinus</i>
Isabelline Shrike	<i>Lanius isabellinus</i>			
Bay-backed Shrike	<i>Lanius vittatus</i>			
Long-tailed Shrike	<i>Lanius schach</i>			

<b>Laniidae</b>	<b>Shrikes (Continued)</b>			
Southern Grey Shrike	<i>Lanius meridionale</i>			<i>Lanius</i> taxonomy is unsettled. Formerly considered conspecific to <i>L. excubitor</i> . <i>L. excubitor</i> not found in Afghanistan.
Lesser Gray Shrike	<i>Lanius minor</i>			
Woodchat Shrike	<i>Lanius senator</i>			Vagrant, Rasmussen and Anderton (2005)
Red-backed Shrike	<i>Lanius collurio</i>			Unconfirmed. Cited by Avibase and Habibi. <i>Lanius</i> taxonomy is unsettled. <i>L. collurio</i> often includes <i>L. isabellinus</i> and <i>L. phoenicuroides</i> . <i>L. collurio sensu</i> Rasmussen and Anderton (2005) probably does not occur in Afghanistan.
Masked Shrike	<i>Lanius nubicus</i>			Unconfirmed. Cited by Habibi. <i>Lanius</i> taxonomy is unsettled. <i>L. nubicus</i> Sometimes considered conspecific with <i>L. schach</i> (Rasmussen and Anderton, 2005). Possible vagrant in Afghanistan.

<b>Oriolidae</b>	<b>Orioles and Figbirds</b>			
Eurasian Golden Oriole	<i>Oriolus oriolus</i>			<i>O. oriolus</i> subspecies often split into <i>O. oriolus</i> and <i>O. kundoo</i> . <i>O. o. oriolus</i> is a vagrant in Afghanistan. <i>O. o. kundoo</i> is a regular breeder in Afghanistan (Rasmussen and Anderton, 2005)

<b>Dicruridae</b>	<b>Drongos</b>			
Black Drongo	<i>Dicrurus macrocercus</i>			
Ashy Drongo	<i>Dicrurus leucophaeus</i>			
Square-tailed Drongo	<i>Dicrurus ludwigii</i>			Unconfirmed. Cited by Habibi. Restricted to Africa.

<b>Monarchidae</b>	<b>Monarchs</b>			
Asian Paradise-Flycatcher	<i>Terpsiphone paradisi</i>			

<b>Corvidae</b>	<b>Crows and Jays</b>			
Black-headed Jay	<i>Garrulus lanceolatus</i>			
Eurasian Magpie	<i>Pica pica</i>			
Eurasian Nutcracker	<i>Nucifraga caryocatactes</i>			Sometimes split into <i>N. caryocatactes</i> and <i>N. multipunctata</i> . If split, <i>N. caryocatactes</i> not found in Afghanistan while <i>N. multipunctata</i> is (Rasmussen and Anderton, 2005).
Red-billed Chough	<i>Pyrrhocorax pyrrhocorax</i>			
Yellow-billed Chough	<i>Pyrrhocorax graculus</i>			
Eurasian Jackdaw	<i>Corvus monedula</i>			
Rook	<i>Corvus frugilegus</i>			
Carrion Crow	<i>Corvus corone</i>			
Large-billed Crow	<i>Corvus macrorhynchos</i>			
Brown-necked Raven	<i>Corvus ruficollis</i>			
Common Raven	<i>Corvus corax</i>			
Hooded Crow	<i>Corvus cornix</i>			
House Crow	<i>Corvus splendens</i>			Unconfirmed. Cited by Avibase, Habibi and Kullberg. No evidence traced for Afghan specimens (Rasmussen and Anderton 2005)

<b>Bombycillidae</b>	<b>Waxwings and Allies</b>			
Bohemian Waxwing	<i>Bombycilla garrulus</i>			
Hypocolius	<i>Hypocolius ampelinus</i>			

<b>Paridae</b>	<b>Tits and Chickadees</b>			
Fire-capped Tit	<i>Cephalopyrus flammiceps</i>			One record from Afghanistan (Rasmussen and Anderton, 2005)
Black-breasted Tit	<i>Parus rufonuchalis</i>			Cited for Afghanistan by Dickinson (2003). Split from <i>P. rubidiventris</i>
Black-crested Tit	<i>Parus melanolophus</i>			
Great Tit	<i>Parus major</i>			
Turkestan Tit	<i>Parus bokharensis</i>			Cited for Afghanistan by Sibley and Monroe (1996)
Yellow-breasted Tit	<i>Parus flavipectus</i>			Cited for Afghanistan by Sibley and Monroe (1996)
Rufous-vented Tit	<i>Parus rubidiventris</i>			Cited by Habibi. <i>P. rubidiventris</i> split from <i>P. rufonuchalis</i> and, in strict sense, not found in Afghanistan.
Willow Tit	<i>Parus montanus</i>			Unconfirmed. Cited by Habibi.
Azure Tit	<i>Parus cyanus</i>			Unconfirmed. Cited by Avibase and Habibi.
Blue Tit	<i>Parus caeruleus</i>			Unconfirmed. Cited by Habibi. "Speculative" in W Afghanistan (Rasmussen and Anderton, 2005)

<b>Remizidae</b>	<b>Penduline Tits</b>			
Eurasian Penduline-Tit	<i>Remiz pendulinus</i>			<i>R. pendulinus</i> sometimes split into <i>R. pendulinus</i> and <i>R. coronatus</i> . Both forms are found in Afghanistan (Rasmussen and Anderton, 2005)

<b>Hirundinidae</b>	<b>Swallows and Martins</b>			
Collared Sand Marten/Bank Marten	<i>Riparia riparia</i>			Some genuine and some fraudulent specimens from Afghanistan (Rasmussen and Anderton, 2005)
Pale Sand Martin	<i>Riparia diluta</i>			Earlier included as <i>R. riparia</i> (Rasmussen and Anderton, 2005)
Plain Martin	<i>Riparia paludicola</i>			Considered <i>R. chinensis</i> in Rasmussen and Anderton (2005).
Eurasian Crag-Martin	<i>Ptyonoprogne rupestris</i>			
Pale Crag Martin	<i>Ptyonoprogne obsoleta</i>			
Wire-tailed Swallow	<i>Hirundo smithii</i>			
Cliff Swallow	<i>Hirundo fluvicola</i>			
Barn Swallow	<i>Hirundo rustica</i>			
Red-rumped Swallow	<i>Cecropis daurica</i>			
Streak-throated Swallow	<i>Petrochelidon fluvicola</i>			Cited as <i>Hirundo fluvicola</i> by Habibi and by Rasmussen and Anderton (2005)
Common House-Martin	<i>Delichon urbica</i>			
Rock Martin	<i>Ptyonoprogne fuligula</i>			Unconfirmed. Cited by Avibase. Often considered conspecific to <i>P. obsoleta</i> (Rasmussen and Anderton, 2005).

<b>Aegithalidae</b>	<b>Long-tailed Tits</b>			
White-cheeked Tit	<i>Aegithalos leucogenys</i>			

<b>Alaudidae</b>	<b>Larks</b>			
Bar-tailed Lark	<i>Ammomanes cinctura</i>			Cited for Afghanistan by Dickinson (2003)
Desert Lark	<i>Ammomanes deserti</i>			
Greater Hoopoe-Lark	<i>Alaemon alaudipes</i>			
Calandra Lark	<i>Melanocorypha calandra</i>			
Bimaculated Lark	<i>Melanocorypha bimaculata</i>			
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>			Cited by Habibi as <i>C. cinerea</i>
Hume's Lark	<i>Calandrella acutirostris</i>			
Lesser Short-toed Lark	<i>Calandrella rufescens</i>			
Sand Lark	<i>Calandrella raytal</i>			Cited for Afghanistan by Dickinson (2003)
Crested Lark	<i>Galerida cristata</i>			
Eurasian Skylark	<i>Alauda arvensis</i>			
Oriental Skylark	<i>Alauda gulgula</i>			
Horned Lark	<i>Eremophila alpestris</i>			
Wood Lark	<i>Lullula arborea</i>			Unconfirmed. Cited by Avibase.
Rufous-tailed Lark	<i>Ammomanes phoenicurus (phoenicura)</i>			Unconfirmed. Cited by Habibi. Sometimes confused with <i>A. cinctura</i> (Rasmussen and Anderton 2005).
Temminck's Horned Lark	<i>Eromophila bilopha</i>			Unconfirmed. Cited by Habibi.

<b>Cisticolidae</b>	<b>Cisticolas and Allies</b>			
Streaked Scrub-Warbler	<i>Scotocerca inquieta</i>			
Zitting Cisticola	<i>Cisticola juncidis</i>			
Striated Prinia	<i>Prinia criniger (cringera)</i>			
Graceful Prinia	<i>Prinia gracilis</i>			

<b>Pycnonotidae</b>	<b>Bulbuls</b>			
White-eared Bulbul	<i>Pycnonotus leucotis</i>			
White-cheeked Bulbul	<i>Pycnonotus leucogenys</i>			
Common Bulbul	<i>Pycnonotus barbatus</i>			Introduced
Black Bulbul	<i>Hypsipetes leucocephalus</i>			Lumps <i>Microscelis psaroides</i> in Habibi (nd)
Red-vented Bulbul	<i>Pycnonotus cafer</i>			Unconfirmed. Cited by Kullberg.

<b>Sylviidae</b>	<b>Old World Warblers</b>			
Cetti's Warbler	<i>Cettia cetti</i>			
Grasshopper Warbler	<i>Locustella naevia</i>			
Moustached Warbler	<i>Acrocephalus melanopogon</i>			
Paddyfield Warbler	<i>Acrocephalus agricola</i>			
Blunt-winged Warbler	<i>Acrocephalus concinens</i>			
Eurasian Reed-Warbler	<i>Acrocephalus scirpaceus</i>			
Blyth's Reed-Warbler	<i>Acrocephalus dumetorum</i>			
Great Reed-Warbler	<i>Acrocephalus arundinaceus</i>			One record only (Rasmussen and Anderton, 2005)

Sylviidae	Old World Warblers (Continued)			
Clamorous Reed-Warbler	<i>Acrocephalus stentoreus</i>			
Booted Warbler	<i>Hippolais caligata</i>			
Eastern Olivaceous Warbler	<i>Hippolais pallida</i>			
Upcher's Warbler	<i>Hippolais languida</i>			
Common Chiffchaff	<i>Phylloscopus collybita</i>			
Mountain Chiffchaff	<i>Phylloscopus sindianus</i>			Cited for Afghanistan by Dickinson (2003), one record only from Siestan (Rasmussen and Anderton, 2005)
Plain Leaf-Warbler	<i>Phylloscopus neglectus</i>			Near endemic (Evans 2006)
Greenish Warbler	<i>Phylloscopus trochiloides</i>			
Sulphur-bellied Warbler	<i>Phylloscopus griseolus</i>			
Lemon-rumped Warbler	<i>Phylloscopus proregulus</i>			Considered as <i>P. chloronotus</i> by Rasmussen and Anderton (2005)
Brooks's Leaf-Warbler	<i>Phylloscopus subviridis</i>			Near endemic (Evans 2006)
Hume's Warbler	<i>Phylloscopus humei</i>			
Green Warbler	<i>Phylloscopus nitidus</i>			
Tytler's Leaf-Warbler	<i>Phylloscopus tytleri</i>			
Western Crowned Leaf-Warbler	<i>Phylloscopus occipitalis</i>			
Greater Whitethroat	<i>Sylvia communis</i>			
Lesser Whitethroat	<i>Sylvia curruca</i>			
Hume's Whitethroat	<i>Sylvia althaea</i>			
Asian Desert Warbler	<i>Sylvia nana</i>			
Barred Warbler	<i>Sylvia nisoria</i>			
Desert lesser whitethroat	<i>Sylvia minula</i>			
Eastern Orphean Warbler	<i>Sylvia hortensis</i>			Rasmussen and Anderton (2005) separate <i>S. crassirostris</i> from <i>S. hortensis</i> . <i>Crassirostris</i> form found in Afghanistan but <i>hortensis</i> is not. Dickenson (2003) lumps them.
Menetries's Warbler	<i>Sylvia mystacea</i>			
Pallas's Warbler	<i>Locustella certhiola</i>			Unconfirmed. Cited by Avibase and Habibi. Afghan specimens are frauds (Rasmussen and Anderton, 2005)
Radde's Warbler	<i>Phylloscopus schwarzi</i>			Unconfirmed. Cited by Avibase and Habibi. Afghan specimens are frauds (Rasmussen and Anderton, 2005)
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>			Unconfirmed. Cited by Avibase and Habibi. Formerly included <i>P. humei</i> . <i>P. inornatus</i> does not occur in Afghanistan (Rasmussen and Anderton, 2005)
Large-billed Leaf-Warbler	<i>Phylloscopus magnirostris</i>			Unconfirmed. Cited by Avibase. Needs confirmation from Afghanistan (Rasmussen and Anderton, 2005)
Pallas's Warbler	<i>Locustella certhiola</i>			Unconfirmed. Cited by Avibase and Habibi. Afghan specimens are frauds (Rasmussen and Anderton, 2005)
Radde's Warbler	<i>Phylloscopus schwarzi</i>			Unconfirmed. Unconfirmed. Cited by Avibase and Habibi. Afghan specimens are frauds (Rasmussen and Anderton, 2005)

<b>Sylviidae</b>	<b>Old World Warblers (Continued)</b>			
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>			Unconfirmed. Cited by Avibase and Habibi. Formerly include <i>P. humei</i> . <i>P. inornatus</i> does not occur in Afghanistan (Rasmussen and Anderton, 2005)
Large-billed Leaf-Warbler	<i>Phylloscopus magnirostris</i>			Unconfirmed. Cited by Avibase. Needs confirmation from Afghanistan (Rasmussen and Anderton, 2005)
Pale-rumped Warbler	<i>Phylloscopus chloronotus</i>			Unconfirmed. Cited by Avibase.

<b>Timaliidae</b>	<b>Babblers and Parrotbills</b>			
Streaked Laughingthrush	<i>Garrulax lineatus (lineatum)</i>			Rasmussen and Anderton (2005) give genus as <i>Trochalopteron</i>
Variiegated Laughingthrush	<i>Garrulax variegatus (variegatum)</i>			Rasmussen and Anderton (2005) give genus as <i>Trochalopteron</i>
Common Babbler	<i>Turdoides caudatus (caudata)</i>			Rasmussen and Anderton (2005) split <i>huttoni</i> (Afghan Babbler) from <i>caudatus</i> . The <i>caudatus</i> form not found in Afghanistan.
Bearded Tit (Bearded Reedling)	<i>Panurus biarmicus</i>			Cited by Avibase and Habibi. No records but likely to occur in Siestan and NW (Rasmussen and Anderton, 2005)

<b>Zosteropidae</b>	<b>White Eyes</b>			
Oriental White-eye	<i>Zosterops palpebrosus</i>			

<b>Regulidae</b>	<b>Goldcrests and Kinglets</b>			
Goldcrest	<i>Regulus regulus</i>			

<b>Troglodytidae</b>	<b>Wrens</b>			
Winter Wren	<i>Troglodytes troglodytes</i>			

<b>Sittidae</b>	<b>Nuthatches and Wallcreeper</b>			
Kashmir Nuthatch	<i>Sitta cashmirensis</i>			Cited for Afghanistan by Dickinson (2003).
White-cheeked Nuthatch	<i>Sitta leucopsis</i>			
Persian Nuthatch	<i>Sitta tephronota</i>			
Wallcreeper	<i>Tichodroma muraria</i>			
Nuthatch	<i>Sitta europaea</i>			Unconfirmed. Cited by Habibi. Considered conspecific with <i>S. cashmirensis</i> (Rasmussen and Anderton, 2005)
Rock Nuthatch	<i>Sitta neumayer</i>			Unconfirmed. Cited by Habibi.

<b>Certhiidae</b>	<b>Treecreepers</b>			
Bar-tailed Treecreeper	<i>Certhia himalayana</i>			



<b>Sturnidae</b>	<b>Starlings</b>			
Common Myna	<i>Acridotheres tristis</i>			Habibi cites both <i>Acridotheres tristis</i> and <i>Sturnus tristis</i>
Bank Myna	<i>Acridotheres gingianus</i>			Cited as <i>Sturnus gingianus</i> by Habibi. One old specimen (Rasmussen and Anderton, 2005)
Brahminy Starling	<i>Temenuchus pagodarum</i>			
Rosy Starling	<i>Pastor roseus</i>			
European Starling	<i>Sturnus vulgaris</i>			

<b>Turdidae</b>	<b>Thrushes</b>			
Rufous-tailed Rock-Thrush	<i>Monticola saxatilis</i>			
Blue-capped Rock-Thrush	<i>Monticola cinclorhynchus</i>			
Blue Rock-Thrush	<i>Monticola solitarius</i>			
Blue Whistling-Thrush	<i>Myophonus caeruleus</i>			
Eurasian Blackbird	<i>Turdus merula</i>			
Chestnut Thrush	<i>Turdus rubrocanus</i>			
Dark-throated Thrush	<i>Turdus ruficollis</i>			
Redwing	<i>Turdus iliacus</i>			Cited for Afghanistan by Sibley and Monroe (1996). Winter vagrant (Rasmussen and Anderton, 2005).
Mistle Thrush	<i>Turdus viscivorus</i>			
Tickell's Thrush	<i>Turdus unicolor</i>			Unconfirmed. Cited by Avibase
Fieldfare	<i>Turdus pilaris</i>			Unconfirmed. Cited by Avibase
European Robin	<i>Erithacus rubecula</i>			Unconfirmed. Cited by Avibase. One uncertain sight record from Afghansitan (Rasmussen and Anderton, 2005)

<b>Muscicapidae</b>	<b>Chats and Old World Flycatchers</b>			
Spotted Flycatcher	<i>Muscicapa striata</i>			
Siberian Flycatcher	<i>Muscicapa sibirica</i>			
Rusty-tailed Flycatcher	<i>Muscicapa ruficauda</i>			
Red-breasted Flycatcher	<i>Ficedula parva</i>			
Ultramarine Flycatcher	<i>Ficedula supercilialis</i>			
Common Nightingale	<i>Luscinia megarhynchos</i>			
White-tailed Rubythroat	<i>Luscinia pectoralis</i>			
Bluethroat	<i>Luscinia svecica</i>			
Indian Blue Robin	<i>Luscinia brunnea</i>			
White-throated Robin	<i>Irania gutturalis</i>			
Rufous-tailed Scrub-Robin	<i>Cercotrichas galactotes</i>			
Rufous-backed Redstart	<i>Phoenicurus erythronota</i>			
Blue-capped Redstart	<i>Phoenicurus caeruleocephalus (coeruleocephala)</i>			
Black Redstart	<i>Phoenicurus ochruros</i>			
White-winged Redstart	<i>Phoenicurus erythrogaster (erythrogastrus)</i>			
Blue-fronted Redstart	<i>Phoenicurus frontalis</i>			
White-capped Redstart	<i>Chaimarrornis leucocephalus</i>			
Plumbeous Redstart	<i>Rhyacornis fuliginosus</i>			

<b>Muscicapidae</b>	<b>Chats and Old World Flycatchers (Continued)</b>			
Little Forktail	<i>Enicurus scouleri</i>			
Spotted Forktail	<i>Enicurus maculatus</i>			
Stonechat	<i>Saxicola torquata (torquatus)</i>			Sibley and Monroe (1996) splits <i>S. maura</i> from <i>S. torquata</i> and cite <i>S. maura</i> from Afghanistan. Dickinson (2003) does not recognize the split. Rasmussen and Anderton (2005) follow Dickinson.
White-browed Bushchat	<i>Saxicola macrorhyncha</i>	VU		
Pied Bushchat	<i>Saxicola caprata</i>			
Hume's Wheatear	<i>Oenanthe alboniger (albonigra)</i>			
Northern Wheatear	<i>Oenanthe oenanthe</i>			
Finsch's Wheatear	<i>Oenanthe finschii</i>			
Variable Wheatear	<i>Oenanthe picata</i>			Near endemic (Evans 2006)
Pied Wheatear	<i>Oenanthe pleschanka</i>			
Red-tailed Wheatear	<i>Oenanthe chrysopygia</i>			<i>O. chrysopygia</i> long considered conspecific with <i>O. xanthopygma</i> . Latter not found in Afghanistan (Rasmussen and Anderton 2005). Habibi cites <i>O. xanthopygma</i> . Avibase cites both.
Desert Wheatear	<i>Oenanthe deserti</i>			
Isabelline Wheatear	<i>Oenanthe isabellina</i>			
Orange Flanked Bush Robin	<i>Luscinia cyanurus</i>			Unconfirmed. Cited as genus <i>Tarsiger</i> by Sibley and Monroe (1996). Cited for Afghanistan by Sibley and Monroe. Cited as <i>Tarsiger rufatus</i> by Rasmussen and Anderton (2005)
Common Redstart	<i>Phoenicurus phoenicurus</i>			Unconfirmed. Cited by Avibase and Habibi. Likely found in NE Afghanistan, but no genuine records (Rasmussen and Anderton, 2005)
Whinchat	<i>Saxicola rubetra</i>			Unconfirmed. Cited by Avibase and Habibi. Single observer sight records from Afghanistan need verification Rasmussen and Anderton (2005)
Brown-backed Indian robin	<i>Saxicoloides fulicata</i>			Cite by Habibi. One old Afghan record needs confirmation (Rasmussen and Anderton, 2005)
Hooded Wheatear	<i>Oenanthe monacha</i>			Unconfirmed. Cited by Avibase, Habibi, and Kullberg. Rasmussen and Anderton's (2005) maps suggest it does not occur in Afghanistan.
White-tailed Wheatear	<i>Oenanthe leucopyga</i>			Unconfirmed. Cited by Habibi. Rasmussen and Anderton (2005) do not list it occurring in the region.
Black Wheatear	<i>Oenanthe leucura</i>			Cited by Habibi. Rasmussen and Anderton (2005) do not list it occurring in the region.

<b>Cinclidae</b>	<b>Dippers</b>			
White-throated Dipper	<i>Cinclus cinclus</i>			
Brown Dipper	<i>Cinclus pallasii</i>			

<b>Nectariniidae</b>	<b>Sunbirds</b>			
Purple Sunbird	<i>Cinnyris asiaticus</i>			Cited by Habibi as <i>Nectarinia asiatica</i>

<b>Passeridae</b>	<b>Sparrows, Snowfinches and Allies</b>			
House Sparrow	<i>Passer domesticus</i>			
Spanish Sparrow	<i>Passer hispaniolensis</i>			
Russet Sparrow	<i>Passer rutilans</i>			
Dead Sea Sparrow	<i>Passer moabiticus</i>			“Near endemic” (Evans 1994)
Eurasian Tree Sparrow	<i>Passer montanus</i>			
Chestnut-shouldered Petronia	<i>Petronia xanthocollis</i>			
Rock Petronia	<i>Petronia petronia</i>			
Pale Rock Sparrow	<i>Petronia brachydactyla</i>			
White-winged Snowfinch	<i>Montifringilla nivalis</i>			
Afghan Snowfinch	<i>Montifringilla theresae</i>			Near endemic to Afghanistan
Saxaul Sparrow	<i>Passer ammodendri</i>			Unconfirmed. Cited by Avibase. Said to occur on Iran-Afghanistan border, but no records traced (Rasmussen and Anderton, 2005)

<b>Estrildidae</b>	<b>Waxbills, grass finches, munia and allies</b>			
White-throated Munia	<i>Lonchura malabarica</i>			Unconfirmed. Cited by Avibase. Sometimes called <i>Euodice malabarica</i> .

<b>Prunellidae</b>	<b>Accentors</b>			
Alpine Accentor	<i>Prunella collaris</i>			
Himalayan Accentor	<i>Prunella himalayana</i>			
Rufous-breasted Accentor	<i>Prunella strophiatea</i>			
Brown Accentor	<i>Prunella fulvescens</i>			
Black-throated Accentor	<i>Prunella atrogularis</i>			

<b>Motacillidae</b>	<b>Wagtails and Pipits</b>			
White Wagtail	<i>Motacilla alba</i>			
Citrine Wagtail	<i>Motacilla citreola</i>			
Yellow Wagtail	<i>Motacilla flava</i>			
Gray Wagtail	<i>Motacilla cinerea</i>			
Meadow Pipit	<i>Anthus pratensis</i>			Overlooked specimen from Kabul, other records require verification (Rasmussen and Anderton, 2005)
Oriental Pipit	<i>Anthus rufulus</i>			Cited by Habibi as <i>A. novaeseelandiae</i> which has been split into several species.
Tawny Pipit	<i>Anthus campestris</i>			
Long-billed Pipit	<i>Anthus similis</i>			
Tree Pipit	<i>Anthus trivialis</i>			
Red-throated Pipit	<i>Anthus cervinus</i>			
Rosy Pipit	<i>Anthus roseatus</i>			
Water Pipit	<i>Anthus spinoletta</i>			

<b>Motacillidae</b>	<b>Wagtails and Pipits (Continued)</b>			
Upland Pipit	<i>Anthus sylvanus</i>			
Large Pied Wagtail	<i>Motacilla maderapatensis</i>			Unconfirmed. Cited by Kullberg. Noted from Wakhan
Olive-backed Pipit	<i>Anthus hodgsoni</i>			Unconfirmed. Cited by Avibase and Habibi. Records of breeding in Afghanistan “dubious” (Rasmussen and Anderton, 2005)

<b>Fringillidae</b>	<b>Finches and Hawaiian Honeycreepers</b>			
Chaffinch	<i>Fringilla coelebs</i>			
Brambling	<i>Fringilla montifringilla</i>			
Plain Mountain-Finch	<i>Leucosticte nemoricola</i>			
Black-headed Mountain-Finch	<i>Leucosticte brandti</i>			
Common Rosefinch	<i>Carpodacus erythrinus</i>			
Pale Rosefinch	<i>Carpodacus synoicus</i>			Cited for Afghanistan by Dickinson (2003)
White-browed Rosefinch	<i>Carpodacus thura</i>			
Red-mantled Rosefinch	<i>Carpodacus rhodochlamys</i>			Considered <i>C. grandis</i> by Rasmussen and Anderton (2005)
Great Rosefinch	<i>Carpodacus rubicilla</i>			Considered <i>C. severtzovi</i> by Rasmussen and Anderton (2005)
Red-fronted Rosefinch	<i>Carpodacus puniceus</i>			Considered <i>Pyrrhospiza punicea</i> by Rasmussen and Anderton (2005)
Red Crossbill	<i>Loxia curvirostra</i>			Multiple sight records for Wakhan (Rasmussen and Anderton, 2005)
European Greenfinch	<i>Carduelis chloris</i>			
European Goldfinch	<i>Carduelis carduelis</i>			
Twite	<i>Carduelis flavirostris</i>			Cited as <i>Acanthis flavirostris</i> by Habibi
Eurasian Linnet	<i>Carduelis cannabina</i>			Cited as <i>Acanthis cannabina</i> by Habibi
Fire-fronted Serin	<i>Serinus pusillus</i>			
Hawfinch	<i>Coccothraustes coccothraustes</i>			
Black-and-yellow Grosbeak	<i>Mycerobas icteroides</i>			
White-winged Grosbeak	<i>Mycerobas carnipes</i>			
Crimson-winged Finch	<i>Rhodopechys sanguinea</i>			
Mongolian Finch	<i>Rhodopechys mongolica</i>			Considered <i>Bucanetes mongolica</i> by Rasmussen and Anderton (2005)
Trumpeter Finch	<i>Bucanetes githaginea</i>			
Desert Finch	<i>Rhodospiza obsoleta</i>			
Eurasian Siskin	<i>Carduelis spinus</i>			Unconfirmed. Cited by Avibase. Sight records from NE Afghanistan (Rasmussen and Anderton, 2005)

<b>Emberizidae</b>	<b>Buntings, American Sparrows and Allies</b>			
Yellowhammer	<i>Emberiza citrinella</i>			
Pine Bunting	<i>Emberiza leucocephalos</i>			
Rock Bunting	<i>Emberiza cia</i>			
Gray-hooded Bunting	<i>Emberiza buchanani</i>			

<b>Emberizidae</b>	<b>Buntings, American Sparrows and Allies (Continued)</b>			
Ortolan Bunting	<i>Emberiza hortulana</i>			
Chestnut-breasted Bunting	<i>Emberiza stewarti</i>			Cited for Afghanistan by Dickinson (2003)
House Bunting	<i>Emberiza striolata</i>			
Black-headed Bunting	<i>Emberiza melanocephala</i>			
Red-headed Bunting	<i>Emberiza bruniceps</i>			
Reed Bunting	<i>Emberiza schoeniclus</i>			
Corn Bunting	<i>Emberiza calandra</i>			
Grey-headed Bunting	<i>Embriza fucata</i>			Unconfirmed. Cited by Habibi. One questionable record (Rasmussen and Anderton, 2005)
Cinereous Bunting	<i>Emberiza cineracea</i>			Unconfirmed. Cited by Avibase. Two unlikely sight records from Afghanistan (Rasmussen and Anderton, 2005)
Little Bunting	<i>Emberiza pusilla</i>			Unconfirmed. Cited by Avibase.
Rustic Bunting	<i>Emberiza rustica</i>			Unconfirmed. Cited by Avibase. Unsubstantiated sight records (Rasmussen and Anderton, 2005)
Snow Bunting	<i>Plectrophenax nivalis</i>			Unconfirmed. Cited by Habibi. Largely Nearctic and European range.
Lapland Bunting	<i>Calcarius lapponicus</i>			Unconfirmed. Cited by Habibi.

#### References:

- AVIBASE (<http://www.bsc-eoc.org/avibase/avibase.jsp?region=af&pg=checklist&list=clements>)
- Dickenson, E.C. (ed). 2004. The Howard and Moore Complete Checklist of the Birds of the World. 3rd ed., Christopher Helm, London.
- Habibi (<http://fwie.fw.vt.edu/afghanistan/BirdChecklist.html>)
- Kullberg ([http://www.camacdonald.com/birding/meafghanistan\(AnssiTripReport\).htm](http://www.camacdonald.com/birding/meafghanistan(AnssiTripReport).htm))
- Rasmussen, R.C. and Anderton, J.C. 2005. Birds of South Asia. The Ripley Guide. Vols 1 and 2. Smithsonian Institution and Lynx Edicions, Washington, D.C. and Barcelona.
- Sibley, C. G. and B. L. Monroe. 1996. A World Checklist of Birds. Yale Univ. Press. New Haven, USA

## Appendix 3 The Reptiles of Afghanistan: A Checklist

Reptile Species of Afghanistan					
Scientific Name	Common Name	Authority	Red List	CITES	Notes
<b>Testudinae</b>		<b>Tortoises</b>			
<i>Testudo horsfieldii</i>	Afghan Tortoise	Leviton and Anderson (1970); EMBL database (2006)	VU	II	
<b>Agamidae</b>		<b>Agama Lizards</b>			
<i>Calotes versicolor</i>	Common Tree Lizard, Eastern Garden Lizard, Oriental Garden Lizard	Leviton and Anderson (1970); EMBL database (2006)			
<i>Laudakia nupta</i>	Spiney-head Rock Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama nupta</i>
<i>Laudakia nuristanica</i>	Nuristan Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama nuristanica</i>
<i>Laudakia tuberculata</i>	Kashmir Rock Agama, Blue Rock Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama tuberculata</i>
<i>Laudakia agrorensis</i>	Agror Agama	Leviton and Anderson (1970); EMBL database (2006)			Name changed from <i>Agama agrorensis</i>
<i>Laudakia badakhshana</i>	Badakhshan Rock Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama badakhshana</i>
<i>Laudakia caucasica</i>	Caucasian Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama caucasica</i>
<i>Laudakia erythrogastra</i>		Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama erythrogastra</i>
<i>Laudakia himalayana himalayana</i>	Himalayan Agama	Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama himalayana</i>
<i>Laudakia lehmanni</i>		Leviton and Anderson (1970); EMBL database (2006)			Named changed from <i>Agama lehmanni</i>
<i>Phrynocephalus clarkorum</i>	Toadhead Agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus euptilopus</i>	Spotted Toad Agama, Alcock's toad-headed agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus interscapularis</i>	Lichtenstein's Toadhead Agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus luteoguttatus</i>	Yellow-speckled toad-headed agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus maculatus</i>	Blacktail Toadhead Agama, Whip-tail Toad Agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus mystaceus</i>	Secret Toadhead Agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus ornatus</i>	Striped Toad Agama,	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus reticulatus boettgeri</i>	Reticulated toad-headed Agama	Leviton and Anderson (1970); EMBL database (2006)			
<i>Phrynocephalus scutellatus</i>	Gray Toadhead Agama	Leviton and Anderson (1970); EMBL database (2006)			

<b>Agamidae</b>	<b>Agama Lizards (Continued)</b>			
<i>Trapelus agilis</i>	Brilliant Ground Agama	Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Agama agilis</i>
<i>Trapelus ruderatus</i>	Horn-scaled Agama, Baluch ground Agama	Leviton and Anderson (1970); EMBL database (2006)		Named changed from <i>Agama rederata</i>
<i>Uromastyx asmussi</i>	Iranian Uromastyx, Iranian Mastigure	Leviton and Anderson (1970); EMBL database (2006)	II	
<i>Uromastyx hardwickii</i>	Indian Spiny Tail Lizard, Hardwick's Spiny-tailed Lizard	Leviton and Anderson (1970)	II	Not IN EMBL database

<b>Anguidae</b>	<b>Glass lizards</b>			
<i>Pseudopsis apodus</i>		Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Ophisaurus apodus</i>

<b>Gekkonidae</b>	<b>Geckoes</b>			
<i>Agamura femoralis</i>	Pointed-tail Spider Gecko	Leviton and Anderson (1970)		Not in EMBL database
<i>Agamura persica</i>	Persian Spider Gecko	Leviton and Anderson (1970); EMBL database (2006)		
<i>Alsophylax laevis</i>	Kaspischer Even-fingered Gecko	Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>A. pipiens</i>
<i>Asiocolotes levitoni</i>	Leviton's Gecko	EMBL database (2006)		Endemic to Afghanistan
<i>Bunopus tuberculatus</i>	Tuberculated Desert Gecko, Baluch Rock Gecko	Leviton and Anderson (1970); EMBL database (2006)		
<i>Crossobamon eversmanni</i>	Comb-toed Gecko	Leviton and Anderson (1970); EMBL database (2006)		Includes <i>C. lumsdeni</i> and <i>C. maynardi</i> of Leviton and Anderson (1970). See EMBL database.
<i>Cyrtopodion caspius</i>		Leviton and Anderson (1970); EMBL database (2006)		<i>Name changed from C. caspius</i>
<i>Cyrtopodion fedtschenkoi</i>		Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Cyrtodactylus fedtschenkoi</i>
<i>Cyrtopodion scabrum</i>	Rough-tailed Gecko	Leviton and Anderson (1970); EMBL database (2006)		Changed from <i>Cyrtodactylus scaber</i>
<i>Cyrtopodion watsoni</i>	Watson's Gecko	Leviton and Anderson (1970); EMBL database (2006)		Changed from <i>Cyrtodactylus watsoni</i>
<i>Eublepharis macularius</i>	Fat-tail Gecko, Common Leopard Gecko	Leviton and Anderson (1970); EMBL database (2006)		
<i>Hemidactylus flaviviridis</i>	Yellow-belly Common House Gecko	Leviton and Anderson (1970); EMBL database (2006)		
<i>Teratoscincus bedriagai</i>	Bedraiga's Wonder Gecko	Leviton and Anderson (1970); EMBL database (2006)		
<i>Teratoscincus microlepis</i>	Baloch Sand Gecko, Small-scaled Wonder Gecko	Leviton and Anderson (1970)		Not in EMBL database
<i>Teratoscincus scincus</i>	Common Wonder Gecko	Leviton and Anderson (1970); EMBL database (2006)		

Lacertidae	Wall lizards		
<i>Acanthodactylus cantoris</i>	Indian Fringe-fingered Lizard	Leviton and Anderson (1970)	Clark (1990) cites <i>A. blanfordi</i> as a probably subspecies of <i>A. cantoris</i>
<i>Eremias acutirostris</i>	Point-snouted Racerunner	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias aria</i>		Leviton and Anderson (1970); EMBL database (2006)	Endemic to Afghanistan
<i>Eremias fasciata</i>	Striped Sand Lizard	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias grammica</i>	Reticulate Racerunner	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias intermedia</i>		Leviton and Anderson (1970)	Not in EMBL database
<i>Eremias lineolata</i>		Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias nigrocellata</i>		Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias persica</i>	Persian Sand Lizard	Leviton and Anderson (1970); EMBL database (2006)	Name changed from <i>E. velox persica</i> -- <a href="http://www.embl-heidelberg.de/~uetz/">http://www.embl-heidelberg.de/~uetz/</a>
<i>Eremias regeli</i>		Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias scripta</i>	Vermiculate Sand Lizard	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eremias velox</i>	Rapid Racerunner	Leviton and Anderson (1970); EMBL database (2006)	Considered by Leviton and Anderson to be <i>E. velox velox</i>
<i>Mesalina guttulata</i>	Small Spotted Lizard	Leviton and Anderson (1970); EMBL database (2006)	Considered by Leviton and Anderson to be <i>Eremia guttulata watsonana</i>
<i>Mesalina watsonana</i>		Leviton and Anderson (1970); EMBL database (2006)	Considered by Leviton and Anderson to be <i>Eremia guttulata watsonana</i> -- see EMBL database
<i>Ophisops jerdoni</i>	Rugose Spectacled Lizard	Leviton and Anderson (1970); EMBL database (2006)	
<i>Scapteira aporosceles</i>	Greater Reticulate Sand Lizard	Leviton and Anderson (1970); EMBL database (2006)	Name changed from <i>Eremisa aporosceles</i> -- see EMBL database

Scincidae	Skinks		
<i>Ablepharus pannonicus</i>	Red-tailed Snake-eyed Skink	Leviton and Anderson (1970); EMBL database (2006)	
<i>Ablepharus bivittatus lindbergi</i>	Two-striped Skink	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eumeces schneideri</i>	Red-striped Skink	Leviton and Anderson (1970); EMBL database (2006)	
<i>Eurylepis taeniolatus</i>	Alpine Punjab Skink	Leviton and Anderson (1970)	Name changed from <i>Eumeces taeniolatus</i> --see EMBL database
<i>Mabuya dissimilis</i>	Striped Grass Skink	Leviton and Anderson (1970)	
<i>Ophiomorus tridactylus</i>	Three-toed Sand Swimmer	Leviton and Anderson (1970); EMBL database (2006)	
<i>Scincella himalayana</i>	Himalayan Skink	Leviton and Anderson (1970)	Not in EMBL database. Some consider it to be <i>Asymblepharus himalayana</i> or <i>Lygosoma himalayana</i> (Das et al. 1998).



<b>Varanidae</b>	<b>Monitor lizards</b>			
<i>Varanus bengalensis bendalensis</i>	Bengal Monitor	Leviton and Anderson (1970); EMBL database (2006)	I	
<i>Varanus griseus caspius</i>	Desert Monitor, Grey Monitor, Caspian Monitor	Leviton and Anderson (1970); EMBL database (2006)	I	
<b>Boidae</b>	<b>Boas</b>			
<i>Eryx elegans</i>	Elegant Sand Boa	Leviton and Anderson (1970); EMBL database (2006)	II	
<i>Eryx johnii</i>	Indian Sand Boa	Leviton and Anderson (1970); EMBL database (2006)	II	
<i>Eryx tataricus</i>	Tartary Sand Boa	Leviton and Anderson (1970); EMBL database (2006)	II	
<i>Eryx miliaris</i>	Dwarf Sand Boa	EMBL database (2006)	II	Not in Leviton and Anderson (1970)
<b>Colubridae</b>	<b>Colubrids</b>			
<i>Boiga trigonata melanocephalus</i>	Indian Gamma Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Eirinis persica</i>	Persian Dwarf Snake	Leviton and Anderson (1970)		
<i>Elaphe dione</i>	Dione Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Hemorrhois ravergieri</i>	Ravergier's Whip Snake	Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Coluber ravergieri</i>
<i>Lytorhynchus maynardi</i>	Maynard's Awl Headed Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Lytorhynchus ridgewayi</i>	Afghan Awl Headed Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Natrix tessellata tessellata</i>	Dice Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Platyceps karelini</i>	Spotted Desert Racer	Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Coluber karelinii</i>
<i>Platyceps rhodorichis</i>	Jan's Whip Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Platyceps ventromaculatus</i>	Spotted Whip Snake	Leviton and Anderson (1970); EMBL database (2006)		Name changed from <i>Coluber ventromaculatus</i>
<i>Psammophis lineolatus</i>	Steppe Ribbon Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Psammophis schokari</i>	Forskal's Sandsnake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Ptyas mucosa</i>	Oriental Rat Snake or Whipsnake	Leviton and Anderson (1970); EMBL database (2006)	II	Name changed from <i>P. mucosus</i>
<i>Spalerosophis diadema schirazana</i>	Diadem Snake	Leviton and Anderson (1970); EMBL database (2006)		
<i>Xenochrophis piscator</i>	Chequered Keelback, Asiatic Watersnake	Leviton and Anderson (1970); EMBL database (2006)		
<b>Elapidae</b>	<b>Cobras</b>			
<i>Naja oxiana</i>	Central Asian Cobra	Leviton and Anderson (1970); EMBL database (2006)	II	

<b>Leptotyphlopidae</b>	<b>Slender blind snakes</b>				
<i>Leptotyphlops blandfordi</i>		Leviton and Anderson (1970); EMBL database (2006)			
<b>Typhlopidae</b>	<b>Blind snakes</b>				
<i>Typhlops vermicularis</i>	Worm Snake	Leviton and Anderson (1970); EMBL database (2006)			
<b>Viperidae</b>	<b>Vipers</b>				
<i>Echis carinatus</i>	Saw-scaled Viper, Carpet Viper	Leviton and Anderson (1970); EMBL database (2006)			
<i>Eristicophis macmahoni</i>	MacMahon Viper	Leviton and Anderson (1970); EMBL database (2006)			
<i>Gloydus halys</i>	Crotalid Halys Viper	Leviton and Anderson (1970); EMBL database (2006)			Name changed from <i>Agkistrodon halys</i>
<i>Gloydus himalayanus</i>	Himalayan Pit Viper	Leviton and Anderson (1970)			Name changed from <i>Agkistrodon himalayanus</i> . Leviton and Anderson (1970) cite a specimen apparently collected in Nuristan. Not in EMBL database.
<i>Macrovipera lebetina</i>	Desert Adder	Leviton and Anderson (1970); EMBL database (2006)			Name changed from <i>Vipera lebetina</i>
<i>Pseudocerastes persicus persicus</i>	Persian False Hornviper	Leviton and Anderson (1970); EMBL database (2006)			
<b>Uncertain species</b>					
<i>Cyrtopodion longipes</i>		EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Cyrtopodion russowii</i>		Leviton and Anderson (1970)			Not confirmed from Afghanistan, Name changed from <i>Cyrtodactylus russowii</i> , Not in EMBL database
<i>Cyrtopodion turcmenicus</i>		EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Cyrtopodion voraginosus</i>		EMBL database (2006)			Not in Leviton and Anderson (1970); endemic to Afghanistan
<i>Acanthodactylus blanfordii</i>	Blanford's Fringe-fingered Lizard	EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Eremias afghanistanica</i>	Point-snouted Racerunner	EMBL database (2006)			Not in Leviton and Anderson (1970); endemic to Afghanistan
<i>Ablepharus grayanus</i>	Earless Snake-eyed Skink	Leviton and Anderson (1970); EMBL database (2006)			Not confirmed from Afghanistan
<i>Eumeces blythianus</i>		Leviton and Anderson (1970)			Not confirmed from Afghanistan
<i>Mabuya aurata</i>		Leviton and Anderson (1970)			Not confirmed from Afghanistan
<i>Ophiomorus brevipes</i>	Short-legged Snake Skink	EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Ophiomorus chernovi</i>	Chernov's Snake Skink	EMBL database (2006)			Not in Leviton and Anderson (1970)

<b>Uncertain species</b>	<b>(Continued)</b>				
<i>Eryx miliaris</i>	Dwarf Sand Boa	EMBL database			Not in Leviton and Anderson (1970)
<i>Lycodon striatus bicolor</i>	Northern Wolf Snake	Leviton and Anderson (1970); EMBL database (2006)			Not confirmed from Afghanistan
<i>Oligodon taeniolatus</i>	Streaked Kukri Snake	Leviton and Anderson (1970); EMBL database (2006)			Not confirmed from Afghanistan
<i>Psammophis leithii</i>	Pakistan Sand Racer or Leith's Sand Snake	Leviton and Anderson (1970); EMBL database (2006)			Not confirmed from Afghanistan
<i>Pseudocyclophis persicus</i>	Dark-headed Dwarf Racer	EMBL database			Not in Leviton and Anderson (1970)
<i>Telescopus rhinopoma</i>	Indian Desert Tiger Snake	EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Bungarus caeruleus</i>	Indian Krait	EMBL database (2006)			Not in Leviton and Anderson (1970)
<i>Naja naja</i>	Indian Cobra	EMBL database (2006)			Not in Leviton and Anderson (1970); EMBL database cites Afghan distribution with a ?
<i>Gloydus intermedius</i>	Central Asian Pitviper	EMBL database			Not in Leviton and Anderson (1970)

## Appendix 4 The Amphibians of Afghanistan: A Checklist

Amphibian Species of Afghanistan			
Hynobiidae	Asiatic Salamanders		
<i>Batrachuperus mustersi</i>	Paghman Mountain Salamander	Leviton and Anderson (1970)	Endemic and Critically Endangered

Bufonidae	True Toads		
<i>Bufo stomaticus</i>	Indus Valley Toad	Leviton and Anderson (1970)	Previously called <i>Bufo andersonii</i>
<i>B. viridis</i>	European Green Toad	Leviton and Anderson (1970)	

Ranidae	True Frogs		
<i>Euphlyctis cyanophlyctis</i>	Skipping Frog, Skittering Frog among others	Leviton and Anderson (1970)	Previously called <i>Rana cyanophlyctis</i>
<i>R. ridibunda ridibunda</i>	Marsh Frog, Lake Frog, Laughing Frog	Leviton and Anderson (1970)	
<i>Paa sternosignata</i>	Baluch Mountain Frog, Malir Paa Frog, Murray's Frog, Karez Frog	Leviton and Anderson (1970)	Previously called <i>Rana sternosignata</i>

Uncertain species			
<i>Bufo latastii</i>	Ladakh Toad	Listed on AmphibiaWeb	Unable to verify published record
<i>Bufo oblongus</i>		Listed on AmphibiaWeb	Unable to verify published record

## Appendix 5 The Fish of Afghanistan: A Checklist

Fish Species of Afghanistan				
Scientific Name	Authority	Common Name	Status	Notes
<b>Acipenseridae</b>	<b>Sturgeons</b>			
<i>Acipenser nudiventris</i>	Coad (1981)	Fringebarbel sturgeon	Coad=- native; Fishbase = extirpated	
<i>Pseudoscaphirhynchus hermanni</i>	Coad (1981)	Dwarf sturgeon	native	
<i>Pseudoscaphirhynchus kaufmanni</i>	Coad (1981)	Amu Darya sturgeon	native	

<b>Salmonidae</b>	<b>Salmonids</b>			
<i>Oncorhynchus mykiss</i>	Coad (1981)	Rainbow trout	introduced	<i>Oncorhynchus gairdneri</i> in Coad (1981)
<i>Salmo trutta</i>	Coad (1981)	Sea trout, Brown trout	native	

<b>Cyprinidae</b>	<b>Minnnows and carps</b>			
<i>Alburnoides bipunctatus</i>	Coad (1981)	Chub	native	
<i>Alburnoides taeniatus</i>	Coad (1981)	Striped bystranka	native	
<i>Amblypharyngodon mola</i>	Coad (1981)	Mola carplet	native	
<i>Aspidoparia jaya</i>	Coad (1981)	Jaya	native	
<i>Aspiolucius esocinus</i>	Coad (1981)	Pike asp	native	
<i>Aspius aspius</i>	Coad (1981)	Asp	native	
<i>Bangana diplostomus</i>	Coad (1981)	None	native	<i>Labeo diplostomus</i> in Coad (1981)
<i>Barbus brachycephalus</i>	Coad (1981)	Aral barbel	native	
<i>Barbus capito</i>	Coad (1981)	Bulatmai barbel	native	
<i>Barilius vagra</i>	Coad (1981)	None	native	
<i>Capoeta capoeta</i>	Coad (1981)	Transcaucasian barb	native	
<i>Capoetobrama kuschakewitschi</i>	Coad (1981)	Sharpray	native	
<i>Carassius auratus</i>	Coad (1981)	Goldfish	introduced	
<i>Crossocheilus diplochilus</i>	Talwar and Jhingram (1991)	None	native	<i>Crossocheilus latius diplochilus</i> in Coad (1981)
<i>Crossocheilus latius</i>	Coad (1981)	None	native	
<i>Ctenopharyngodon idella</i>	Coad (1981)	Grass carp	introduced	
<i>Cyprinion microphthalmum</i>	Talwar and Jhingram (1991)	None	native	
<i>Cyprinion milesi</i>	Talwar and Jhingram (1991)	None	native	
<i>Cyprinion watsoni</i>	Coad (1981)	None	native	
<i>Devario devario</i>	Coad (1981)	Sind danio	native	<i>Danio devario</i> in Coad (1981)
<i>Esomus danricus</i>	Coad (1981)	Flying barb	native	

<b>Cyprinidae</b>	<b>Minnnows and carps (Continued)</b>			
<i>Garra rossica</i>	Coad (1981)	None	native	
<i>Gobio gobio</i>	Coad (1981)	Gudgeon	native	
<i>Hemiculter leucisculus</i>	Coad (1981)	Sharpbelly	introduced	
<i>Hypophthalmichthys molitrix</i>	Coad (1981)	Silver carp	introduced	
<i>Labeo angra</i>	Coad (1981)	None	native	
<i>Labeo ariza</i>	Coad (1981)	Reba	native	<i>Cirrhinus reba</i> in Coad (1981)
<i>Labeo dyocheilus</i>	Coad (1981)	None	native	
<i>Labeo gonius</i>	Coad (1981)	Kuria labeo	native	
<i>Labeo pangusia</i>	Coad (1981)	None	native	
<i>Leuciscus latus</i>	Coad (1981)	None	native	
<i>Pelecus cultratus</i>	Coad (1981)	Ziege	native	
<i>Pseudorasbora parva</i>	Coad (1981)	Stone moroko	introduced	
<i>Puntius conchonicus</i>	Coad (1981)	Rosy barb	native	
<i>Puntius sarana</i>	Coad (1981)	Olive barb	native	
<i>Puntius sophore</i>	Coad (1981)	Pool barb	native	
<i>Rhodeus sinensis</i>	Coad (1981)	none	introduced	
<i>Rutilus rutilus</i>	Coad (1981)	Roach	native	
<i>Salmostoma bacaila</i>	Coad (1981)	Large razorbelly minnow	native	
<i>Schizocypris brucei</i>	Coad (1981)	Waziristan snowtrout	native	
<i>Schizocypris ladigesi</i>	Coad (1981)	None	native	
<i>Schizopygopsis stoliczkae</i>	Coad (1981)	False osman	native	<i>Schizocypris stoliczkae</i> in Coad (1981)
<i>Schizopyge curvifrons</i>	Menon (1999)	Sattar snowtrout		
<i>Schizothorax edeniana</i>	Coad (1981)	None	native	
<i>Schizothorax esocinus</i>	Coad (1981)	Chirruh snowtrout	native	Coad (1981) also recognized <i>S. barbatus</i> , now included with <i>S. esocinus</i>
<i>Schizothorax intermedius</i>	Coad (1981)	Common marinka	native	Coad separately lists <i>S. schumacheri</i> which is now considered as <i>S. intermedius</i>
<i>Schizothorax labiatus</i>	Coad (1981)	Kunar snowtrout	native	
<i>Schizothorax microcephalus</i>	Coad (1981)	None	native	
<i>Schizothorax pelzmani</i>	Coad (1981)	Transcaspian marinka	native	
<i>Schizothorax plagiostomus</i>	Coad (1981)	None	native	
<i>Schizothorax richardsonii</i>	Talwar and Jhingram (1991)	Snowtrout	native	
<i>Schizothorax zarudnyi</i>	Coad (1981)	None	native	
<i>Sinilabeo dero</i>		Kalabans	native	<i>Labeo dero</i> in Coad (1981)
<i>Tor putitora</i>	Coad (1981)	Putitor mahseer	native	

<b>Balitoridae</b>	<b>River Loaches</b>			
<i>Dzihunia amurdarjensis</i>	Coad (1981)	Bukhara stone loach	native	<i>Noemacheilus (Triplophysa) amurdarjensis</i> in Coad (1981)
<i>Nemacheilus baluchiorum</i>	Coad (1981)		native	<i>Noemacheilus baluchiorum</i> in Coad (1981)
<i>Nemacheilus longicaudus</i>	Coad (1981)	Eastern crested loach	native	<i>Noemacheilus longicauda</i> in Coad (1981)
<i>Nemacheilus oxianus</i>	Coad (1981)	Amu Darya stone loach	native	<i>Noemacheilus oxianus</i> in Coad (1981)
<i>Paracobitis boutanensis</i>	Coad (1981)	None	native	<i>Noemacheilus boutanensis</i> in Coad (1981)
<i>Paracobitis ghazniensis</i>	Coad (1981)	None	native	<i>Noemacheilus ghazniensis</i> in Coad (1981)
<i>Paracobitis rhadineus</i>	Coad (1981)	None	native	<i>Noemacheilus rhadineus</i> in Coad (1981)
<i>Paracobitis malapterura</i>	Coad (1981)	Western crested loach	native	<i>Noemacheilus malapterurus</i> in Coad (1981)
<i>Schistura alepidotus</i>	Coad (1981)	None	native	<i>Noemacheilus alepidotus</i> in Coad (1981)
<i>Schistura alta</i>	Nalbant and Bianco (1998)	None	native	
<i>Schistura cristata</i>	Coad (1981)	Turkmenian crested loach	native	<i>Noemacheilus or Paracobitis cristatus</i> in Coad (1981)
<i>Schistura kessleri</i>	Coad (1981)	Kessler's loach	native	<i>Noemacheilus kessleri</i> in Coad (1981)
<i>Schistura lindbergi</i>	Talwar and Jhingram (1991), Nalbant and Bianco (1998)	None	native	
<i>Schistura prashari</i>	Coad (1981)	None	native	<i>Noemacheilus prashaari</i> in Coad (1981)
<i>Schistura sargadensis</i>	Coad (1981)	Turkmenian loach	native	<i>Noemacheilus sargadensis</i> in Coad (1981)
<i>Triplophysa brahui</i>	Coad (1981)	None	native	<i>Noemacheilus brahui</i> in Coad (1981)
<i>Triplophysa farwelli</i>	Coad (1981)		native and endemic	<i>Noemacheilus farwelli</i> in Coad (1981)
<i>Triplophysa griffithi</i>	Coad (1981)		native	<i>Noemacheilus griffithi</i> in Coad (1981)
<i>Triplophysa kullmanni</i>	Coad (1981)		native	<i>Noemacheilus kullmani</i> in Coad (1981)
<i>Triplophysa stoliczkae</i>	Coad (1981)	Tibetan stone loach	native	<i>Noemacheilus stoliczkae</i> in Coad (1981). Coad (1981) cited <i>N. (Triplophysa) akhtari</i> which is now included in <i>T. stoliczkae</i>
<i>Triplophysa tenuis</i>	Coad (1981)		native	<i>Noemacheilus tenuis</i> in Coad (1981)

<b>Cobitidae</b>	<b>Loaches</b>			
<i>Sabanajewia aurata</i>	Coad (1981)	Golden spined loach	native	

<b>Bagridae</b>	<b>Bagrid catfishes</b>			
<i>Mystus tengara</i>	Coad (1981)	None	native	
<i>Rita macracanthus</i>	Ng (2004)	None	native	
<i>Rita rita</i>	Coad (1981)	Rita	native	
<i>Sperata sarwari</i>	Eschemeyer (2004)	None	native	
<i>Sperata seenghala</i>	Coad (1981), Talway and Jhingram (1991)	Giant river catfish	native	<i>Mystus seenghala</i> in Coad (1981)

<b>Siluridae</b>	<b>Old-world catfishes</b>			
<i>Ompok bimaculatus</i>	Coad (1981)	Butter catfish	native	
<i>Ompok canio</i>	Coad (1981)	None	native	
<i>Ompok pabda</i>	Coad (1981)	Padbah catfish	native	
<i>Pterocryptis afghana</i>	Talwar and Jhingram (1991)	None	native	
<i>Silurus glanis</i>	Coad (1981)	Wels catfish	native	
<i>Wallago attu</i>	Coad (1981)	Wallago	native	

<b>Sisoridae</b>	<b>Sisorid and sucker catfishes</b>			
<i>Glyptosternum akhtari</i>	Coad (1981)	None	native	
<i>Glyptosternum reticulatum</i>	Coad (1981)	Turkestan catfish	native	
<i>Glyptothorax jalalensis</i>	Coad (1981)	None	native	

<b>Poeciliidae</b>	<b>Mummichogs</b>			
<i>Gambusia affinis</i>	Coad (1981)	Mosquito fish	introduced	

<b>Percidae</b>	<b>Perches</b>			
<i>Sander lucioperca</i>	Coad (1981)	Zander	native	<i>Stizostedion lucioperca</i> in Coad (1981)

<b>Gobiidae</b>	<b>True gobies</b>			
<i>Rhinogobius similis</i>	Coad (1981)	none	introduced	

<b>Channidae</b>	<b>Snakeheads</b>			
<i>Channa gachua</i>	Coad (1981)	None	native	<i>Ophiocephalus gachua</i> in Coad (1981)
<i>Channa orientalis</i>	Talwar and Jhingram (1991)	Walking snakehead	native	
<i>Channa punctatus</i>	Coad (1981)	Spotted snakehead	native	<i>Ophiocephalus punctata</i> in Coad (1981)

<b>Uncertain occurrence in Afghanistan</b>				
<i>Nemacheilus kuschakewitschi</i>	Coad (1981)	Kuschakewitsch loach	Coad = uncertain; Fishbase = native	<i>Noemacheilus kuschakewitschi</i> in Coad (1981)
<i>Schistura corica</i>	Coad (1981)	none	Coad = uncertain; Fishbase = native	<i>Noemacheilus corica</i> in Coad (1981)
<i>Schistura naseeri</i>	Coad (1981)		Coad - Uncertain; not in Fishbase Afghan database	<i>Noemacheilus naseeri</i> in Coad (1981)
<i>Schistura pakistanicus</i>	Coad (1981)		Coad - Uncertain; not in Fishbase Afghan database	<i>Noemacheilus pakistanicus</i> in Coad (1981)
<i>Triplophysa choprai</i>	Coad (1981)	None	Coad = uncertain; Fishbase = native	<i>Noemacheilus choprai</i> in Coad (1981)
<i>Triplophysa dorsalis</i>	Coad (1981)	Gray loach	Coad = uncertain; Fishbase = native	Originally cited as <i>Noemacheilus dorsalis</i>



Uncertain occurrence in Afghanistan (Continued)				
<i>Triplophysa stenura</i>	Coad (1981)		Coad = uncertain; Fishbase = native	<i>Noemacheilus stenurus</i> in Coad (1981)
<i>Ptychobarbus conirostris</i>	Coad (1981)	Indus snowtrout	Coad = native; Fishbase = questionable	
<i>Puntius ticto</i>	Coad (1981)	Ticto barb	Coad - Uncertain; not in Fishbase Afghan database	
<i>Puntius chelynoides</i>	Coad (1981)	Dark mahseer	Coad - Uncertain; not in Fishbase Afghan database	<i>Tor cheloides</i> in Coad (1981)
<i>Salmostoma punjabensis</i>	Coad (1981)	Punjab razor-belly minnow	Coad - Uncertain; not in Fishbase Afghan database	
<i>Cirrhinus burmesiana</i>	Coad (1981)		native	Not a valid species?
<i>Scardinius erythrophthalmus</i>	Coad (1981)	Rudd	uncertain	
<i>Schizothorax anjac</i>	Coad (1981)		uncertain	Possibly <i>S. zarudnyi</i> (Coad 1981). <i>S. anjac</i> not a recognized species.
<i>Schizothorax chrysochlora</i>	Coad (1981)	None	native	Not a recognized species?
<i>Schizothorax gobioides</i>	Coad (1981)		native	Not a recognized species?
<i>Abramis brama</i>	Coad (1981)	Carp bream	Coad - uncertain; Fishbase = native	
<i>Abramis sapa</i>	Coad (1981)	White-eye bream	Coad - uncertain; Fishbase = native	
<i>Aspidoparia morar</i>	Coad (1981)	None	Coad - uncertain; Fishbase = native	
<i>Capoeta fusca</i>	Coad (1981)	None	Coad - uncertain; Fishbase = native	
<i>Chalcalburnus chalcoides</i>	Coad (1981)	Danube bleak	Coad - uncertain; Fishbase = native	
<i>Cyprinus carpio</i>	Coad (1981)	Common carp	Coad = native; Fishbase = introduced	
<i>Garra gotyla</i>	Coad (1981)	Sucker head	Coad - uncertain; Fishbase = native	
<i>Garra rufa</i>	Coad (1981)	None	Coad - uncertain; Fishbase = native	
<i>Hemigrammocapoeta elegans</i>	Coad (1981)		Coad - uncertain; Fishbase = native	<i>Hemigarra elegans</i> in Coad (1981)
<i>Leuciscus idus</i>	Coad (1981)	Ide	Coad - uncertain; Fishbase = native	
<i>Leuciscus lehmanni</i>	Coad (1981)	Zeravshan dace	Coad - uncertain; Fishbase = native	
<i>Leuciscus leuciscus</i>	Coad (1981)	Common dace	Coad - uncertain; Fishbase = native	
<i>Esox lucius</i>	Coad (1981)	Northern pike	Coad - Uncertain; not in Fishbase Afghan database	
<i>Pungitius platygaster</i>	Talwar and Jhingram (1991)	Southern ninespine stickleback	Coad = uncertain; Fishbase = native	
<i>Mastacembelus armatus</i>	Coad (1981)	Zig-zag eel	Coad - Uncertain; not in Fishbase Afghan database	
<i>Gymnocephalus cernua</i>	Coad (1981)	Ruffe	Coad =- uncertain; Fishbase = native	
<i>Perca fluviatilis</i>	Coad (1981)	European perch	Coad =- uncertain; Fishbase = native	
<i>Clupisoma naziri</i>	Coad (1981)	None	Coad = uncertain; Fishbase = native	
<i>Glyptothorax cavia</i>	Coad (1981)	None	Coad = uncertain; Fishbase = native	
<i>Glyptothorax naziri</i>	Coad (1981)		Coad - Uncertain; not in Fishbase Afghan database	
<i>Glyptothorax punjabensis</i>	Coad (1981)		Coad - Uncertain; not in Fishbase Afghan database	
<i>Glyptothorax stocki</i>	Coad (1981)		Coad - Uncertain; not in Fishbase Afghan database	

## Appendix 6 The Butterflies of Afghanistan: A Checklist

<b>Butterflies of Afghanistan</b>	
Taken from Koçak & Kemal, <i>Checklist of the Butterflies of Afghanistan</i>	
<a href="http://www.members.tripod.com/entlep/Af.htm">http://www.members.tripod.com/entlep/Af.htm</a>	
<b>Family Papilionidae, Swallowtails</b>	
<i>Hypermnestra helios</i>	Desert Apollo
<i>Parnassius (Driopa) mnemosyne</i>	Clouded Apollo
<i>Parnassius (s.str.) actius</i>	
<i>Parnassius (s.str.) autocrator</i>	
<i>Parnassius (s.str.) charltonius</i>	Regal Apollo
<i>Parnassius (s.str.) delphius</i>	Banded Apollo
<i>Parnassius (s.str.) epaphus</i>	Common Red Apollo
<i>Parnassius (s.str.) honrathi</i>	Honrath's Common Blue Apollo
<i>Parnassius (s.str.) infernalis</i>	
<i>Parnassius (s.str.) inopinatus</i>	
<i>Parnassius (s.str.) jacquemontii</i>	Keeled Apollo
<i>Parnassius (s.str.) stoliczkanus</i>	
<i>Parnassius (s.str.) tianschanicus</i>	Celestial Apollo
<i>Atrophaneura (s.str. (latreillei-gr)) latreillei</i>	Rose Windmill
<i>Priniceps (Priniceps (demoleus-gr)) demoleus</i>	Lime Butterfly
<i>Priniceps (Priniceps (paris-gr)) polycctor</i>	Common Peacock
<i>Papilio (s.str.) alexanor</i>	Southern Swallowtail, Tiger Swallowtail
<i>Papilio (s.str.) machaon</i>	Swallowtail, Common Yellow Swallowtail

<b>Family Pieridae, Whites and Sulphurs</b>	
<i>Aporia (Metaporis (Turanoporia)) leucodice</i>	Blackvein
<i>Aporia (s.str.) crataegi</i>	Black-veined White
<i>Belenois aurota</i>	Pioneer, Caper White
<i>Colotis fausta</i>	Large Salmon Arab
<i>Delias belladonna</i>	
<i>Euchloe (s.str.) ausonia</i>	Dappled White, Green-Dapled White
<i>Ixias pyrene</i>	Yellow Orange Tip
<i>Pieris (Artogeia) canidia</i>	
<i>Pieris (Artogeia) krueperi</i>	Kruper's Small White
<i>Pieris (Artogeia) rapae</i>	Small White
<i>Pieris (s.str.) brassicae</i>	Large White
<i>Pontia callidice</i>	Small Bath White
<i>Pontia chloridice</i>	Hübner's Mountain White
<i>Pontia daplidice</i>	Bath White
<i>Zegris fausti</i>	Faust's Orange Tip
<i>Catopsilia crocale</i>	Common Emigrant
<i>Catopsilia pyranthe</i>	Mottled Emigrant

<b>Family Pieridae, Whites and Sulphers (Continued)</b>	
<i>Colias alpherakii</i>	Green Clouded Yellow
<i>Colias cocandica</i>	Khokandian Clouded Yellow
<i>Colias erate</i>	Eastern Pale Clouded Yellow
<i>Colias fieldii</i>	Himalayan Clouded Yellow
<i>Colias marcopolo</i>	Marcopolo's Clouded Yellow
<i>Colias poliographus</i>	Motschulsky's Clouded Yellow
<i>Colias shahfuladi</i>	Clench's Clouded Yellow
<i>Colias wiskotti</i>	Broad Bordered Clouded Yellow

<b>Family Libytheidae, Snout Butterflies</b>	
<i>Libythea myrrha</i>	

<b>Family Danaidae, Milkweed Butterflies</b>	
<i>Danaus (Anosia) chrysippus</i>	Milkweed, Monarch, Plain Tiger
<i>Parantica melaneus</i>	
<i>Parantica sita</i>	
<i>Tirumala hamata</i>	Blue Tiger
<i>Tirumala limniace</i>	

<b>Family Argynniidae</b>	
<i>Cyrestis thyodamas</i>	
<i>Euthalia aconthea</i>	
<i>Hypolimnas misippus</i>	False Plain Tiger
<i>Limenitis lepechini</i>	Hipolimnas-
<i>Pantoporia selenophora</i>	
<i>Precis almana</i>	Peacock Pansy
<i>Precis hierta</i>	
<i>Precis orithya</i>	Blue Pansy
<i>Sephisia dichroa</i>	
<i>Nymphalis xanthomelas</i>	Yellow-legged Tortoiseshell
<i>Aglais kaschmirensis</i>	Kashmiri Tortoiseshell
<i>Aglais nixa</i>	
<i>Aglais rizana</i>	
<i>Vanessa indica</i>	Indian Red Admiral
<i>Cynthia cardui</i>	Painted Lady
<i>Polygonia c-album</i>	Comma Butterfly
<i>Polygonia egea</i>	Southern Comma, Pellitory Butterfly
<i>Polygonia undina</i>	
<i>Argynnis (Argyreus) hyperbius</i>	
<i>Argynnis (Fabriciana) argyrospilata</i>	
<i>Argynnis (Fabriciana) jainadeva</i>	
<i>Argynnis (Pandoriana) pandora</i>	Cardinal, Great Fritillary
<i>Argynnis (Protodryas) kamala</i>	

Family Argynnididae (Continued)	
<i>Boloria (Proclrossiana) erubescens</i>	
<i>Boloria (s.str.) generator</i>	
<i>Issoria lathonia</i>	Queen of Spain Fritillary
<i>Melitaea arduinna</i>	
<i>Melitaea avinovi</i>	
<i>Melitaea didymina</i>	
<i>Melitaea fascelis</i>	Lesser Spotted Fritillary
<i>Melitaea kuchi</i>	
<i>Melitaea lutko</i>	
<i>Melitaea minerva</i>	
<i>Melitaea paludani</i>	
<i>Melitaea perseae</i>	Persian Fritillary, Desert Fritillary
<i>Melitaea shandura</i>	Dardic Fritillary
<i>Melitaea tangigharuensis</i>	

Family Satyridae, Satyrs and Wood Nymphs	
<i>Hipparchia (Neohipparchia) parisatis</i>	White-bordered Grayling, White-bordered Black
<i>Paralasa afghana</i>	
<i>Paralasa chitralica</i>	
<i>Paralasa danorum</i>	
<i>Paralasa howarthi</i>	
<i>Paralasa icelos</i>	
<i>Paralasa kotzschae</i>	
<i>Paralasa pagmanni</i>	Afghan Ringlet
<i>Paralasa shakti</i>	
<i>Aulocera padma</i>	
<i>Aulocera swaha</i>	Common Satyr
<i>Chazara (Neochazara) enervata</i>	Dark Rockbrown, Turanian Grayling
<i>Chazara (Neochazara) heydenreichi</i>	
<i>Chazara (s.str.) briseis</i>	Hermit
<i>Kanetisa digna</i>	
<i>Karanasa bolorica</i>	
<i>Karanasa huebneri</i>	
<i>Karanasa kotandari</i>	
<i>Karanasa moorei</i>	
<i>Karanasa pamira</i>	
<i>Karanasa voigti</i>	
<i>Pseudochazara (Achazara) kanishka A</i>	Aussem's Tawny Rockbrown
<i>Pseudochazara (Achazara) telephassa</i>	Telephassa Grayling, Turanian Tawny Rockbrown
<i>Pseudochazara (s.str.) droshica</i>	Tytler's Tawny Rockbrown
<i>Pseudochazara (s.str.) panjshira</i>	Afghani Tawny Rockbrown
<i>Pseudochazara (s.str.) porphyritica</i>	
<i>Pseudochazara (s.str.) sagina</i>	

<b>Family Satyridae, Satyrs and Wood Nymphs (Continued)</b>	
<i>Pseudochazara (s.str.) turkestanica</i>	Turkestan Tawny Rockbrown
<i>Satyrus pimpla</i>	
<i>Hyponephele (s.str. (Caspinephele)) dysdora</i>	Lederer's Steppe Brown
<i>Hyponephele (s.str. (Ereminphele)) capella</i>	Christoph's Steppe Brown
<i>Hyponephele (s.str. (Ereminphele)) huebneri</i>	Hübner's Steppe Brown
<i>Hyponephele (s.str. (Iranonephele)) amardaea</i>	Hyrcanian Steppe Brown
<i>Hyponephele (s.str. (Iranonephele)) glasunovi</i>	Glasunov's Steppe Brown
<i>Hyponephele (s.str. (Iranonephele)) hilaris</i>	Cheerful Steppe Brown
<i>Hyponephele (s.str. (Iranonephele)) perplexa</i>	Omoto's Steppe Brown
<i>Hyponephele (s.str. (Orientinephele)) difficilis</i>	Shoumatoff's Steppe Brown
<i>Hyponephele (s.str. (Orientinephele)) mussitans</i>	Clench's Steppe Brown
<i>Hyponephele (s.str. (Tengrinephele)) pamira</i>	Pamir Steppe Brown
<i>Hyponephele (s.str. (Turaninephele)) brevistigma</i>	White-ringed Ladakhi Steppe Brown
<i>Hyponephele (s.str. (Turaninephele)) davendra</i>	White-ringed Steppe Brown
<i>Hyponephele (s.str.) interposita</i>	Intermediate Steppe Brown
<i>Hyponephele (s.str.) lupina</i>	Oriental Steppe Brown
<i>Hyponephele shivacola</i>	Wyatt's Steppe Brown
<i>Hyponephele sussurans</i>	
<i>Coenonympha mangeri</i>	Afghani Heath
<i>Lyela amirica</i>	
<i>Esperarge eversmanni</i>	
<i>Lasiommata hindukushica</i>	
<i>Lasiommata menava</i>	Sooty Argus
<i>Lethe sidonis</i>	
<i>Ypthima asterope</i>	African Ringlet, Common Three-Ring-
<i>Ypthima bolanica</i>	Desert Four-ring

<b>Family Riodinidae, Metalmarks</b>	
<i>Abisara bifasciata</i>	
<i>Polycaena tamerlana</i>	

<b>Family Lycaenidae, Blues and Coppers</b>	
<i>Chaetoprocta odata</i>	
<i>Neozephyrus syla</i>	
<i>Callophrys mystaphia</i>	Miller's Green Hairstreak
<i>Callophrys paulae</i>	Pfeiffer's Green Hairstreak
<i>Callophrys suaveola</i>	Alpine Green Hairstreak
<i>Satyrion (Strymonidia) spini</i>	Blue-spot Hairsreak
<i>Satyrion (Superflua) hyrcanicum</i>	Hyrcanian Black Hairstreak
<i>Satyrion (Superflua) sassanides</i>	Persian Black Hairstreak
<i>Cigaritis acamas</i>	Lebanese Silver-line, Levantine Leopard Butterfly
<i>Cigaritis epargyros</i>	Turanian Leopard Butterfly
<i>Jamides celeno</i>	

Family Lycaenidae, Blues and Coppers (Continued)	
<i>Lampides boeticus</i>	Long-tailed Blue, Pea Blue-Lampides
<i>Tarucus balkanicus</i>	Little Tiger Blue
<i>Tarucus nara</i>	
<i>Tarucus rosaceus</i>	Mediterranean Tiger Blue
<i>Zizeeria karsandra</i>	Indian Grass Blue
<i>Azanus uranus</i>	Dull Babul Blue
<i>Acytolepis puspa</i>	
<i>Celastrina argiolus</i>	Holly Blue
<i>Celastrina carna</i>	
<i>Celastrina kollari</i>	Indian Holly Blue
<i>Udara (Penudara) albocaerulea</i>	
<i>Glauopsyche (s.str.) alexis</i>	Green-underside Blue
<i>Glauopsyche (s.str.) seminigra</i>	Afghani Green-underside Blue
<i>Micropsyche ariana</i>	Arian Small Blue
<i>Praephilotes violacea</i>	
<i>Pseudophilotes vicrama</i>	Lesser Chequered Blue
<i>Turanana anisoptalma</i>	Iranian Odd-spot Blue
<i>Turanana grumi</i>	
<i>Turanana laspura</i>	
<i>Plebejus (Alpherakya) bellonus</i>	
<i>Plebejus (Alpherakya) devanicus</i>	
<i>Plebejus (Kretania) iranicus</i>	Persian Brown Argus
<i>Plebejus (Lycaeides) christophi</i>	Christoph's Blue
<i>Plebejus (ardis-gr) eversmanni</i>	Eversmann's Blue
<i>Plebejus (ardis-gr) firuskuhi</i>	
<i>Polyommatus (Agriades (s.str.)) pheretiades</i>	
<i>Polyommatus (Agriades (s.str.)) walterforster</i>	
<i>Polyommatus (Albulina (Pamiria)) chrysopsis</i>	
<i>Polyommatus (Albulina (Pamiria)) issus</i>	
<i>Polyommatus (Albulina (Pamiria)) selma</i>	
<i>Polyommatus (Albulina (Plebejidea)) loewii</i>	Loew's Blue
<i>Polyommatus (Albulina (Vacciniina)) omotoi</i>	
<i>Polyommatus (s.str. (Agrodiaetus (Juldus))) afghanicus</i>	Afghani Blue
<i>Polyommatus (s.str. (Agrodiaetus (Paragrodiaetus))) bogra</i>	
<i>Polyommatus (s.str. (Agrodiaetus (Paragrodiaetus))) erschoffii</i>	
<i>Polyommatus (s.str. (Agrodiaetus (Paragrodiaetus))) frauvertianae</i>	Frauvertian's Blue
<i>Polyommatus (s.str. (Agrodiaetus (Paragrodiaetus))) nadirus</i>	Nadir's Blue
<i>Polyommatus (s.str. (Sublysandra)) adulterinus</i>	
<i>Polyommatus (s.str. (Sublysandra)) cornelius</i>	Small Anatolian Blue
<i>Polyommatus (s.str. (Sublysandra)) muetingi</i>	
<i>Polyommatus (s.str. (Sublysandra)) nuksani</i>	
<i>Polyommatus (s.str.) eros</i>	Eros Blue
<i>Polyommatus (s.str.) icarus</i>	

<b>Family Lycaenidae, Blues and Coppers (Continued)</b>	
<i>Polyommatus (s.str.) omotoi</i>	Omoto's Blue
<i>Polyommatus (s.str.) persicus</i>	Persian Common Blue
<i>Polyommatus (s.str.) venus</i>	Venus Blue
<i>Chilades (Freyeria) trochylus</i>	Jewel Blue
<i>Chilades (Lachides) contracta</i>	Oriental Jewel Blue
<i>Chilades (Lachides) galba</i>	Small Desert Blue
<i>Chilades (s.str.) parrhasius</i>	
<i>Hyracanana caspia</i>	Caspian Copper
<i>Lycaena (s.str.) kiyokoe</i>	
<i>Lycaena (s.str.) phlaeas</i>	Small Copper
<i>Margelycaena margelanica</i>	
<i>Phoenicurusia athamantis</i>	
<i>Thersamonia (Thersamolycaena) aeolus</i>	
<i>Thersamonia (s.str.) aditya</i>	
<i>Thersamonia (s.str.) alaica</i>	
<i>Thersamonia (s.str.) eberti</i>	
<i>Thersamonia (s.str.) thersamon</i>	Lesser Fiery Copper
<i>Heliophorus (Nesa) sena</i>	

<b>Family Hesperiiidae, Skippers</b>	
<i>Badamia exclamationis</i>	
<i>Coladenia dan</i>	
<i>Carcharodus (Lavatheria) stauderi</i>	Stauder's Skipper
<i>Carcharodus (Reverdinus) dravira</i>	
<i>Carcharodus (s.str.) alceae</i>	Mallow Skipper
<i>Carcharodus (s.str.) swinhoei</i>	Swinhoe's Skipper
<i>Erynnis marloyi</i>	Inky Skipper, Oriental Jet Skipper
<i>Muschampia antonia</i>	
<i>Muschampia musta</i>	
<i>Muschampia proteus</i>	
<i>Pyrgus alpinus</i>	
<i>Pyrgus badachschanus</i>	
<i>Pyrgus cashmirensis</i>	
<i>Pyrgus darwazicus</i>	
<i>Spialia (Neospialia) orbifer</i>	Red Underwing Skipper
<i>Spialia (s.str.) osthelderi</i>	Osthelder's Skipper
<i>Gegenes nostradamus</i>	Mediterranean Skipper, Peaty Skipper
<i>Hesperia comma</i>	Silver-Spotted Skipper
<i>Thymelicus alaicus</i>	
<i>Thymelicus lineolus</i>	Essex Skipper

## Appendix 7 The Mosquitoes of Afghanistan: A Checklist

<b>Mosquitoes of Afghanistan</b> Ward, R.A. 1972. <i>Mosquitoes of Afghanistan – an annotated bibliography.</i> <i>Mosquito Systematics</i> 4 No. 3: 93 – 97.
1. <i>Anopheles (A.) algeriensis</i> Theobald
2. <i>Anopheles (A.) claviger</i> Meigen
3. <i>Anopheles (A.) habibi</i> Mulligan and Puri
4. <i>Anopheles (A.) hyrcanus</i> Pallas
5. <i>Anopheles (A.) lindesayi</i> Giles
6. <i>Anopheles (A.) peditaeniatus</i> Leicester
7. <i>Anopheles (A.) sacharovi</i> Favre
8. <i>Anopheles (Cellia) annularis</i> Van der Wulp
9. <i>Anopheles (C.) culicifacies</i> Giles
10. <i>Anopheles (C.) fluviatilis</i> James
11. <i>Anopheles (C.) maculatus</i> Theobald
12. <i>Anopheles (C.) maculatus wilmosi</i> James
13. <i>Anopheles (C.) moghulensis</i> Christophers
14. <i>Anopheles (C.) multicolor</i> Cambouliu
15. <i>Anopheles (C.) pulcherrimus</i> Theobald
16. <i>Anopheles (C.) splendidus</i> Koisumi
17. <i>Anopheles (C.) stephensi</i> Liston
18. <i>Anopheles (C.) subpictus</i> Grassi
19. <i>Anopheles (C.) superpictus</i> Grassi
20. <i>Anopheles (C.) turkhudi</i> Liston
21. <i>Anopheles (C.) vagus</i> Donitz
22. <i>Uranotaenia (Uranotaenia) unguiculata</i> Edwards
23. <i>Aedes (Ochlerotatus) caspius</i> Pallas
24. <i>Culiseta (Allotheobaldia) longiareolata</i> Macquart
25. <i>Culex (Barraudius) pusillus</i> Macquart
26. <i>Culex (Neoculex) deserticola</i> Kirkpatrick
27. <i>Culex (N.) quettensis</i> Mattingly
28. <i>Culex (Culex) pipiens fatigans</i> Wiedeman
29. <i>Culex (C.) theileri</i> Theobald
30. <i>Culex (C.) univittatus</i> Theobald



## Appendix 8 The Liverworts of Afghanistan: A Checklist

Liverworts of Afghanistan		
Family	Species	Province of Occurrence
Targionaceae	<i>Targonia hypophylla</i>	Farah, Helmand
Aytoniaceae	<i>Plagiochasma sp</i>	Bamiyan, Konar
Aytoniaceae	<i>Reboulia hemisphaerica</i>	Kabul, Konar, Zabul
Aytoniaceae	<i>Mannia fragrans</i>	Bamiyan, Konar
Aytoniaceae	<i>Mannia androgyna</i>	Kabul, Konar
Conocephalaceae	<i>Conocephalun conicum</i>	Konar
Cleveaceae	<i>Athalamia hyalina</i>	Kabul
Marchantiaceae	<i>Preissia quadrata</i>	Kabul, Kapisa, Konar
Marchantiaceae	<i>Marchantia polymorpha</i>	Bamiyan, Faryab, Kabul
Marchantiaceae	<i>Wiesnerella denudata</i>	Konar
Ricciaceae	<i>Riccia fluitans</i>	Kabul
Pellicaceae	<i>Pellia endivifolia</i>	Kabul
Lophocoleaceae	<i>Chiloscyphus polyanthos</i>	Konar
Radulaceae	<i>Radula complanata</i>	Unknown
Porellaceae	<i>Porella cordaeana</i>	Unknown (Hindu Kush noted)
Porellaceae	<i>Porella platyphylla</i>	Laghman

## Appendix 9 The Lichens and Fungi of Afghanistan: A Checklist

Lichens and Lichenicolous Fungi of Afghanistan	
Feuerer, T. 2006. (Ed.). <i>Checklists of lichens and lichenicolous fungi. Version 1</i> ( <a href="http://www.biologie.uni-hamburg.de/checklists/asia/afghanistan_1.htm">http://www.biologie.uni-hamburg.de/checklists/asia/afghanistan_1.htm</a> )	
<i>Acarospora altissima</i> H. Magn.	<i>Caloplaca persica</i> (J. Steiner) M. Steiner & Poelt
<i>Acarospora assimilans</i> Vain.	<i>Caloplaca polycarpoides</i>
<i>Acarospora bohlinii</i> H. Magn.	<i>Caloplaca pyracea</i> (Ach.) Th. Fr.
<i>Acarospora brevilobata</i> H. Magn.	<i>Caloplaca saxicola</i> (Hoffm.) Nordin
<i>Acarospora cervina</i> A. Massal.	<i>Caloplaca sororicida</i> ined.
<i>Acarospora lavicola</i> J. Stein	<i>Caloplaca tominii</i> Sav.
<i>Acarospora rufa</i> (Vain.) H. Magn.	<i>Caloplaca trachyphylla</i> (Tuck.) Zahlbr.
<i>Acarospora rufoalutacea</i> (Harm.) H. Magn.	<i>Caloplaca transcaspica</i> (Nyl.) Zahlbr.
<i>Acarospora scabrida</i> H. Magn.	<i>Caloplaca variabilis</i> (Pers.) Müll. Arg.
<i>Acarospora sinopica</i> (Wahlenb.) Körb.	<i>Candelaria concolor</i> (J. Dicks.) Stein
<i>Acarospora stapfiana</i> (Müll. Arg.) Hue	<i>Candelariella aurella</i> (Hoffm.) Zahlbr.
<i>Acarospora strigata</i> (Nyl.) Jatta	<i>Candelariella kansuensis</i> H. Magn.
<i>Acarospora suprasedens</i> H. Magn.	<i>Candelariella oleifera</i> H. Magn.
<i>Acarospora verruciformis</i> H. Magn.	<i>Candelariella vitellina</i> (Ehrh.) Müll. Arg.
<i>Anaptychia desertorum</i> (Rupr.) Poelt	<i>Cladonia fimbriata</i> (L.) Sandst.
<i>Anaptychia elbursiana</i> (Szat.) Poelt	<i>Cladonia fimbriata</i> (L.) Sandst. var. simplex Hag.
<i>Anaptychia roemerii</i> Poelt	<i>Collema cristatum</i> (L.) Weber ex F. H. Wigg.
<i>Anaptychia ulotrichoides</i> (Vain.) Vain.	<i>Collema polycarpum</i> (Schaer.) Kremp.
<i>Apiosporella caudata</i> (Kernst.) Keissl.	<i>Collema tenax</i> (Sw.) Ach. em. Degel.
<i>Aspicilia calcarea</i> (L.) Mudd	<i>Conotrema freyi</i> Vezda & Poelt
<i>Buellia elegans</i> Poelt	<i>Dermatocarpon miniatum</i> (L.) Mann
<i>Buellia epipolia</i> (Ach.) Mong.	<i>Dermatocarpon moulinsii</i> (Mont.) Zahlbr. var. moulinsii
<i>Buellia longispora</i> Scheidegger	<i>Dermatocarpon moulinsii</i> (Mont.) Zahlbr. var. pellitum Poelt & Wirth
<i>Buellia populorum</i> (A. Massal.) Clauzade & Roux	<i>Dermatocarpon perumbratum</i> Nyl.
<i>Caloplaca anchon-phoeniceon</i> Poelt & Clauzade in Poelt	<i>Dermatocarpon vellereum</i> Zschacke
<i>Caloplaca biatorina</i> (A. Massal.) Steiner	<i>Dermatocarpon wernerii</i> Rouss.
<i>Caloplaca biatorina</i> (A. Massal.) Steiner var. gyalotechnicoides (Müll. Arg.) Poelt	<i>Didymosphaeria sporastatae</i> (Anzi) Winter
<i>Caloplaca bicolor</i> H. Magn.	<i>Dimelaena oreina</i> (Ach.) Norm.
<i>Caloplaca cerina</i> (Ehrh.) Th. Fr.	<i>Echinothecium reticulatum</i> Zopf
<i>Caloplaca circumalbata</i> var. circumalbata	<i>Fulgensia desertorum</i> (Tomin) Poelt
<i>Caloplaca decipiens</i> (Arnold) Jatta	<i>Fulgensia subbracteata</i> (Nyl.) Poelt
<i>Caloplaca hedinii</i> H. Magn.	<i>Glypholecia scabra</i> (Pers.) Müll. Arg.
<i>Caloplaca intrudens</i> H. Magn.	<i>Lecania diplococca</i> M. Steiner & Poelt
<i>Caloplaca juniperina</i> Tomin	<i>Lecania erysibe</i> (Ach.) Mudd. f. nigra B. de Lesd.
<i>Caloplaca paulii</i> Poelt	<i>Lecania ochronigra</i> J. Steiner
<i>Caloplaca paulsenii</i> (Vain.) Zahlbr.	<i>Lecania triseptata</i> (Vain.) Zahlbr.

<i>Lecanora albescens</i> (Hoffm.) Flörke	<i>Melanelia infumata</i> (Nyl.) Essl.
<i>Lecanora argopholis</i> (Ach.) Ach.	<i>Melanelia subargentifera</i> (Nyl.) Essl.
<i>Lecanora asiatica</i> H. Magn. var. <i>subfarinosa</i> H. Magn. T	<i>Melanelia tominii</i> (Oksner) Essl.
<i>Lecanora baicalensis</i> Zahlbr.	<i>Muellerella pygmaea</i> (Körb.) D. Hawksw.
<i>Lecanora bohlinii</i> H. Magn.	<i>Neofuscelia glomellifera</i> (Nyl.) Essl.
<i>Lecanora crenulata</i> Hook.	<i>Neofuscelia loxodes</i> (Nyl.) Essl.
<i>Lecanora dispersa</i> (Pers.) Sommerf.	<i>Neofuscelia pulla</i> (Ach.) Essl.
<i>Lecanora disperso-areolata</i> (Schaer.) Lamy	<i>Neofuscelia verruculifera</i> (Nyl.) Essl.
<i>Lecanora frustulosa</i> (J. Dicks.) Ach.	<i>Parmelina tiliacea</i> (Hoffm.) Hale
<i>Lecanora garovaglii</i> (Körb.) Zahlbr.	<i>Peccania crispa</i> ined.
<i>Lecanora hagenii</i> Ach.	<i>Peccania terricola</i> H. Magn.
<i>Lecanora hagenii</i> Ach. var. <i>umbrina</i> (Ehrh.) Arnold	<i>Peltigera lepidophora</i> (Nyl.) Vain.
<i>Lecanora hartiana</i> Steiner	<i>Peltigera praetextata</i> (Flörke) Zopf
<i>Lecanora hedinii</i> H. Magn.	<i>Peltigera rufescens</i> (Weis) Humb.
<i>Lecanora invadens</i> H. Magn.	<i>Peltigera scabrosa</i> Th. Fr.
<i>Lecanora koerberiana</i> Lamm	<i>Phaeophyscia kairamoi</i> (Vain.) Moberg
<i>Lecanora maculata</i> H. Magn.	<i>Phaeophyscia nigricans</i> (Flörke) Moberg
<i>Lecanora microspora</i> Arnold	<i>Phaeophyscia orbicularis</i> (Neck.) Moberg
<i>Lecanora monodi</i> R. G. Werner	<i>Phoma lichenis</i> Pass.
<i>Lecanora pachyphylla</i> H. Magn.	<i>Physcia adscendens</i> (Fr.) H. Oliv.
<i>Lecanora percrenata</i> H. Magn.	<i>Physcia aipolia</i> (Humb.) Fűrnr.
<i>Lecanora placentiformis</i> J. Steiner	<i>Physcia caesia</i> (Hoffm.) Fűrnr.
<i>Lecanora scabridula</i> H. Magn.	<i>Physcia caesia</i> (Hoffm.) Fűrnr. var. <i>ventosa</i> (Lyngé) Frey
<i>Lecanora subalbicans</i> H. Magn.	<i>Physcia dimidiata</i> (Arnold) Nyl.
<i>Lecanora subcaesia</i> H. Magn.	<i>Physcia dubia</i> (Hoffm.) Lettau
<i>Lecanora zederbaueri</i> Zahlbr.	<i>Physcia grisea</i> (Lam.) Zahlbr. var. <i>pithyrea</i> Flag.
<i>Lecidea atrobrunnea</i> (Ramond) Schaer.	<i>Physcia hispidula</i> (Ach.) Frey subsp. <i>hispidula</i>
<i>Lecidea oreja</i> Stizenb.	<i>Physcia hispidula</i> (Ach.) Frey subsp. <i>primaria</i> Poelt
<i>Lecidea paratropoides</i> Müll. Arg.	<i>Physcia latifolia</i> Steiner & Poelt
<i>Lecidea pavementans</i> H. Magn.	<i>Physcia leptalea</i> (Ach.) DC.
<i>Lecidea percrassata</i> H. Magn.	<i>Physcia magnussonii</i> Frey
<i>Lecidea pulcherrima</i> Vain.	<i>Physcia pusilloides</i> Zahlbr.
<i>Lecidea tessellata</i> Flörke var. <i>caesia</i> (Anzi) Arnold	<i>Physcia sciastra</i> (Ach.) Nyl.
<i>Lecidea tessellata</i> Flörke var. <i>tessellata</i>	<i>Physcia semipinnata</i> (Gmel.) Moberg
<i>Lecidella alaiensis</i> (Vain.)	<i>Physcia stellaris</i> (L.) Nyl.
<i>Lecidella carpathica</i> Körb.	<i>Physcia strigosa</i> Poelt & Buschardt
<i>Lecidella elaeochroma</i> (Ach.) M. Choisy	<i>Physcia tenella</i> DC. em. Bitter
<i>Lecidella euphorea</i> (Flörke) Nyl.	<i>Physconia detersa</i> (Nyl.) Poelt
<i>Lecidella patavina</i> (A. Massal.) Knoph & Leuckert	<i>Physconia distorta</i> (With.) J. R. Laundon
<i>Lecidella stigmatea</i> (Ach.) Hertel & Leuckert	<i>Physconia farrea</i> (Ach.) Poelt
<i>Lichenostigma epipolina</i> Nav.-Ros., Calatayud & Hafellner	<i>Physconia grisea</i> (Lam.) Poelt
<i>Lichenostigma semiimmersa</i> Hafellner	<i>Protoblastenia immersa</i> (Web.) Steiner
<i>Lobothallia praeradiosa</i> (Nyl.) Hafellner	<i>Protoparmeliopsis muralis</i> (Schreb.) M. Choisy var. <i>muralis</i>
<i>Melanelia exasperatula</i> (Nyl.) Essl.	<i>Protoparmeliopsis muralis</i> (Schreb.) M. Choisy var. <i>diffracta</i> (Ach.) "Rabenh."

<b>Lichens and Lichenicolous Fungi of Afghanistan (Continued)</b>	
<i>Protoparmeliopsis muralis</i> (Schreb.) M. Choisy var. <i>dubyi</i> (Müll. Arg.)	<i>Rinodina violascens</i> H. Magn.
<i>Psora decipiens</i> (Hedw.) Hoffm.	<i>Sarcogyne gyrocarpa</i> H. Magn.
<i>Psora rubiformis</i> (Wahlenb.) Hook.	<i>Sarcogyne privigna</i> (Ach.) A. Massal.
<i>Ramalina sinensis</i> Jatta	<i>Sphaerothallia desertorum</i> (Kremp.) Szatala
<i>Rhizocarpon disporum</i> (Naeg.) Müll. Arg.	<i>Sphaerothallia straussii</i> (Steiner) Szatala )
<i>Rhizocarpon effiguratum</i> (Anzi) Th. Fr.	<i>Sporastatia asiatica</i> H. Magn.
<i>Rhizocarpon geminatum</i> Körb.	<i>Sporastatia testudinea</i> (Ach.) A. Massal.
<i>Rhizocarpon geographicum</i> (L.) DC.	<i>Staurothele clopima</i> (Wahlenb.) Th. Fr.
<i>Rhizocarpon kansuense</i> H. Magn.	<i>Staurothele levinae</i> Oxner
<i>Rhizocarpon macrosporum</i> Räsänen	<i>Teloschistes brevior</i> (Vain.) Hillm.
<i>Rhizocarpon pusillum</i> Runem. var. <i>asiaticum</i> Poelt	<i>Teloschistes contortuplicatus</i> (Ach.) Clauzade & Rondon 1)
<i>Rhizocarpon ridescens</i> (Nyl.) Zahlbr.	<i>Tichothecium gemmiferum</i> (Tayl.) Körb.
<i>Rhizocarpon solitarium</i> H. Magn.	<i>Toninia sedifolia</i> (Scop.) Timdal
<i>Rhizoplaca melanophthalma</i> (Ramond) Leuckert & Poelt	<i>Tornabea scutellifera</i> (With.) J. R. Laundon
<i>Rhizoplaca peltata</i> (Ramond) Leuckert & Poelt	<i>Umbilicaria aprina</i> Nyl. 58), Steiner & Mayrhofer (1987: 322)
<i>Rinodina afghanica</i> M. Steiner & Poelt	<i>Umbilicaria decussata</i> (Vill.) Frey
<i>Rinodina bischoffii</i> (Hepp) A. Massal.	<i>Umbilicaria hirsuta</i> Ach. em. Frey
<i>Rinodina epiianthina</i> (Harm.) Zahlbr.	<i>Umbilicaria vellea</i> (L.) Ach. em. Frey
<i>Rinodina guzzinii</i> Jatta	<i>Verrucaria amphibola</i> Nyl.
<i>Rinodina pycnocarpa</i> H. Magn.	<i>Xanthomendoza fallax</i> (Hepp) Søchting, Kärnefelt & S. Kondr.
<i>Rinodina pyrina</i> (Ach.) Arnold	<i>Xanthoparmelia mexicana</i> (Gyeln.) Hale
<i>Rinodina straussii</i> Steiner	<i>Xanthoria candelaria</i> (L.) Kickx.
<i>Rinodina subnigra</i> H. Magn.	<i>Xanthoria elegans</i> (Link) Th.
<i>Rinodina tominii</i> Mayrh.	<i>Xanthoria sorediata</i> (Vain.) Poelt

## Appendix 10 Afghan Species Listed on the IUCN Red List of Threatened Species

Afghan Species on the IUCN Red List of Threatened Species			
MAMMALS			
Species Listing	Subspecies Listing	Common Name	Threat
<i>Ovis ammon</i>		Argali	VU
	<i>Ovis ammon ssp. poli</i>	Marco Polo Argali	VU
<i>Ovis orientalis</i>		Urial	VU
	<i>Ovis orientalis ssp. cycloceros</i>	Afghan Urial	VU
<i>Panthera leo</i>		African Lion	VU
	<i>Panthera pardus ssp. saxicolor</i>	North Persian Leopard	EN
<i>Panthera tigris</i>			EN
	<i>Panthera tigris ssp. virgata</i>	Caspian Tiger	EX
<i>Rhinolophus mehelyi</i>		Mehely's Horseshoe Bat	VU
<i>Uncia uncia</i>		Snow Leopard	EN
<i>Ursus thibetanus</i>		Asiatic Black Bear	VU
<i>Vulpes cana</i>		Afghan Fox	VU
<i>Acinonyx jubatus</i>		Cheetah	VU
<i>Capra aegagrus</i>		Wild Goat	VU
	<i>Capra aegagrus ssp. aegagrus</i>	Wild Goat	VU
<i>Capra falconeri</i>		Markhor	EN
	<i>Capra falconeri ssp. heptneri</i>	Tadjik Markhor	CR
	<i>Capra falconeri ssp. megaceros</i>	Straight-Horned Markhor	EN
<i>Cervus elaphus</i>			
	<i>Cervus elaphus ssp. bactrianus</i>	Bactrian Deer	VU
<i>Gazella subgutturosa</i>		Goitered Gazelle	VU
<i>Eptesicus nasutus</i>		Sind Bat	VU
<i>Meriones zarudnyi</i>		Zarudny's Jird	EN
<i>Myotis emarginatus</i>		Geoffroy's Bat	VU
<i>Myotis longipes</i>		Kashmir Cave Bat	VU

BIRDS			
Species Listing	Subspecies Listing	Common Name	Threat
<i>Numenius tenuirostris</i>		Long-Billed Curlew	CR
<i>Otis tarda</i>		Great Bustard	VU
<i>Oxyura leucocephala</i>		White-Headed Duck	EN
<i>Pelecanus crispus</i>		Dalmatian Pelican	VU
<i>Saxicola macrorhyncha</i>		Stoliczka's Bushchat	VU
<i>Vanellus gregarius</i>		Sociable Lapwing	CR
<i>Anas formosa</i>		Baikal Teal	VU
<i>Anser erythropus</i>		Lesser White-Fronted Goose	VU
<i>Aquila clanga</i>		Greater Spotted Eagle	VU

<b>BIRDS (Continued)</b>			
<b>Species Listing</b>	<b>Subspecies Listing</b>	<b>Common Name</b>	<b>Threat</b>
<i>Aquila heliaca</i>		Imperial Eagle	VU
<i>Chlamydotis undulata</i>		Houbara Bustard	VU
<i>Columba eversmanni</i>		Pale-Backed Pigeon	VU
<i>Falco cherrug</i>		Saker Falcon	EN
<i>Falco naumanni</i>		Lesser Kestrel	VU
<i>Grus leucogeranus</i>		Siberian Crane	CR
<i>Gyps bengalensis</i>		Asian White-Backed Vulture	CR
<i>Gyps indicus</i>		Indian Vulture	CR
<i>Haliaeetus leucoryphus</i>		Band-Tailed Fish-Eagle	VU
<i>Marmaronetta angustirostris</i>		Marbled Duck	VU

<b>REPTILES</b>			
<b>Species Listing</b>	<b>Subspecies Listing</b>	<b>Common Name</b>	<b>Threat</b>
<i>Testudo horsfieldii</i>		Afghan Tortoise	VU

<b>AMPHIBIANS</b>			
<b>Species Listing</b>	<b>Subspecies Listing</b>	<b>Common Name</b>	<b>Threat</b>
<i>Batrachuperus mustersi</i>		Afghani Brook Salamander	CR

<b>INSECTS</b>			
<b>Species Listing</b>	<b>Subspecies Listing</b>	<b>Common Name</b>	<b>Threat</b>
<i>Parnassius autocrator</i>		None	VU

<b>PLANTS</b>			
<b>Species Listing</b>	<b>Subspecies Listing</b>	<b>Common Name</b>	<b>Threat</b>
<i>Ulmus wallichiana</i>		Himalayan elm	VU

## Appendix 11 Afghan Species Listed on Appendices I and II of the Convention on the Trade in Endangered Species (CITES)

Afghan Species on CITES Appendices I and II				
FAUNA (ANIMALS)				
	Common Name	Scientific Name	Appendix	Notes
<b>Class: MAMMALIA (Mammals)</b>				
	Rhesus Macaque	<i>Macaca mulatta</i>	II	
	Wolf	<i>Canis lupus</i>	II	
	Blandford's Fox	<i>Vulpes cana</i>	II	
	Brown Bear	<i>Ursus arctos isabellinus</i>	I	
	Asiatic Black Bear	<i>Ursus thibetanus</i>	I	
	Common Otter	<i>Lutra lutra</i>	I	
	Cheetah	<i>Acinonyx jubatus</i>	I	Extirpated in Afghanistan
	Caracal	<i>Caracal caracal</i>	I	
	Jungle Cat	<i>Felis chaus</i>	II	
	Sand Cat	<i>Felis margarita</i>	II	Unconfirmed from Afghanistan
	Wildcat	<i>Felis silvestris</i>	II	
	Lynx	<i>Lynx lynx</i>	II	
	Pallas's Cat	<i>Otocolobus manul</i>	II	
	Leopard	<i>Panthera pardus</i>	I	
	Tiger	<i>Panthera tigris</i>	I	Extirpated in Afghanistan
	Leopard Cat	<i>Prionailurus bengalensis</i>	II	
	Snow Leopard	<i>Uncia uncia</i>	I	
	Onager or wild ass	<i>Equus onager</i>	II	<i>O. e. onager</i> and <i>O. e. khulan</i> occur in Afghanistan. <i>O. e. khur</i> occurs in India and Pakistan and is Appendix I. Considered <i>Equus hemionus</i> by Duff and Lawson (2004).
	Himalayan Musk Deer	<i>Moschus chrysogaster</i>	I	
	Bactrian Deer	<i>Cervus elaphus bactrianus</i>	II	Subspecies only, probably extirpated in Afghanistan
	Wild Yak	<i>Bos mutus</i>	I	Unconfirmed from Afghanistan
	Markhor	<i>Capra falconeri</i>	I	
	Goral	<i>Naemorhedus goral</i>	I	Unconfirmed from Afghanistan
	Argali	<i>Ovis ammon</i>	II	Only <i>O. a. poli</i> in Afghanistan
	Urial/Mouflon	<i>Ovis vignei [orientalis]</i>	II	The Afghan subspecies ( <i>cycloceros</i> ) is considered <i>O. orientalis</i> by IUCN and Duff and Lawson (2004). Considered <i>O. vignei</i> by CITES.

Class : AVES (Birds)				
	Dalmatian Pelican	<i>Pelecanus crispus</i>	I	
	Black Stork	<i>Ciconia nigra</i>	II	
	Eurasian Spoonbill	<i>Platalea leucorodia</i>	II	

Class : AVES (Birds) (Continued)				
	Lesser Flamingo	<i>Phoenicopterus minor</i>	II	Unconfirmed from Afghanistan
	Greater Flamingo	<i>Phoenicopterus ruber</i>	II	
	Baikal Teal	<i>Anas formosa</i>	II	Unconfirmed from Afghanistan
	White-headed Duck	<i>Oxyura leucocephala</i>	II	
	Osprey	<i>Pandion haliaetus</i>	II	
	Shikra	<i>Accipiter badius</i>	II	
	Northern Goshawk	<i>Accipiter gentilis</i>	II	
	Eurasian Sparrowhawk	<i>Accipiter nisus</i>	II	
	Cinereous Vulture	<i>Aegypius monachus</i>	II	
	Golden Eagle	<i>Aquila chrysaetos</i>	II	
	Greater Spotted Eagle	<i>Aquila clanga</i>	II	
	Steppe Eagle	<i>Aquila nipalensis</i>	II	
	Imperial Eagle	<i>Aquila heliaca</i>	I	
	White-eyed Buzzard	<i>Butastur teesa</i>	II	
	Eurasian Buzzard	<i>Buteo buteo</i>	II	Uncertain for Afghanistan
	Rough-legged Hawk	<i>Buteo lagopus</i>	II	
	Long-legged Buzzard	<i>Buteo rufinus</i>	II	
	Short-toed Eagle	<i>Circaetus gallicus</i>	II	
	Western Marsh-Harrier	<i>Circus aeruginosus</i>	II	
	Northern Harrier	<i>Circus cyaneus</i>	II	
	Pallid Harrier	<i>Circus macrourus</i>	II	
	Montagu's Harrier	<i>Circus pygargus</i>	II	
	Lammergeier	<i>Gypaetus barbatus</i>	II	
	White-rumped Vulture	<i>Gyps bengalensis</i>	II	
	Eurasian Griffon	<i>Gyps fulvus</i>	II	
	Himalayan Griffon	<i>Gyps himalayensis</i>	II	
	Indian Vulture	<i>Gyps indicus</i>	II	Unconfirmed from Afghanistan
	Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	II	
	White-tailed Eagle	<i>Haliaeetus albicilla</i>	I	
	Bonelli's Eagle	<i>Hieraetus fasciatus</i>	II	Cited as <i>Aquila fasciatus</i> by Dickinson (2003)
	Black Kite	<i>Milvus lineatus [migrans]</i>	II	Cited as <i>Milvus migrans</i> by Dickinson (2003)
	Egyptian Vulture	<i>Neophron percnopterus</i>	II	
	European Honey-buzzard	<i>Pernis apivorus</i>	II	Unconfirmed from Afghanistan
	Amur Falcon	<i>Falco amurensis</i>	II	Unconfirmed from Afghanistan
	Saker Falcon	<i>Falco cherrug</i>	II	
	Merlin	<i>Falco columbarius</i>	II	
	Laggar Falcon	<i>Falco jugger</i>	I	
	Lesser Kestrel	<i>Falco naumanni</i>	II	
	Barbary Falcon	<i>Falco pelegrinoides</i>	I	
	Eurasian Hobby	<i>Falco subbuteo</i>	II	
	Eurasian Kestrel	<i>Falco tinnunculus</i>	II	
	Peregrine Falcon	<i>Falco peregrinus</i>	I	
	Himalayan Monal	<i>Lophophorus impejanus</i>	I	
	Common Crane	<i>Grus grus</i>	II	
	Demoiselle Crane	<i>Grus virgo</i>	II	<i>Anthropoides virgo</i> in Dickinson (2003)



Class : AVES (Birds) (Continued)				
	Siberian Crane	<i>Grus leucogeranus</i>	I	
	Houbara Bustard	<i>Chlamydotis undulata</i>	I	
	Great Bustard	<i>Otis tarda</i>	II	
	Little Bustard	<i>Tetrax tetrax</i>	II	
	Alexandrine Parakeet	<i>Psittacula eupatria</i>	II	
	Slaty-headed Parakeet	<i>Psittacula himalayana</i>	II	
	Rose-ringed Parakeet	<i>Psittacula krameri</i>	II	Not listed for Afghanistan by CITES.
	Short-eared Owl	<i>Asio flammeus</i>	II	
	Long-eared Owl	<i>Asio otus</i>	II	
	Little Owl	<i>Athene noctua</i>	II	
	Eurasian Eagle-Owl	<i>Bubo bubo</i>	II	
	Collared Owlet	<i>Glaucidium brodiei</i>	II	
	Pallid Scops-Owl	<i>Otus brucei</i>	II	
	European Scops-Owl	<i>Otus scops</i>	II	
	Tawny Owl	<i>Strix aluco</i>	II	
	Scaly-bellied Woodpecker	<i>Picus squamatus flavirostris</i>	II	

Class : REPTILIA (Reptiles)				
	Afghan Tortoise	<i>Testudo horsfieldii</i>	II	
	Iranian Uromastyx	<i>Uromastyx asmussi</i>	II	
	Indian Spiny Tail Lizard	<i>Uromastyx hardwickii</i>	II	
	Bengal Monitor	<i>Varanus bengalensis</i>	I	
	Desert Monitor	<i>Varanus griseus</i>	I	
	Elegant Sand Boa	<i>Eryx elegans</i>	II	
	Indian Sand Boa	<i>Eryx johnii</i>	II	
	Dwarf Sand Boa	<i>Eryx miliaris</i>	II	
	Tartary Sand Boa	<i>Eryx tataricus</i>	II	
	Oriental Rat Snake or Whipsnake	<i>Ptyas mucosus</i>	II	
	Central Asian Cobra	<i>Naja oxiana</i>	II	

Class : ACTINOPTERYGII (Bony Fishes)				
	Fringebarbel sturgeon	<i>Acipenser nudiventris</i>	II	
	Dwarf sturgeon	<i>Pseudoscaphirhynchus hermanni</i>	II	
	Amu Darya sturgeon	<i>Pseudoscaphirhynchus kaufmanni</i>	II	

FLORA (PLANTS)				
	No Common Name	<i>Sternbergia fischeriana</i>	II	
	Elephant's foot	<i>Dioscorea deltoidea</i>	II	
	No Common Name	<i>Dactylorhiza hatagirea</i>	II	
	Southern Marsh Orchid	<i>Dactylorhiza majalis majalis</i>	II	
	No Common Name	<i>Eulophia turkestanica</i>	II	
	No Common Name	<i>Habenaria josephii</i>	II	
	No Common Name	<i>Orchis latifolia</i>	II	
	Himalayan yew	<i>Taxus wallichiana</i>	II	

## Appendix 12 A Subject Bibliography of Afghan Biodiversity

### Biodiversity-Rich Area

#### Protected Areas

1. FAO. 1978. National parks and utilization of wildlife resources: Afghanistan. Project findings and recommendations. 32 pp. FO: DP/AFG/74/016. Rome: UNDP/FAO.
2. ———. 1980. National parks and wildlife management: Afghanistan. Project findings and recommendations. 22 pp. Rome: UNDP/FAO.
3. Faymann, T. 1976. Preparation of an area Development Plan for the Tourist Region, Bamiyan, Band e Amir, Ajara Valley. Kabul: UNDP.
4. Habibi, K. 1970. Fading natural splendour of Band e Amir Lakes. Kabul Times. 30 September.
5. Petocz, R. G., and T. Skogland. 1974. Report on the status of Band-e Amir National Park. FO: DP/AFG/72/005. FAO/UNDP.
6. Puget, A. 1971. Observations sur l'avifaune nidificatrice de l'étang de Binihesar (Chamane Qala Hachmatran) dans la proche banlieue de Kaboul en Afghanistan. 39: 139-44.
7. Rahim, A., and J. Y. Larsson. 1978. A Preliminary Study of Lake Hashmat Khan with Recommendations for Management. FO: DP/AFG/74/016. UNDP, FAO and Department of Forests.
8. Sayer, J. A., and A. P. M. Van der Zon. 1981. National Parks and Wildlife Conservation, Afghanistan. A Contribution to a Conservation Strategy. Technical Report. Rome: FAO.
9. Shank, C. C., and J. Y. Larsson. 1977. A Strategy for the establishment and development of Band-e Amir National Park. FO: DP/AFG/74/016. FAO.
10. Shank, C. C., R. G. Petocz, and K. Habibi. 1977. A preliminary management plan for the Ajar Valley Wildlife Reserve. FO: DP/AFG/74/016. FAO Field Report.
11. Shank, C. C., and W. F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. FO: DP/AFG/74/016. Kabul: UNDP, FAO and Department of Forests and Range, Ministry of Agriculture.
12. UNEP/WCMC. nd. World Database on Protected Areas. Web page, [accessed March 2006]. Available at: <http://sea.unep-wcmc.org/wdbpa/>.
13. UNEP and WCMC. nd. Band e Amir National Park. Web page. Available at <http://sea.unep-wcmc.org/sites/pa/1637v.htm>.

#### Ab-i-Estada

1. Akhtar, S. A. 1947. Ab-i Estadah, a breeding place of the flamingo (*Phoenicopterus ruber ruber*) (Pallas) in Afghanistan. J. Bombay Nat. Hist. Soc. 47: 308-414.
2. Förstner, U., and Bartsch, G. 1970. Die Seen von Banda-Amir, Datscht-i-Nawar, Ob-i-Istada und Hamun-i-Puzak (Zentral und Südwestafghanistan). Science (Kabul) 6: 19-23.

3. Jamil, A. 1994. Mission to the Ab-i-Istada, Ghazni Province, Afghanistan, 23.10.93 to 23.11.93. Unpubl. report to Crane Foundation and BirdLife International.
4. Khan, A. 2002. Impact of exotic technology on physical environment and cultural practices in Ab-i-Estada. Geography Department, University of Wisconsin.
5. ———. 2000. Research Feasibility Study at Lake Ab-i-Estada in preparation for M.S. degree course in Conservation Biology and Sustainable Development from the University of Wisconsin at Madison (USA). Unpublished report. <http://fwie.fw.vt.edu/afghanistan/Lake%20Ab-i-Estada%20.pdf>.
6. Niethammer, G. 1970. Die Flamingos am Ab-i-Estada in Afghanistan. *Natur Und Museum* 100: 201-210.
7. ———. 1971. Vogelleben am Ab-i-Estada (Afghanistan). *Die Vogelwarte* 26: 221-227.
8. Nogge, G. Afghanistan - the Ab-e-Istada: A vanishing breeding place of flamingoes. *IWRB Bulletin* 31: 28-30.
9. Pelt, J. M., J. C. Hayon, and Ch. Younos. 1968. Sur la flore et al vegetation des bords du lac Ab-i-Estada (Afghanistan). *C.R. Acad. Sc. Paris, Serie D.* 267: 1279-82.
10. Petocz, R. G., and K. Habibi. 1975. The flamingoes of Ab-i-Estada and Dashte Nawar. Ghazni Province, Afghanistan. *FAO Report FO: DP/AFG/72/005*.
11. Petocz, R. G., T. Skogland, and K. Habibi. 1975. The Birds of Band-i-Amir, Dasht-i- Nawar and Ab-i-Estada, identified during field surveys in 1974 and 1975. Kabul, Directorate of Wildlife and National Parks, Ministry of Agriculture.
12. Sauey, R. 1985. The range, status and winter ecology of the Siberian Crane (*Grus leucogeranus*). Ph.D. diss. Cornell University, Ithaca, New York.
13. Shank, C. C., and W. F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. 43 pp. FO: DP/AFG/74/016, Kabul. UNDP, FAO and Department of Forests and Range, Ministry of Agriculture.

## **Ajar Valley**

1. Ahmadi, A. N., A. W. Modaqiq, A. Khairzad, A. G. Ghoryani, and G. M. Malikyar. 2000. The status of the environment in Afghanistan. Kabul: Save the Environment Afghanistan (SEA).
2. Faymann, T. 1976. Preparation of an Area Development Plan for the Tourist Region, Bamiyan, Band e Amir, Ajar Valley. Kabul: UNDP.
3. Hopkins, T. 2007. Back to the forgotten valley. *Explore*. Winter, no. 148: 50-58, 72-80.
4. Larsson, J. Y. 1978. Status of alpine rangelands in central Afghanistan with special reference to the Ajar Valley Wildlife Reserve. Kabul: FAO.
5. Ledgard, J. 2004. The Valley of the King. *Atlantic Monthly*. April: 150-154.
6. Pelt, J. M., J. C. Hayon, P. Marlin, and Ch. Younos. 1970. La végétation de la vallée d'Hadjar (Afghanistan central). *Bull. Soc. Bot. France.* 117, no. 12: 297-305.

7. Shank, C. C., R. G. Petocz, and K. Habibi. 1977. A preliminary management plan for the Ajar Valley Wildlife Reserve. Field Report, FAO.
8. Skogland, T. 1976. Ecological reconnaissance of the Hindu Kush Ibex (*Capra ibex*) in Ajar Valley, Bamiyan Province, Afghanistan. 12 pp. FAO.
9. Weippert, D. 1964. Zur Geologie des Gebiet des Doab-Saighan-Hajar (Nord- Afghanistan). Beih. Geol. Jb.: 153-184. Note: Beihefte zum Geologischen Jahrbuch.

## **Band e Amir**

1. Anonymous. 1974. Band e Amir declared national park. *Ariana*. 1, no. 2: 48.
2. Balland, C. and J. Lang. 1974. Les rapports géomorphologiques quaternaires et actuels de Bassin de Bamyán et de ses bordures montagneuses (Afghanistan Central). *Rev. G. Phyc. Et Géol. Dynamique* (Paris), 2me Sér. 16, no. 3: 327-50.
3. Bedunah, D. 2007. Rangeland conditions of the Band-i-Amir area. Wildlife Conservation Society.
4. Bernard, P. 1978. Aï Khanoum "la barbare". *Études de géographie historique sur la plaine d'Aï Khanoum (Afghanistan)*: (eds.) Bernard, P., and H. P. Francfort. Paris; Note: pp. 17 - 25 for legend of Band-i-Amir.
5. Bourrouilh-Le Jan, F. G., B. Akram, and M. Schoerer. 2007. Band-e-Amir and Dragon Valley (Bamiyan): myths and seismicity in Afghanistan. *Myth and geology*: (eds.) Piccardi, L., and W. B. Massr. London: Geological Society of London.
6. Bryant, C. 2008. Blue vistas: protecting Afghanistan's mountain lakes. *U.S. Department of State Magazine*. March, no. 521: 16-17.
7. Caspani, E. and E. Cagnacci. 1951. *Afghanistan, Crocevia dell'Asia*. Milan; Note: Information on shrine 233-34.
8. de Lapparent, A. F. 1966. Les dépôts de travertines des montagnes Afghanes a l'ouest de Kaboul. *Revue De Geographie Physique Et De Geologie Dynamique* 8: 351-57.
9. de Planhol, X. nd. Band-e Amer. Web page, [accessed November 2006]. Available at <http://www.iranica.com/newsite/articles/v3f7/v3f7a004.html>.
10. Dieterle, A. 1973. Vegetations kundliche untersuchungen im gebiete von Band-i-Amir (Zentral Afghanistan). 24 pp. Inaug. Diss.
11. Dollot, R. 1937. *L'Afghanistan*. Paris. (pp. 130-32 for Band-i-Amir information).
12. Faymann, T. 1976. Preparation of an area Development Plan for the Tourist Region, Bamiyan, Bande Amir, Ajar Valley. Kabul: UNDP.
13. Förstner, U., and G. Bartsch. 1970. Die Seen von Banda-Amir, Datscht-i-Nawar, Ob-i-Istada und Hamun-i-Puzak (Zentral und Südwestafghanistan). *Science (Kabul)* 6: 19-23.
14. Foucher, A. 1942. *La vieille route de l'Inde, de Bactres à Taxila*. Paris: MDAFA.

15. Habibi, K. 1970. Fading natural splendour of Bande Amir Lakes. *Kabul Times*.
16. Hackin, R., and A. A. Kohzad. 1953. *Le gendes et coutumes afghanes*. Paris.
17. Hay, W. R. 1936. Band-e-Amir. *The Geographical Journal* 87, no. 4: 348-50.
18. Hayon, J C., G. Kilbertus, and J. M. Pelt. 1970. Flore et vegetation d'un barrage de travertins en Afghanistan central (Ziarat de Band-I-Amir) (Flora and vegetation of a travertine barrier in central Afghanistan (Ziarat in Band-I-Amir)). *Acad. Sci. Compt. Rend. Ser. D.* 270, no. 25: 3075-78.
19. Jux, U. 1975. Paläogeographische Entwicklungen an mobilen Schollengrenzen im Westhindukusch (Bande Amir, Zentralafghanistan). *Journal International Journal of Earth Sciences* 64, no. 1: 523-40.
20. Jux, U., and E. K. Kempf. 1971. Stauseen durch travertinabsatz im zentralenafghanischen. *Hochgebirge* 12: 107-37.
21. Jux, U., E. K. Kempf, and U. Meinze. 1971. Schichtenfolge der marinen Oberkreide bei Band-i-Amir (Zentral Afghanistan). *Neues Jahrb. Geol. Paleontol. Monatsh* 12: 712-33.
22. L'Apparant, F. F. 1966. Les dépôts de travertines de montagnes Afghanes a l'ouest de Kaboul. *Rev. Géogr. Phys. Geol. Dyn.* 8: 351-57.
23. Lang, J., and G. Lucas. 1970. Contribution à l'étude de biohermes continentaux: barrages des lacs de Band-e-Amir (Afghanistan central). *Bull. Soc. Geol. De France (7) XII*, no. 5: 834-42.
24. Lindner, I., and K. Petelski. 1984. Travertine dammed lakes and glaciers of the north western Hindu Kush. *Quat. Studies Poland* 5: 99-116.
25. Madge S. C. 1970. Notes on the migration of birds through Bande Amir. Unpublished report, cited in Evans (1994).
26. Matthews R.O. 1988. Band-e-Amir Lakes. Jewels in the foothills of the Hindu Kush, pp. 85-87. *The atlas of natural wonders*. New York, Oxford: Facts on File Publication.
27. Moravec, F., and A. Amin. 1978. Some helminth parasites excluding Monogenea from fishes of Afghanistan. *Acta Sci. Nat. Brun.* 12: 1-45.
28. Murphy, C., and N. Redman. 1978. No title (Field notes on Afghan birds).
29. Petocz, R. G., and T. Skogland. 1974. Report on the status of Band-e Amir National Park. FO: DP/AFG/72/005. FAO/UNDP.
30. Petocz, R. G., T. Skogland, and K. Habibi. 1975. The Birds of Band-i-Amir, Dasht-i- Nawar and Ab-i- Estada, identified during field surveys in 1974 and 1975. Kabul, Directorate of Wildlife and National Parks, Ministry of Agriculture.
31. Shank, C. C., and J. Y. Larsson. 1977. A Strategy for the establishment and development of Band-e-Amir National Park. FO: DP/AFG/741016. FAO.
32. Terek, J. 1983. To the knowledge of aquatic fauna of Bandi-Amir Lakes (Afghanistan). *Biologia (Bratisl.)* 38, no. 2: 167-71.

33. UNEP and WCMC. nd. Band e Amir National Park. Web page. Available at <http://sea.unep-wcmc.org/sites/pa/1637v.htm>.
34. Zahler, P. 2002. Birds seen at or in vicinity of Band-e-Amir, Afghanistan (September 2002). Unpublished report.

### **Dasht e Nawar**

1. Förstner, U., and G. Bartsch. 1970. Die Seen von Banda-Amir, Datscht-i-Nawar, Ob-i-Istada und Hamun-i-Puzak (Zentral und Südwestafghanistan). *Science (Kabul)* 6: 19-23.
2. Klockenhoff, H., and G. Madel. 1970. Über die Flamingos (*Phoenicopterus ruber*) der Dasht-i-Nawar in Afghanistan. 111: 78-84.
3. Petocz, R. G. 2006. Dasht-e Nawar National Waterfowl and Flamingo Sanctuary (Proposed). Compiler. Information Sheet on Ramsar Wetlands (RIS), 2006-2008 version.
4. ———. 2006. Interim Management Plan for Dasht-e Nawar Proposed National Flamingo and Waterfowl Sanctuary.
5. ———. 2006. Nomination of the Proposed Dasht-e Nawar National Waterfowl and Flamingo Sanctuary to the Ramsar Convention on Wetlands. 17 pp.
6. Petocz, R. G., and K. Habibi. 1975. The flamingoes of Ab-i-Estada and Dashte Nawar. Ghazni Province, Afghanistan. FO: DP/AFG/72/005. FAO Report.
7. Petocz, R. G., T. Skogland, and K. Habibi. 1975. The Birds of Band-i-Amir, Dasht-i- Nawar and Ab-i-Estada, identified during field surveys in 1974 and 1975. Kabul, Directorate of Wildlife and National Parks, Ministry of Agriculture.
8. Shank, C. C., and W. F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. FO: DP/AFG/74/016, Kabul. UNDP, FAO and Department of Forests and Range, Ministry of Agriculture.

### **Kol e Hashmat Khan**

1. Puget, A. 1971. Observations sur l'avifaune nidificatrice de l'étang de Binihesar (Chamane Qala Hachmatran) dans la proche banlieue de Kaboul en Afghanistan. 139-44.
2. Petocz, R.G. 2006. Interim management plan for Kol-i-Hashmat Khan. Unpublished report to UNEP.
3. Rahim, A., and J. Y. Larsson. 1978. A Preliminary Study of Lake Hashmat Khan with Recommendations for Management. FO: DP/AFG/74/016. UNDP, FAO and Department of Forests.

### **Nuristan**

1. Ahlemann, H. 1970. Markhor-Jagd in Nuristan. *Wild und Hund* 73: 172-77.
2. Petocz, R. G. 1972. Report on the Laghman markhor survey. Unpubl. rpt. to Afghan Tourist Organization.
3. Petocz, R. G., and J. Y. Larsson. 1977. Ecological reconnaissance of western Nuristan with recommendations for management. FO: DP/AFG/74/016, Field Report #9. FAO.

## Pamirs

1. Ayé, R. 2007. Wakhan avifauna survey: priority species for conservation and survey of autumn migration. Unpubl. Rept. to Wildlife Conservation Society, Afghanistan Biodiversity Conservation Project.
2. Habib, B. 2007. An annotated list of bird species observed by the Mammal Survey Team in Wakhan in April 2007. Kabul: Wildlife Conservation Society.
3. ———. 2008. Status of mammals in Wakhan Afghanistan. Unpublished report. Wildlife Conservation Society.
4. Kullmann, E. nd. Expedition in die Heimat der Marco Polo Sheep; ein Beitrag über die Tierwelt des Afghanistan. *Freunde Des Kölner Zoo* 11: 107-22.
5. Mishra, C., and A. Fitzherbert. 2004. War and wildlife: a post-conflict assessment of Afghanistan's Wakhan Corridor. *Oryx* 38: 102-5.
6. Naumann, C. 1970. Ein ehemaliges Wildyak-vorkommen im afghanischen Pamir. *Bonn. Zool. Beitr.* 24: 249-53.
7. Naumann, C., and J. Niethammer. 1973. Zur Säugetierfauna des afghanischen Pamir und des Wakhan. *Bonner Zoologische Beiträge* 24: 237-48.
8. Nogge, G. 1973. Ornithologische Beobachtungen im afghanischen Pamir. *Bonn. Zool. Beitr.* 24: 254-269.
9. Petocz, R. G. 1971. The exploitation and conservation of wild ungulates and their habitat in the Afghan Pamir. Unpublished Report to the Afghan Tourist Organization.
10. ———. 1973. Reorganization and improvement of the Marco Polo sheep hunting programme. Unpublished Report to the Government of Afghanistan.
11. Petocz, R. G., K. Habibi, A. Jamil, and A. Wassey. 1978. Report on the Afghan Pamir. Rome, FAO Field Document No. 6, FAO: DP/AFG/74/016.
12. Petocz, R. G., and J. Y. Larsson. 1978. Report on the Afghan Pamir: Part 3, Management Plan for the Big Pamir Wildlife Reserve. FAO, FO: DP/AFG/74/016.
13. Petocz, R. G., and C. C. Shank. 1983. Horn exfoliation in Marco Polo Sheep, *Ovis ammon poli*, in the Afghan Pamir. *J. Mamm.* 64, no. 1: 136-38.
14. Petocz, R. G., T. Skogland, and C. C. Shank. nd. Winter habitat utilization and diet of Marco Polo sheep (*Ovis ammon poli*) in the Small Pamir, Afghanistan. Unpublished.
15. Schaller, G. B. 2004. The Status of Marco Polo Sheep in the Pamir Mountains of Afghanistan. Wildlife Conservation Society.
16. Skogland, T., and R. G. Petocz. 1975. Ecology and behavior of Marco Polo Sheep (*Ovis ammon poli*) in Pamir during winter. FAO, Unpublished report.
17. UNEP. 2003. Afghanistan Wakhan Mission Technical Report. Geneva: UNEP, FAO.

## Seistan

1. Baker, E. C. S. 1919. Notes on two collections of birds from Seistan. *Rec. Indian Mus.* 18, no. 2: 121-34.
2. Cumming, J. W. N. 1905. Birds of Seistan, being a list of the birds shot or seen in Seistan by members of the Seistan Arbitration Mission, 1903–05. *J. Bombay Nat. Hist. Soc.* 16: 686-99.
3. Förstner, U., and G. Bartsch. 1970. Die Seen von Banda-Amir, Datscht-i-Nawar, Ob-i-Istada und Hamun-i-Puzak (Zentral und Südwestafghanistan). *Science (Kabul)* 6: 19-23.
4. Petocz, R. G., W. F. Rodenburg, and K. Habibi. 1976. The birds of Hamun-i-Puzak. Unpublished FAO Report.
5. Scott, D. A. 1975. Mid-winter waterfowl counts in the wetlands of the Seistan Basin: 1970-75. Internal Report. Tehran, Iran: Department of the Environment.
6. ———. 1976. Waterbird counts in the Seistan Wetlands of Afghanistan: January 1976. Unpublished report.
7. Scott, D. A., and M. Smart. 1992. Wetlands of the Seistan Basin, South Caspian and Fars, Islamic Republic of Iran. Ramsar Convention Monitoring Procedure Report, Gland, Switzerland: Ramsar Convention Bureau.

## Wetlands

1. Akhtar, S. A. 1947. Ab-i Estadah, a breeding place of the flamingo (*Phoenicopterus ruber ruber*) (Pallas) in Afghanistan. *J. Bombay Nat. Hist. Soc.* 47: 308-414.
2. Anonymous. 2003. Afghanistan's wetlands and birdlife bear brunt of war and drought. Web page. Available at <http://www.wildlifeneews.co.uk/articles2003/feb/feb1503g.htm>.
3. Archibald, G., and S. Landfried. 1991. Conservation measures for the Siberian Crane. Wetland and Waterfowl Conservation in South and West Asia: (eds.) M. Moser, and J. van Vessem. WRB Special Publication No. 25 & AWB Publication No. 85. IWRB, Slimbridge, U.K., & AWB, Kuala Lumpur.
4. Carp, E. 1980. A Directory of Western Palearctic Wetlands. Nairobi, Kenya and Gland, Switzerland: UNEP and IUCN.
5. Conolly, E. 1840. Sketch of the physical geography of Seistan. *J. Asiatic Soc. Bengal.* 9, no. 2: 710-25.
6. Jamil, A. 1994. Mission to the Ab-i-Istada, Ghazni Province, Afghanistan, 23.10.93 to 23.11.93. Unpublished.
7. Klockenhoff, H., and G. Madel. 1970. Über die Flamingos (*Phoenicopterus ruber*) der Dasht-i-Nawar in Afghanistan. 111: 78-84.
8. Koning, F. J., and L. J. Dijkzen. 1971. Summary of the IWRB Mission to Pakistan and Afghanistan, February 1971. *IWRB Bulletin* 32: 67-75.
9. Koning, F. J., and J. G. Walmsley. 1972. IWRB Mission to Afghanistan, February 1972. *IWRB Bulletin* 33: 39-41.
10. Koning, F. J., and J. G. Walmsley. 1973. Some Waterfowl Counts in Afghanistan, Winter 1973. *IWRB Bulletin* 35: 62-64.



11. Niethammer, G. 1971. Vogelleben am Ab-i-Estada (Afghanistan). *Die Vogelwarte* 26: 221-27.
12. Nogge, G. 1971. Afghanistan - the Ab-e-Istada: A vanishing breeding place of flamingoes. *IWRB Bulletin* 31: 28-30.
13. ———. 1974. Beobachtungen an den Flamingobrutplätzen Afghanistans. *J. Ornithologie* 115: 142-51.
14. Petocz, R. G., and K. Habibi. 1975. The flamingoes of Ab-i-Estada and Dashte Nawar. Ghazni Province, Afghanistan. *FAO Report*. FO: DP/AFG/72/005.
15. Petocz, R. G., W. F. Rodenburg, and K. Habibi. 1976. The birds of Hamun-i-Puzak. Unpublished *FAO Report*.
16. Petocz, R. G., T. Skogland, and K. Habibi. 1975. The Birds of Band-i-Amir, Dasht-i- Nawar and Ab-i-Estada, identified during field surveys in 1974 and 1975. Kabul, Directorate of Wildlife and National Parks, Ministry of Agriculture.
17. Puget, A. 1971. Observations sur l'avifaune nidificatrice de l'étang de Binihesar (Chamane Qala Hachmatran) dans la proche banlieue de Kaboul en Afghanistan. *Alauda* 39: 139-44.
18. Sauey, R. 1985. The range, status and winter ecology of the Siberian Crane (*Grus leucogeranus*). Ph.D. diss. Cornell University, Ithaca, New York.
19. Savage, C. D. W. 1972. Status of Wetlands of International Importance in Afghanistan -Pakistan- India-Ceylon. International Conference on Conservation of Wetlands and Waterfowl: (ed.) E. Carp. *IWRB*, Slimbridge.
20. ———. 1968. The wildfowl and wetland situation in Afghanistan, pp. 119 - 122. *Proc. Technical Meeting on Wetland Conservation*: (ed.) H. F. J. Elliott. Ankara-Bursa- Istanbul.
21. Scott, D. A., (ed.). 1995. A directory of wetlands in the Middle East. *IUCN Gland, Switzerland and IWRB, Slimbridge, U.K.*
22. ———. 1975. Mid-winter waterfowl counts in the wetlands of the Seistan Basin: 1970-75. Internal Report, Tehran, Iran: Department of the Environment.
23. ———. 2008. Waterbird counts in the Seistan Wetlands of Afghanistan: January 1976. Unpubl. rpt..
24. ———. 1993. Wetlands of West Asia - A regional overview. *Wetland and Waterfowl Conservation in South and West Asia*: (eds.) Moser, M., and J. van Vessem. *IWRB Special Publication No 25 and AWB Publication No. 85*. Slimbridge, U.K., and AWB, Kuala Lumpur, Malaysia: *IWRB and AWB*.
25. Scott, D. A., and M. Smart. 1992. Wetlands of the Seistan Basin, South Caspian and Fars, Islamic Republic of Iran. *Ramsar Convention Monitoring Procedure Report*: Ramsar Convention Bureau, Gland, Switzerland.
26. Shank, C. C., and W. F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. FO: DP/AFG/74/016. UNDP, FAO and Department of Forests and Range, Ministry of Agriculture, Kabul.
27. UNEP. 2008. Biodiversity and Wetlands Working Group: final thematic report. *UNEP and GEF*.

## General Zoology

1. Bobrov, V. V. 2005. Independence of the Central Asian Faunistic Region (according to the distribution of lizards (Reptilia, Sauria)). *Biology Bulletin* 32, no. 6: 576-89.
2. Nahif, A. A. 1986. Bibliography of zoological literature on Afghanistan. *Bonner Zoologische Beitrage* 37, no. 4: 311-39.

## Species Groups

### Mammals

1. Adams, L. 1858. Remarks on the habits and haunts of some of the mammalia found in the various parts of India and the western Himalaya Mountains. *Proc. Zool. Soc., London*, 26: 512-31.
2. Aellen, V. 1959. Contribution a l'etude de la faune d'Afghanistan. *Chiropteres* 66: 353-86.
3. Ahlemann, H. 1970. Markhor-Jagd in Nuristan. *Wild Und Hund* 73: 172-77.
4. Aitchison, J. E. T. 1889. The zoology of the Afghan Delimitation Commission. 5: 53-142.
5. Barus, V., and F. Tenora. 1967. Three interesting nematode species in *Miniopterus schreiberei* (Chiroptera) from Afghanistan. (*Acta Univ. Agric. Brno*) Sb. Uys. Sk. Zemed Brno 1: 95-101.
6. Blandford, W. T. 1888. The fauna of British India including Ceylon and Burma. Mammalia. London: Taylor and Francis.
7. Blandford, W. T. 1881. On the voles (*Arvicola*) of the Himalayas, Tibet and Afghanistan. *J. Asiatic Soc. Bengal* 50: 88-117.
8. Caughley, G. 1970. Wildlife resources in Afghanistan. A report to the Government of Afghanistan. FAO/UNDP Report TA 2905.
9. Clarke, J. 1964. The great arc of the wild sheep. Norman: University of Oklahoma Press.
10. DeBlase, A. 1980. The bats of Iran: systematics, distribution, ecology. *Fieldiana Zoology* 4: 1-424.
11. Donald, O. H. 1948. Jackals. *J. Bombay Nat. Hist. Soc.* 47: 721-28.
12. Felten, H., R. Spitzenberger, and G. Storch. 1977. Small mammals from western Asia Minor; Part 3A. *Senckenbergiana Biologica* 58, no. 1 - 2: 1-44.
13. Fulton, H. T. 1903. Rough notes on the mammalia of Chitral. *J. Bombay Nat. Hist. Soc.* 23: 146-147.
14. Gaisler, J. 1970. The bats (Chiroptera) collected in Afghanistan by the Czechoslovak Expeditions of 1965-1967. *Acta Scientiarum Naturalium Bmo*, 4, no. 6: 1-56.
15. ———. 1971. Systematic review and distinguishing characters of the bats (Chiroptera) hitherto recorded in Afghanistan. *Zool. Listy* 20: 97-110.
16. Gaisler, J. 1970. Zoogeographical notes on the bat fauna of Afghanistan, Mammalia Chiroptera. *Vestnik Ceskoslovenske Spolecnosti Zoologicke* 34, no. 4: 284-88.

17. Gaisler, J., D. Povolny, Z. Sebek, and F. Tenora. 1967. Faunal and ecological review of mammals occurring in the environs of Jalalabad, with notes on further discoveries of mammals in Afghanistan I. Insectivora, Rodentia 16: 355-364.
18. ———. 1968. Faunal and ecological review of mammals occurring in the environs of Jalalabad. With notes on further discoveries of mammals in Afghanistan II. Chiroptera. Zool. Listy 17: 41-48.
19. ———. 1968. Faunal and ecological review of mammals occurring in the environs of Jalalabad, with notes on further discoveries of mammals in Afghanistan III. Carnivora, Lagomorpha. 17: 185-89.
20. Golenishchev, F. N., and O. V. Sablina. 1991. [On taxonomy of *Microtus (Blanfordimys) afghanus*]. Zoologicheskii Zhurnal 70: 98-110.
21. Groombridge, B., (ed.). 1992. Global Biodiversity: Status of the Earth's Living Resources. London: Chapman and Hall.
22. Groves, C. 2003. Taxonomy of ungulates of the Indian subcontinent. J. Bombay Nat. Hist. Soc. 100, no. 2&3: 341-62.
23. Habib, B. 2008. Status of mammals in Wakhan Afghanistan. Unpublished report. Wildlife Conservation Society.
24. Habibi, K. 1997. Afghanistan. Wild sheep and goats and their relatives. Status survey and conservation action plan for Caprinae: (ed.) D. M. Shackleton. Gland and Cambridge: IUCN.
25. ———. 2003. Mammals of Afghanistan. 168 pp. Zoo Outreach Organisation.
26. ———. 1977. The mammals of Afghanistan: their distribution and status. FAO Field Document No. 1. Kabul.
27. ———. 1976. Recommendations on the status of the Bactrian deer (*Cervus elaphus bactrianus*) in Ajar valley. Unpublished FAO report. Kabul.
28. Habibi, K. nd. The vertebrate fauna of Afghanistan. Web page, [accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>.
29. Hassinger, J. 1968. Introduction to the mammal survey of the 1965 Street Expedition to Afghanistan. Fieldiana Zoology 55: 1-81.
30. ———. 1973. A survey of the mammals of Afghanistan resulting from the 1965 Street Expedition. 1-195.
31. Horáček, I., V. Hanák, and J. Gaisler. 2000. Bats of the Palearctic Region: a taxonomic and biogeographic review, pp. 11-157. Proceedings of the VIIIth EBRs: (ed.) Bronislaw W. Woloszyn. Krakaw: CIC ISEZ PAN.
32. Hutton, I. 1845. Rough notes on the zoology of Candahar and the neighbouring districts (with footnotes by E. Blyth). J. Asiatic Soc. Bengal 14: 340-54.
33. Koopman K. 1993. Order Chiroptera. Mammal species of the world. A taxonomic and geographic reference. Second Edition: (eds.) Wilson D. E., and D. M., Reeder, 1206 pp. Washington and London: Smithsonian Inst. Press.
34. Kullmann, E. 1965. Die Säugetiere Afghanistans (Teil I) Carnivora, Artiodactyla, Primates. Journal Faculty of Science, Kabul: 1-17.

35. ———. 1970. Die Tierwelt Ostafghanistans in ihren geographischen Beziehungen. *Freunde Des Kölner Zoo* 13: 3-35.
36. ———. nd. Expedition in die Heimat der Marco Polo Sheep; ein Beitrag über die Tierwelt des Afghanistan. *Freunde Des Kölner Zoo* 11: 107-22.
37. ———. 1967. Über leoparden Afghanistan und ihren Parasiten. *Freunde Des Kölner Zoo* 10: 126-35.
38. Lindberg, K. 1961. Recherches biospèologiques en Afghanistan. *Acta University Lund* 57: 1-39.
39. ———. 1962. Recherches biospèologiques en Afghanistan. *Acta University Lund* 58: 1-15.
40. Melisch, R., and G. Rietschel. 1995. The Eurasian otter *Lutra lutra* in Afghanistan. *Bonner Zoologische Beiträege* 46, no. 1-4: 367-75.
41. Meyer-Oehme, D. 1965. Die Säugetiere Afghanistans (Teil III) Chiroptera. *Journal Faculty of Science, Kabul*. 42-56.
42. ———. 1968. Zur Kenntnis der Chiropteren—Fauna Afghanistans. *Bonn Zoologische Beiträege* 19: 97-103.
43. Murray, J. A. 1887. The zoology of Beloochistan and southern Afghanistan. *Indian Annual Magazine Natural Science*. Ser. 1. 2: 50-68, No. 3: 105-31.
44. Naumann, C. 1970. Ein ehemaliges Wildyak-vorkommen im afghanischen Pamir. *Bonn. Zool. Beitr.* 24: 249-53.
45. ———. 1973. Zur Säugetierfauna des Afghanischen Pamir und des Wakhan. *Zoologische Beiträege* 24: 237-48.
46. Naumann, C., and J. Niethammer. 1974. New mammal finds in northern Afghanistan. *Säugetierkundliche Mitteilungen* 22, no. 4: 295-98.
47. ———. 1973. Zur Säugetierfauna des afghanischen Pamir und des Wakhan. *Bonner Zoologische Beiträege* 24: 237-48.
48. Naumann, C., and G. Nogge. 1973. Die Grosssäuger Afghanistans. *Zeitschrift Kölner Zoo* 16: 79-93.
49. Nauroz, M. K., and C. M. Naumann. 1975. Observations on the distribution of the markhor, *Capra falconeri*, new record in Afghanistan. *Säugetierkundliche Mitteilungen*, 23, no. 2: 81-85.
50. Neronov, V. M., and L. P. 1982. Arsen'eva, Regional peculiarities of the fauna of bats of Afghanistan. *Zoologicheskii Zhurnal*. 61, no. 4: 585-92.
51. Neuhauser, H. N. 1969. The bats of Afghanistan. A study resulting from the Street Expedition of 1965. M.Sc. thesis. University of Georgia.
52. Neuhauser, H. N., and A. F. DeBlase. 1974. Notes on bats (Chiroptera: Vespertilionidae) new to the faunal lists of Afghanistan and Iran. *Feldiana Zoology* 62, no. 2: 85-96.
53. Niethammer, J. 1967. Die Flughörnchen (Petaunistinae) Afghanistans. *Bonner Zoologische Beiträege* 18: 2-14.

54. ———. 1965. Die Säugetiere Afghanistans (Teil II) Insectivora, Lagomorpha, Rodentia. *Journal of the Faculty of Science, Kabul*: 18-41.
55. ———. 1969. Die Waldmaus, *Apodemus sylvaticus*, in Afghanistan. 121-128.
56. ———. 1970. Die Wühlmäuse (Microtinae) Afghanistans. 1-24.
57. ———. 1982. Dormice *Myomimus* in Afghanistan. *Zeitschrift Für Saeugetierkunde* 47, no. 3: 187-89.
58. ———. 1973. *Mustela nivalis stoliczkana* in Afghanistan. *Bonner Zoologische Beitrage* 24, no. 1-2: 1-6.
59. ———. 1973. On the hedgehogs, Erinaceidae, of Afghanistan. *Zeitschrift Fuer Saeugetierkunde* 38, no. 5: 271-76.
60. ———. 1966. Zur Ernährung des Sumpfluchses, *Felis chaus* in Afghanistan. *Zietschrift Fur Saugetierkunde* 31.
61. Niethammer, J., and J. Martens. 1975. The genera *Rattus* and *Maxomys* in Afghanistan and Nepal. *Zeitschrift für Säugetierkunde* 40, no. 6: 325-355.
62. Ognev, S. I. 1963. Mammals of the USSR and adjacent countries: Rodents (continued). (Mammals of eastern Europe and northern Asia) [A translation of S. I. Ognev, 1948, *Zveri SSSR i prilozhashchikh stran: Gryzuny (prodolzhenie)*. (*Zveri vostochnoi evropy i severnoi azii*)], 508 pp. Israel Program for Scientific Translations.
63. Paludan, K. 1949. Notes on Afghanistan mammals made in 1948-49 while participating in the Third Danish Expedition to Central Asia. Unpublished, cited in Habibi (2003).
64. Petocz, R. G. 1973. Background information on fluctuations in animal population sizes with comments on the expanding rodent population in the north of Afghanistan. Unpublished report.
65. ———. 1973. The Bactrian deer (*Cervus elaphus bactrianus*). A report of the March 1973 field survey in northern Afghanistan. Unpublished Report.
66. ———. 1973. Conservation and utilization of wildlife resources. Progress Report No. 1, (AFG/72/005). Unpublished Report to the Government of Afghanistan.
67. ———. 1971. The exploitation and conservation of wild ungulates and their habitat in the Afghan Pamir. Unpublished Report to the Afghan Tourist Organization.
68. ———. 1973. Kabul markhor (*Capra falconeri megaceros*) and Urial (*Ovis orientalis cycloceros*) in the Kohe Safi region of Kapisa province. Unpublished Report.
69. ———. 1973. Marco Polo sheep (*Ovis ammon poli*) of the Afghan Pamir: a report of biological investigations 1972-73. Unpublished report.
70. ———. 1973. Reorganization and improvement of the Marco Polo sheep hunting programme. Unpublished Report to the Government of Afghanistan.
71. ———. 1972. Report of the Laghman Markhor survey. Unpublished report.
72. ———. 1978. Report on the Afghan Pamir. Part 1. Ecological reconnaissance. Rome, FAO Field Document No. 5, FO: DP/AFG/74/016.

73. ———. 1972. Report on the Laghman markhor survey. Unpublished report to Afghan Tourist Organization.
74. Petocz, R. G., and C. C. Shank. 1983. Horn exfoliation in Marco Polo Sheep, *Ovis ammon poli*, in the Afghan Pamir. *J. Mamm.* 64, no. 1: 136-38.
75. Petocz, R. G., T. Skogland, and K. Habibi. 1977. Conservation and utilization of wildlife resources in Afghanistan, interim report. FO: DP/AFG/72/005. FAO: Rome.
76. Petocz, R. G., T. Skogland, and C. C. Shank. nd. Winter habitat utilization and diet of Marco Polo sheep (*Ovis ammon poli*) in the Small Pamir, Afghanistan. Unpublished report.
77. Povolny, D. 1966. The discovery of the bear *Selenarctos thibetanus* in Afghanistan. *Zool. Listy* 15: 305-16.
78. Puget, A. 1976. The Afghan pika *Ochotona rufescens rufescens*; Mammalia, Lagomorpha. *Bulletin De La Societe Zoologique De France* 101, no. 2: 203-8.
79. ———. 1971. Observations on the rhesus macaque, *Macaca mulatta*, in Afghanistan. *Mammalia* 35, no. 2: 199-203.
80. ———. 1971. *Ochotona rufescens rufescens* in Afghanistan and its raising in captivity. *Mammalia* 35, no. 1: 25-37.
81. Roberts, T.J. 1969. A note on *Capra falconeri*. *Z. f. Saugetierk* 34: 238-49.
82. Roberts, T. J. 1977. *The mammals of Pakistan*. London: Ernest Benn Ltd.
83. Rodenburg, W. F. 1977. *The trade in the wild animal furs in Afghanistan*. Kabul, Afghanistan: FAO.
84. Rookmaaker, L. C. 2000. Records of the rhinoceros in Pakistan and Afghanistan. *Pakistan Journal of Zoology* 32, no. 1: 65-74.
85. Sayer, J. nd. *Wildlife in Afghanistan*. Tigerpaper.
86. Schaller, G. B. 2004. *The Status of Marco Polo Sheep in the Pamir Mountains of Afghanistan*. Wildlife Conservation Society.
87. Schaller, G. B., and S. A. Khan. 1975. Distribution and status of markhor, *Capra falconeri*. *Biological Conservation* 7, no. 3: 185-98.
88. Scully, J. 1887. On the mammals and birds collected by Captain C.E. Yates, C.S.I. of the Afghan Boundary Commission. *J. Asiatic Soc. Bengal* 56: 68-69.
89. Skogland, T. 1976. Ecological reconnaissance of the Hindu Kush Ibex (*Capra ibex*) in Ajar Valley, Bamian Province, Afghanistan. 12 pp. FAO.
90. Skogland, T., and R. G. Petocz. 1975. Ecology and behavior of Marco Polo sheep (*Ovis ammon poli*) in Pamir during winter. 31 pp. FAO.
91. Sultanov, G. S. 1988. Some data on the vertebrate fauna of eastern Afghanistan. *Uzbekskii Biologicheskii Zhurnal* 4: 44-47.

92. Tokuda, M. 1966. On a vole and a mouse collected from Mount Noshag by R. Yosii, pp. 271-272. Committee of the Kyoto University Scientific Expedition to the Karakoram and Hindukush. Kyoto University: Kyoto, Japan.
93. Zahler, P., and A. Karim. 1998. New distribution, elevation, habitat, and diurnal refuge for the Kashmir flying squirrel *Eoglaucomys fimbriatus*. *Mammalia* 62, no. 4: 588-91.
94. Zimmermann, K. 1956. Fledermause aus Afghanistan. *Zeitschrift Säugetierkunde* 21: 195-196.

## Birds

1. Aitchison, J. E. T. 1889. The zoology of the Afghan Delimitation Commission. 53-142.
2. Akhtar, S. A. 1947. Ab-i Estadah, a breeding place of the flamingo (*Phoenicopterus ruber ruber*) (Pallas) in Afghanistan. *J. Bombay Nat. Hist. Soc.* 47: 308-414.
3. ———. 1946. Babar the Great on flamigos. *J. Bombay Nat. Hist. Soc.* 46: 545-47.
4. Akhtar S. A. 1955. Bird migration and fowling in Afghanistan. *J. Bombay Nat. Hist. Soc.* 5a: 49-53.
5. Annandale, N., and H. E. Carter. 1919. Notes on the vegetation of Seistan. *J. Asiatic Soc. Bengal* 15: 267-297.
6. Anonymous. 2003. Afghanistan's wetlands and birdlife bear brunt of war and drought. Web page. Available at <http://www.wildlifeneews.co.uk/articles2003/feb/feb1503g.htm>.
7. Anstey, S. 1989. The status and conservation of the White-headed Duck, *Oxyura leucocephala*. IWRB Spec. Publ.; v. 10. Slimbridge, UK: IWRB.
8. Archibald, G., and S. Landfried. 1993. Conservation measures for the Siberian Crane. Wetland and Waterfowl Conservation in South and West Asia: 4-20 December 1991: (eds.) Moser, M., and J. van Vessem. WRB Special Publication No. 25. AWB Publication No. 85. IWRB, Slimbridge, U.K., & AWB, Kuala Lumpur.
9. Argandeval, M. E. 1983. Raspredelenie i chislennost khishchnykh ptits v gornyx landshaffakh tsentralnogo i vostochnogo Afganistana [Distribution and number of birds of prey in mountain landscapes of the Central and Eastern Afghanistan]. *Ekologiya khishchnykh ptits* [Ecology of birds of prey]. Materials of the 1<sup>st</sup> Meeting on Ecology and Conservation of Birds of Prey: (ed.) V. M. Galushin. pp. 96-99. Moscow: Nauka Pr. (in Russian).
10. Aslanow, M. G. 1953. On the distribution of some Indian birds in Afghanistan. *Zool. Nachr. D. Akad. D. Wiss. Usbek*: 84-89. (in Russian).
11. Ayé, R. 2007. Wakhān Avifauna Survey: priority species for conservation and survey of autumn migration. Kabul: Wildlife Conservation Society.
12. Baker, E. C. S. 1922. Fauna of British India. Birds. 2nd ed. pp. 1-8. London: Taylor and Francis.
13. ———. 1932. The nidification of birds of the Indian Empire. London: Taylor and Francis. 1-4.
14. ———. 1919. Notes on two collections of birds from Seistan. *Rec. Indian Mus.* 18, no. 2: 121-34.

15. Barnes, H. E. 1881. A list of the birds observed in the neighbourhood of Chaman, south Afghanistan. *Stray Feathers* 9: 449-60.
16. ———. 1880. Notes on the nidification of certain species in the neighbourhood of Chaman, south Afghanistan. *Stray Feathers* 9: 449-60.
17. Birdlife International. nd. Country Report: Afghanistan. Web page, [accessed February 2006]. Available at <http://www.birdlifemed.org/Contries/afghanistan/afghanistan.html>.
18. Buttiker, W. 1959. Notizen über die Vogeljagd in Afghanistan. *Zeitschrift Für Jagdwissenschaft* 5, no. 4: 95-105.
19. Cumming, J. W. N. 1905. Birds of Seistan, being a list of the birds shot or seen in Seistan by members of the Seistan Arbitration Mission, 1903–05. *J. Bombay Nat. Hist. Soc.* 16: 686-99.
20. Evans, M. I. (compiler). 1994. Important bird areas of the Middle East. BirdLife Conservation Series, No. 2. Cambridge: BirdLife International.
21. Finn, F. 1896. List of the birds collected by the „Afghan Baluch Boundary Commission of 1896“. *Jour. Asiat. Soc. Bengal*: 566-67.
22. Fulton, H. T. 1904. Notes on the birds of Chitral. *J. Bombay Nat. Hist. Soc.*: 44-64.
23. Green, A. J. 1993. The Status and Conservation of the Marbled Teal *Marmaronetta angustirostris*. 107 pp. Special Publication, 23. IWRB.
24. Griffith, W. 1967. Journals and travels in Assam, Burma, Bootan, Afghanistan and the neighbouring countries. Calcutta.
25. Grimmett, R., F. Lambert, D. Filby, and L. Norton. 2008. Birds recorded Afghanistan, November 1978.
26. Groombridge, B., (ed.). 1992. *Global Biodiversity: Status of the Earth's Living Resources*. 594. London: Chapman and Hall.
27. Habib, B. 2007. An annotated list of bird species observed by the Mammal Survey Team in Wakhan in April 2007. Kabul: Wildlife Conservation Society.
28. Habibi, K. nd. Checklist of birds of Afghanistan. Web page, [accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/BirdChecklist.html>.
29. Habibi, K. The vertebrate fauna of Afghanistan. Web page, [accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>.
30. Hüe, F. and R. D. Etchecopar. 1970. *Les oiseaux du proche et du Moyen Orient*. Paris: N. Boubée.
31. Hutton, C. T. 1847. Rough notes on the ornithology of Candahar and its neighbourhood [avec quelques information supplémentaires sur les oiseaux d'Afghanistan par Blyth (E.)]. pp. 775-94.
32. Inskipp, T., and C. Inskipp. 1979. Jalalbad [sic], eastern Afghanistan. *Bull. Orn. Middle East*: 2: 3-5.
33. Jamil, A. 1994. Mission to the Ab-i-Istada, Ghazni Province, Afghanistan, 23.10.93 to 23.11.93. Unpublished report. Crane Foundation and BirdLife International.



34. Kirwan, G. M. 2004. The taxonomic position of the Afghan Scrub Sparrow *Passer (moabiticus) yatii*. 105-11.
35. Klockenhoff, H., and G. Madel. 1970. Über die Flamingos (*Phoenicopterus ruber*) der Dasht-i-Nawar in Afghanistan. 78-84.
36. Koelz, W. N. 1954, Ornithological Studies 1. New birds from Iran, Afghanistan and India. 1-32.
37. Koning, F. J., and L. J. Dijkzen. 1971. Summary of the IWRB Mission to Pakistan and Afghanistan, February 1971. IWRB Bulletin 32: 67-75.
38. Koning, F. J., and J. G. Walmsley. 1972. IWRB Mission to Afghanistan, February 1972. IWRB Bulletin 33: 39-41.
39. Koning, F. J., and J. G. Walmsley. 1973. Some Waterfowl Counts in Afghanistan, Winter 1973. IWRB Bulletin: 35: 62-64.
40. Kowatsch, P., and R. Probst. 2006. Some notes on raptors and other birds from Afghanistan in autumn 2005. 174-76.
41. Kullberg, A. 2002. Bird Report: Afghanistan. Web page, [accessed February 2006] Available at [http://www.camacdonald.com/birding/meafghanistan\(AnssiTripReport\).htm](http://www.camacdonald.com/birding/meafghanistan(AnssiTripReport).htm).
42. Madge, S. C. 1978. Birds of the Salang Pass, central Afghanistan. Bull. Orn. Soc. Middle East 1: 2-5.
43. Madge S. C. 1970. Notes on the migration of birds through Bande Amir. Unpublished report, cited in Evans (1994).
44. Madge, S. C. nd. Provisional checklist of the birds of Afghanistan. Unpublished report.
45. Meinertzhagen, R. 1939. Notes on Afghan birds. Id: 347.
46. ———. 1938. On the birds of northern Afghanistan. Part 1. Ibis. 14, no. 2: 480-520.
47. Murphy, C., and N. Redman. 1978. Field notes, no title.
48. Niethammer, G. 1966. Der Zug von Kranichen bei Kabul, Afghanistan. Die Vogelwarte. 19: 308-309.
49. ———. 1970. Die Flamingos am Ab-i-Estada in Afghanistan. Natur Und Museum, 100: 201-10.
50. ———. 1967. On the breeding biology of *Montifringilla theresae*. Ibis: 117-18.
51. ———. 1967. Störche in Afghanistan. Die Vogelwarte 20: 42-44.
52. ———. 1971. Vogelleben am Ab-i-Estada (Afghanistan). Die Vogelwarte 26: 221-27.
53. Niethammer, G., and J. Niethammer. 1967. Hochgebirgs- Vogelzug in Afghanistan. Zoologische Beiträge: 501-7.
54. ———. 1967. Neuachweise für Afghanistans Vogelwelt. J. Orn. 108: 76-80.
55. Niethammer, J. 1967. Zwei Jahre Vogelbeobachtungen an stehenden Gewässern bei Kabul in Afghanistan. 119-64.

56. Nogge, G. 1971. Afghanistan - the Ab-e-Istada: A vanishing breeding place of flamingoes. IWRB Bulletin 31: 28-30.
57. ———. 1974. Beobachtungen an den Flamingobrutplätzen Afghanistans. J. Ornithologie 115: 142-51.
58. ———. 1973. Ornithologische Beobachtungen im afghanischen Pamir. Bonn. Zool. Beitr. 24: 254-69.
59. Ostrowski, S. 2006. A visit to the bird market of Kabul (Ka Farushi), 27 August 2006. Wildlife Conservation Society.
60. Paludan, K. 1949. On the birds of Afghanistan. Vidensk. Medd. Dansk Naturh. For. 1: 221-322.
61. Petocz, R. G. 1978. Report on the Afghan Pamir. Part 1. Ecological reconnaissance. Rome, FO: DP/AFG/74/016. FAO Field Document No. 5.
62. Petocz, R. G., and K. Habibi. 1975. The flamingoes of Ab-i-Estada and Dashte Nawar. Ghazni Province, Afghanistan. FO: DP/AFG/72/005. FAO Report.
63. Petocz, R. G., and J. Y. Larsson. 1977. Ecological reconnaissance of western Nuristan with recommendations for management. FAO, FO: DP/AFG/74/016. Field Report No. 9.
64. Petocz, R. G., W. F. Rodenburg, and K. Habibi. 1976. The birds of Hamun-i-Puzak. Unpublished FAO Report.
65. Petocz, R. G., T. Skogland, and K. Habibi. 1975. The Birds of Band-i-Amir, Dasht-i- Nawar and Ab-i-Estada, identified during field surveys in 1974 and 1975. Kabul, Directorate of Wildlife and National Parks, Ministry of Agriculture.
66. Puget, A. 1969. Contribution à l'étude des oiseaux du nord-est de l'Afghanistan. Dissertation. University of Toulouse: France.
67. ———. 1970. Observations on the Psittacidae in nature in Afghanistan. 306-309.
68. ———. 1971. Observations sur l'avifaune nidificatrice de l'étang de Binihesar (Chamane Qala Hachmatran) dans la proche banlieue de Kaboul en Afghanistan. 139-144.
69. Puget, A., and F. Hüe. 1970. La Chevechette *Glaucidium brodei* (Burton) en Afghanistan. L'Oiseau at La Rev. Franç. D'Om 40: 86-87.
70. Rahim, A., and J. Y. Larsson. 1978. A Preliminary Study of Lake Hashmat Khan with Recommendations for Management. FO: DP/AFG/74/016. UNDP, FAO and Department of Forests.
71. Redman, N. 1981. Birds in central Afghanistan. Bull. Orn. Soc. Middle East 7: 2-4.
72. Reeb, R. 1977. Contribution a l'Etude de l'Avifauna et des Migrations en Afghanistan. Alauda 45: 293-333.
73. Sargeant, R. 2007. Untitled. Web page. Available at [www.aos-uk.com](http://www.aos-uk.com).
74. Sauey, R. 1985. The range, status and winter ecology of the Siberian Crane (*Grus leucogeranus*). Ph.D. dissertation. Cornell University: Ithaca, New York.
75. Savage, C. D. W. 1972. Status of Wetlands of International Importance in Afghanistan -Pakistan- India-Ceylon. International Conference on Conservation of Wetlands and Waterfowl. Ramsar, Iran: (ed.) E. Carp. 175-77. IWRB, Slimbridge.

76. ———. 1968. The wildfowl and wetland situation in Afghanistan. Proc. Technical Meeting on Wetland Conservation: (ed.) H. F. J. Elliott. 119-22.
77. Sayer, J. A., and A. P. M. Van der Zon. 1981. Checklist of the Birds of Afghanistan. Appendix I in National Parks and Wildlife Conservation, Afghanistan. A Contribution to a Conservation Strategy. FAO.
78. Scheltema, G. 2008. Afghanistan: trip report Kandahar November 2007-April 2008. Web page. Available at [http://www.surfbirds.com/trip\\_report.php?id=1316](http://www.surfbirds.com/trip_report.php?id=1316).
79. Schweizer, M., R. Ayé, and R. Burri. 2006. Afghan Babbler: a little known western palearctic species. *Birding World* 19, no. 2: 69-70.
80. Scott, D. A. 1975. Mid-winter waterfowl counts in the wetlands of the Seistan Basin: 1970-75. Internal Report, Tehran, Iran: Department of the Environment.
81. ———. 2008. Waterbird counts in the Seistan Wetlands of Afghanistan: January 1976.
82. Scott, D. A., and M. Smart. 1992. Wetlands of the Seistan Basin, South Caspian and Fars, Islamic Republic of Iran. Ramsar Convention Monitoring Procedure Report: Ramsar Convention Bureau, Gland, Switzerland.
83. Scully, J. 1887. On the mammals and birds collected by Captain C.E. Yates, C.S.I. of the Afghan Boundary Commission. 68-69.
84. Shank, C. C., and J. Y. Larsson. 1977. A Strategy for the establishment and development of Band-e-Amir National Park. FAO, FO: DP/AFG/741016.
85. Shank, C. C., and W. F. Rodenburg. 1977. Management Plan for Ab-i-Estada and Dashte Nawar Flamingo and Waterfowl Sanctuaries. . Kabul. UNDP, FAO and Department of Forests and Range, Ministry of Agriculture, FO: DP/AFG/74/016.
86. Smith, E. C. 1974. Some additional information on birds in Afghanistan. *Ardea* 62: 226-35.
87. St. John, O. B. 1889. The birds of southern Afghanistan and Kelat. *Ibis*: 145-80.
88. Sultanov, G. S. 1988. Some data on the vertebrate fauna of eastern Afghanistan. *Uzbekskii Biologicheskii Zhurnal* 4: 444-47.
89. Swinhoe, C. 1882. On the birds of southern Afghanistan. *Ibis*: 95-126.
90. Thiollay, J. 1978. Précisions nouvelles sur le statut de certains rapaces en Afghanistan. *Alauda* 46: 98-100.
91. Ticehurst, C. B. 1926. The birds of British Baluchistan. *J. Bombay Nat. Hist. Soc.* 31: 687-711, 862-81; 32: 63-97.
92. Tong, M. 1968. Report on the birds seen on the Hindu-Kush. Unpublished paper.
93. UNEP. 2003. Afghanistan Wakhan Mission Technical Report. Geneva: UNEP, FAO.
94. Vasiç, V. F. 1974. Observations ornithologiques en Afghanistan. *Alauda*. 42: 259-80.
95. Vaurie, C. 1949. Notes on the bird genus *Oenanthe* in Persia, Afghanistan, and India. *American museum novitates* v. 1425.

96. Viellard, J. 1969. Donnees biogeographiques sur l'avifauna de Asie occidentale. I. Afghanistan (primiere parte). *Alauda* 37: 274-300.
97. Wardlaw-Ramsay, R. G. 1879. Ornithological notes from Afghanistan. *Ibis* 4, no. 3: 444-49.
99. ———. 1880. Ornithological notes from Afghanistan. *Ibis* 4, no. 4: 45-71.
100. Whistler, H. 1944. Material for the ornithology of Afghanistan. *J. Bombay Nat. Hist. Soc.* 45: 505-19.
101. ———. 1945. Materials for the ornithology of Afghanistan. 61-72, 106-122, 280-302, 462-485.
102. Whitehead, C. 1909. On the birds of Kohat and Kurram, northern India. With an introduction by Major H.A.F. Margrath. *Ibis*: 90-134, 214-84, 620-23.
103. Yate, C. 1888. Northern Afghanistan. London.
104. Zahler, P. 2002. Birds seen at or in vicinity of Band-e-Amir, Afghanistan (September 2002). Unpublished report.

## Reptiles

1. Alcock, A., and F. Finn. 1867. An account of the Reptilia collected by Dr. A.H. Maynard, Captain A.H. McMahon, C.I.E. and the members of the Afghan Baluch Boundary Commission. *J. Asiatic Soc. Beng.* 65: 550-66.
2. Anderson, S. C., and A. E. Leviton. 1969. Amphibians and reptiles collected by the Street Expedition to Afghanistan. *Proc. Calif. Acad. Sci. 4 Ser.* 37, no. 2: 25-65.
3. ———. 1967. A new species of *Eremias* (Reptilia: Lacertidae) from Afghanistan. *Occasional Papers of the California Academy of Sciences.* 64.
4. Bobrov, V. V. 2005. Independence of the Central Asian Faunistic Region (according to the distribution of lizards (Reptilia, Sauria)). *Biology Bulletin.* 32, no. 6: 576-89.
5. Bohme, W., and N. N. Scerbak. 1991. Ein neuer Wüstenrenner aus dem hochland Afghanistans, *Eremias (Eremias) afghanistanica* sp. n. (Reptilia: Sauria: Lacertidae). *Bonner Zoologische Beiträge* 42, no. 2: 137-41.
6. Casimir, M. J. 1971. Zur Herpetofauna der Provinz Badghis (NW-Afghanistan). *Die Aquar. Terrar. Z.* 24, no. 7: 244-46.
7. ———. 1970. Zur Herpetofauna des Iran und Afghanistans. *Die Aquar. Terrar. Z.* 23, no. 5: 150-54.
8. Chandra, H., and S. Charon. 1983. Some lizard predators of acridids of Southwestern Afghanistan. *Plant Prot. Bull.* 33, no. 3-4: 153-55.
9. Clark, R. 1990. A report on herpetological observations in Afghanistan. *Brit. Herpetol. Soc. Bull.* 33: 20-42.
11. Clark, R. J., E. D. Clark, S. C. Anderson, and A. E. Leviton. 1969. Report on a collection of amphibians and reptiles from Afghanistan. *Proc. Calif. Acad. Sci. 4 Ser.* 36: 279-316.
12. Das, I., B. Dattagupta, and N. Gayen. 1998. Systematic status of Alcock, „1897“ 1898 (Sauria: Scincidae) collected by the Pamir Boundary Commission, 1885. *Russ. J. Herpetol.:* 5, no. 2.

13. Golubev, M. L., and N. N. Shcherbak. 1979. New species of the *Tropicolotes* Peters, 1880 genus (Reptilia, Sauria, Gekkonidae) from Afghanistan [in Russian]. *Dopovidi Akademiyi Nauk Ukrayins'Koyi Rsr Seriya B Heolohichni Khimichni Ta Biolohichni Nauky* 4: 307-10.
14. Habibi, K. nd. The vertebrate fauna of Afghanistan. Web page, [accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>.
15. Kral, B. 1969. Notes on the herpetofauna of certain provinces of Afghanistan. *Zool. Listy* 18: 55.
16. Leviton, A. E. 1959. Report on a collection of reptiles from Afghanistan. *Proceedings of the California Academy of Sciences*, (4th Series) 29: 445-63.
17. Leviton, A. E., and S. C. Anderson. 1970. The amphibians and reptiles of Afghanistan, a checklist and key to the herpetofauna. 163-206.
18. ———. 1984. Description of a new species of *Cyrtodactylus* from Afghanistan with remarks on the status of *Gymnodactylus longipes* and *Cyrtodactylus fedtschenkoi*. *J. Herpetol.*: 18, no. 3: 270-76.
19. ———. 1961. Further remarks on the amphibians and reptiles of Afghanistan. *Wasmann Journal of Biology* 19: 269-76.
20. ———. 1963. Third contribution to the herpetology of Afghanistan. *Proceedings of the California Academy of Sciences*, (4th Series) 31: 329-39.
21. Leviton, A. E., S. C. Anderson, K. Adler, and S. A. Minton. 1992. *Handbook to Middle East amphibians and reptiles*. 252 pp. Society for the Study of Amphibians and Reptiles, USA.
22. Sharma, R. C., and C. Singh. 1976. Records of some little known reptiles from Afghanistan. 70-74.
23. Smith, M. A. 1940. Contributions to the herpetology of Afghanistan. *Ann. Mag. Nat. Hist.* 11, no. 5: 382-84.
24. Steven, C., S. C. Anderson, and A. E. Leviton. 1967. A new species of *Phrynocephalus* (Sauria: Agamidae) from Afghanistan, with remarks on *Phrynocephalus ornatus* Boulenger. *Proceedings of the California Academy of Sciences*, 4th Ser. 11.
25. Sultanov, G. S. 1988. Some data on the vertebrate fauna of eastern Afghanistan. *Uzbekskii Biologicheskii Zhurnal* 4: 44-47.

## Amphibians

1. American Museum of Natural History. nd. Amphibian Species of the World 3.0, an Online Reference. Web page, [accessed February 2006]. Available at: <http://research.amnh.org/herpetology/amphibia/names.php?taxon=&family=&subfamily=&genus=&commname=&authority=&year=&geo=102&dist=&comment=>. Afghan amphibian checklist.
2. Anderson, S. C. and A. E. Leviton. 1969. Amphibians and reptiles collected by the Street Expedition to Afghanistan. *Proc. Calif. Acad. Sci.* 4 Ser. 37, no. 2: 25-65.
3. Casimir, M. J. 1971. Zur Herpetofauna der Provinz Badghis (NW-Afghanistan). *Die Aquar. Terrar. Z.* 24, no. 7: 244-46.

4. ———. 1970. Zur Herpetofauna des Iran und Afghanistans. *Die Aquar. Terrar. Z.* 23, no. 5: 150-54.
5. Clark, R. J., E. D. Clark, S. C. Anderson, and A. E. Leviton. 1969. Report on a collection of amphibians and reptiles from Afghanistan. *Proc. Calif. Acad. Sci.* 4 Ser. 36: 279-316.
6. Groombridge, B. (ed.). 1992. *Global Biodiversity: Status of the Earth's Living Resources*. 594 pp. London: Chapman and Hall.
7. Habibi, K. nd. The vertebrate fauna of Afghanistan. Web page, accessed February 2006. Available at <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>.
8. Kral, B. 1969. Notes on the herpetofauna of certain provinces of Afghanistan. *Zool. Listy* 18: 55.
9. Leviton, A. E., and S. C. Anderson. 1970. The amphibians and reptiles of Afghanistan, a checklist and key to the herpetofauna. 163-206.
10. ———. 1961. Further remarks on the amphibians and reptiles of Afghanistan. *Wasmann Journal of Biology* 19: 269-76.
11. ———. 1963. Third contribution to the herpetology of Afghanistan. *Proceedings of the California Academy of Sciences, (4th Series)* 31: 329-39.
12. Leviton, A. E., S. C. Anderson, K. Adler, and S. A. Minton. 1992. *Handbook to Middle East amphibians and reptiles*. 252 pp. Society for the Study of Amphibians and Reptiles, USA.
13. Mertens, R. 1970. Salamander aus Afghanustan: *Batrachuperus mustersi*. *DATZ* 23: 346-48.
14. Nawabi, S. 1965. A rare amphibian from Afghanistan: *Batrachuperus mustersi*. *Science (Kabul)*. Aug. Sp. Iss.: 21-25.
15. Reilly, S. M. 1983. The biology of the high altitude salamander *Batrachuperus mustersi* from Afghanistan. *J. Herpetol.* 17, no. 1: 1-9.
16. Smith, M. A. 1940. Contributions to the herpetology of Afghanistan. *Ann. Mag. Nat. Hist.* 11, no. 5: 382-84.
17. Sparreboom M. 1979. Eieren van *Batrachuperus mustersi*. *Lacerta* 37, no. 5.
18. Sultanov, G. S. 1988. Some data on the vertebrate fauna of eastern Afghanistan. *Uzbekskii Biologicheskii Zhurnal* 4: 44-47.
19. Ueno, S., and K. Nakamura. 1966. The anurans collected by the Kyoto University Pamir Hindu Kush Expedition, 1960. Results Kyoto University Scientific Expedition Karakorum-Hindu Kush.

## Fish

1. Alcock, A. W. 1898. Report on the natural history results of the Pamir Boundary Commission. 45 pp. Calcutta: Office of the Superintendent of Government Printing.
2. Balon, E. K., and K. Hensel. 1970. Notes on small collection of fishes from Afghanistan with a description of *Glyptothorax jalalensis*, sp. n. (Pisces, Sisoridae). *Vestnik Cs. Spol. Zool. (Acta Soc. Zool. Bohemoslov)* 34: 159-63.

3. Banarescu, P., and M. R. Mirza. 1965. *Noemacheilus lindbergi* n. sp., a new loach from Afghanistan and West Pakistan (Pisces, Cobitidae). *Senckenbergiana Biologica* 46: 265-69.
4. Banarescu, P., and T. Nalbant. 1975. A collection of Cyprinoidei from Afghanistan and Pakistan with description of a new species of Cobitidae (Pisces, Cypriniformes). *Mitt. Hamburg. Zool. Mus. Inst.* 72: 241-48.
5. Banarescu, P., and T. T. Nalbant. 1966. The 3rd Danish Expedition to central Asia. Zoological results 34. Cobitidae (Pisces) from Afghanistan and Iran. *Vidensk. Medd. Dansk Naturh. Foren. Kjøbenhavn* 129: 149-86.
6. Coad, B. W. 1996. Exotic and transplanted fishes in southwest Asia. 8. Congress of Societas Europaea Ichthyologorum (SEI), Oviedo (Spain), 26 Sep-2 Oct 1994.
7. ———. 1981. Fishes of Afghanistan, an annotated check-list. *Publications in Zoology* No. 14, Ottawa: National Museum of Canada.
8. Coad, B. W., and N. Keyzer-de Ville. 2005. On the validity of the species in the snow-trout genus *Schizocypris* Regan, 1914 (Cyprinidae: Actinopterygii). *Zoology in the Middle East*: 35: 35-42.
9. Day, F. 1876. On the fishes of Yarkand. *Proc. Zool. Soc. Lond.*: 781-807.
10. ———. 1878. Scientific results of the Second Yarkand Mission; based upon the collections and notes of the late Ferdinand Stoliczka, Ph.D. Ichthyology. 825 pp. Office of the Superintendent of Government Printing, Calcutta.
11. Günther, A. Fishes. 1889. In: Aitchison, J.E.T. On the zoology of the Afghan Delimitation Commission. *Trans. Linn. Soc., Lond. Ser. 2.* 5: 106-9.
12. Habibi, K. nd. The vertebrate fauna of Afghanistan. Web page, [accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/Fauna.htm>.
13. Hora, S. L. 1932. *Glyptosternum reticulatum* McClelland, a siluroid fish from Afghanistan. *Ann. Mag. Nat. Hist.* 10, no. 10: 176-79.
14. ———. 1929. The habitat and systematic position of two imperfectly known loaches from Afghanistan. *J. Proc. Asiatic Soc. Bengal* 24: 481-84.
15. ———. 1922. On fishes belonging to the family Cobitidae from high altitudes in Central Asia. *Rec. Indian Mus.* 24: 63-83.
16. ———. 1927. On the manuscript drawings of fish in the library of the Asiatic Society of Bengal. III. Fish drawings among the zoological drawings in the collection of Lieut. Col. Sir Alexander Burnes (1805 - 1841) by Dr. P.B. Lord. *J. Proc. Asiatic Soc. Bengal* 24: 117-25.
17. Karaman, M. S. 1969. Zwei neue Süßwasserfische aus Afghanistan und Iran. *Mitt. Hamburg. Zool. Mus. Inst.* 66: 55-58.
18. Keyserling, E. 1861. Neue Cypriniden aus Persien. *Z. Ges. Naturw.* 17: 1-24.
19. McClelland, J. 1842. On the fresh-water fishes collected by William Griffith, Esq., F.L.S. Madras Medical Service, during his travels under the orders of the Supreme Government of India, from 1835 to 1842. *J. Nat. Hist., Calcutta* 2: 560-89.

20. Menon, A. G. K. 1999. Check list - fresh water fishes of India. Rec. Zool. Surv. India, Misc. Publ., Occas. Pap. 175: 234-59.
21. Mirza, M. R. 1986. Ichthyogeography of Afghanistan and adjoining areas. Pakistan Journal of Zoology 18, no. 4: 331-39.
22. Mirza, M. R., H. Nawaz, and M. N. Javed. 1992. A note on the fishes of genus "Aorichthys" Wu, with the description of a new subspecies from Pakistan. Pakistan J. Zool.: 211-13.
23. Moravec, F., and A. Amin. 1969. Some helminth parasites, excluding Monogenea, from fishes of Afghanistan. Prirodoved Pr. Ustavu. Cesk. Akad. Ved. Brne 16, no. 6: 1-48.
24. ———. 1978. Some helminth parasites excluding Monogenea from fishes of Afghanistan. Acta Sci. Nat. Brun.: 12: 1-45.
25. Nalbant, T. T., and P.G. Bianco. 1998. The loaches of Iran and adjacent regions with description of six new species (Cobitoidea). Ital. J. Zool. 65: 109-25.
26. Ng, H. 2004. *Rita macracanthus*, a new riverine catfish (Teleostei: Bagridae) from South Asia. Zootaxa 568: 1-12.
27. Nikoilsky, G. V., and F. F. Tzentilovich. 1951. Fishes of the Murgab basin (Turkmenia). [in Russian]. Arch. Mus. Zool. Univ. Moscou 7: 105-12.
28. Petr, T. 2002. Cold water fish and fisheries in countries of the high mountain arc of Asia (Hindu Kush-Pamir-Karakoram-Himalayas): a review. Symposium on Cold Water Fishes of the Trans-Himalayan Region, Kathmandu (Nepal), 10-13 Jul 2001. FAO fisheries technical paper No 431.
29. ———. 1999. Coldwater fish and fisheries in Afghanistan. In: Fish and fisheries at higher altitudes, Asia. FAO Fish. Tech. Pap. No. 385: 138-48.
30. Petr, T. nd. Coldwater fish and fisheries in Afghanistan. Web page. Available at [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/DOCREP/003/X2614E/x2614e08.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/X2614E/x2614e08.htm).
31. Pradhan, G. B. N. 2006. Assessment on the status of fisheries conservation management and feasibility of fish farming in different areas of Afghanistan. TA 5441 (AFG): Natural Resources Management and Poverty Reduction. Kabul: Asia Development Bank.
32. Rafique, M. 2000. Fish diversity and distribution in the Indus river and its drainage system. Pakistan Journal of Zoology 32, no. 4: 321-32.
33. Reshetnikov, Y. S., and F. M. Shakirova. 1993. A zoogeographical analysis of the ichthyofauna of Central Asia including a list of freshwater fishes. Voprosy Ikhtiologii 33, no. 4: 99-110.
34. Sultanov, G. S. 1988. Some data on the vertebrate fauna of eastern Afghanistan. Uzbekskii Biologicheskii Zhurnal. 444-47.
35. Talwar, P. K., and A. G. Jhingram. 1991. Inland fishes of India and adjacent countries. A.A. Balkema, Rotterdam.
36. Terek, J. 1983. To the knowledge of aquatic fauna of Bandi-Amir Lakes (Afghanistan). Biologia (Bratisl.) 38, no. 2: 167-71.



37. Vijayalakshmanan, M. A. 1950. A note on the fishes from the Helmund River in Afghanistan, with the description of a new loach. *Rec. Indian Mus.* 47: 217-24.

## Invertebrates

1. Altena, C. O. van Regteren. 1970. Notes on land slugs, 16: *Deroceras* from Afghanistan, including description of *D. kandaharensis*. *Fieldiana Zool.* 51, no. 15: 175-78.
2. Ancey, C. F. 1886. Essai monographique sur les *Buliminus* de l'Asie centrale russe et de l'Afghanistan. *Bull. Soc. Malacol. France* 3: 15-64, 329-39.
3. ———. 1893. Faunes malacologiques de l'Afghanistan et du Béloutchistan. *Bull. Soc. Zool. France* 18: 40-47.
4. Annandale, N., and B. Prashad. 1919. The Mollusca of the inland waters of Baluchistan and of Siestan, with a note on the liver-fluke of sheep in Seistan. *Records Indian Mus.* 18, no. 1: 17-63.
5. Asahina, S. 1963. Odonata taken by Japanese Expeditions to Karakoram, Afghanistan, Iran and Pakistan. *Insect Fauna of Afghanistan and Hindukush. Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush 1955: (ed.) M. Ueno. Vol. 4: 45-50.* Kyoto: Kyoto University Press.
6. Barus, V., and F. Tenora. 1967. Three interesting nematode species in *Miniopterus schreiberei* (Chiroptera) from Afghanistan. (*Acta Univ. Agric. Brno*) *Sb. Uys. Sk. Zemed Brno* 1: 95-101.
7. Bonadonna P. 1960. Notes sur les Anthicidae Palearctiques (Coleoptera). XI. Anthicidae captures en Afghanistan par le D'Lindberg (Contribution a l'étude de la faune de l'Afghanistan, 32). *Revue Fr. Entomol.* 27, no. 1: 53-57.
8. Cerny, V., and M. Daniel. 1977. Ticks of small mammals from the Hindu Kush Afghanistan. *Folia Parasitologica (Ceske Budejovice)* 24, no. 4: 367-71.
9. Collingwood, C. A. 1960. The 3rd Danish expedition to Central Asia. *Zoological Results* 27. Formicidae (Insecta) from Afghanistan. *Videnskabelige Meddelelser Fra Dansk Naturhistorisk Forening* 123: 52-79.
10. Daniel, M. 1977. Medsostigmatid mites of small mammals from the Hindu Kush Afghanistan. *Folia Parasitologica (Ceske Budejovice)*. 353-66.
11. Danilov, V. N. 1985. Mosquitoes (Diptera, Culicidae) of Afghanistan. 1. Classification table for females [In Russian]. *Med. Parazitol. (Mosk)* no. 2: 67-72.
12. ———. 1985. Mosquitoes (Diptera, Culicidae) of Afghanistan. Report 2. Classification table for stage IV larvae [In Russian]. *Med Parazitol (Mosk)* Jul-Aug. no. 4: 51-5; no. 4: 51-55.
13. Dumont, H. J. 1974. A note on some dragonflies from Afghanistan. *Odonatologica* 4, no. 4: 243-48.
14. Hutton, T. 1849. Notices of some land and fresh water shells occurring in Afghanistan. *J. Asiatic Soc. Bengal* 18: 649-61, 967.
15. ———. 1834. On the land shells of India. *J. Asiatic Soc. Bengal* 3: 81-93.
16. Jaekel, S. 1956. Die Weichtiere (Mollusca) der Afghanistans-Expedition (1952 und 1953). *J. Klapperichs. Mitt. Zool. Mus., Berlin* 32, no. 2: 337-53.

17. Klapperich, J. 1950. Auf Forschungsreisen in Afghanistan. Entomol. Bl. Biol. Syst. Kaefer 1: 107-18.
18. Koçak, A. Ö., and M. Kemal. nd. Check-List of the Butterflies of Afghanistan. Web page, [accessed March 2006]. Available at <http://www.members.tripod.com/entlep/Af.htm>.
19. Likharev, I. M., and Y. I. Starobogatov. 1967. On the molluscan fauna of Afghanistan. Tr. Zool. Inst. Akad. Nauk SSSR 42: 159-97.
20. Lindberg K. 1949. Le paludisme en Afghanistan. Rivista Di Malariologia: 281-54.
21. Lopatin, I. K. 1963. Die Chrysomeliden (Coleoptera) Afghanistans auf der Ergebnisse der Forschungsreise der Herrn J. Klapperich in den Jahren 1952/53. Annals Hist.-Nat. Mus. Nat. Hung 15: 349-78.
22. ———. 1962. On the fauna of leaf beetles of Afghanistan (Coleoptera, Chrysomelidae). Zool. J. 41, no. 12: 1811-16.
23. Medvedev, G. S. 2005. Connections of the Sand Desert Faunas of Tenebrionidae (Coleoptera) of Middle Asia, Iran, and Afghanistan. Contributions to Systematics and Biology of Beetles, Papers celebrating the 80th birthday of Igor Konstantinovich Lopatin: (eds.) Konstantinov, A., A. Tishechkin, and L. Penev. Sofia, Moscow: Pensoft Series Faunistica 43.
24. Medvedev, L. N. 1985. To the chrysomelide fauna (Coleoptera, Chrysomelidae) of Afghanistan. II. Ent. Rev. 59, no. 2: 370-77.
25. Moravec, F., and A. Amin. 1978. Some helminth parasites excluding Monogenea from fishes of Afghanistan. Acta Sci. Nat. Brun 12: 1-45.
26. Radchenko, A., and G. W. Elmes. 2003. *Myrmica afghanica* (Hymenoptera: Formicidae), a new ant species from Afghanistan. Zootaxa 375: 1-8.
27. Rietschel, G., and W. Rietschel. 1987. An unknown warble fly larva of the genus *Portschinskia* from Afghanistan (Diptera, Hypodermatidae). Entomologia Generalis 12, no. 4: 277-80.
28. Savich F. 1999. Two new and notes on one previously known species of subgenus *Asioplatus* Kryzhanovskij (Coleoptera, Carabidae, *Pterostichus*) from Afghanistan. Latv. Ent. 37: 6-13.
29. Schmidt, E. 1961. Ergebnisse der Deutschen Afghanistan-Expedition 1956 der Landessammlungen für Naturkunde Karlsruhe sowie der Expeditionen J. Klapperich, Bonn, 1952-1953 und Dr. K. Lindberg, Lund (Schweden) 1957-1960. Beitr. Naturk. Forsch. SüdwDtl. 19:399-435.
30. Solem, A. 1972. Mollusks from prehistoric sites in Afghanistan. Trans. Amer. Phil. Soc., New Series 62, no. 4: 57-65.
31. ———. 1979. Some mollusks from Afghanistan. Fieldiana Zoology 1: 1-89.
32. Telnov, D. 2002. Vorläufige Auflistung der Anthicidae (Coleoptera) von Afghanistan, mit Beschreibung einer neuen Art. Latv. Entomol. 39: 20-29.
33. Ueno, M. 1963. Insect fauna of Afghanistan and Hindukush. Results of the Kyoto University Scientific Expedition to the Karakoram and Hindukush, 1955. Kyoto: Kyoto University.
34. Ward, R. A. 1972. Mosquitoes of Afghanistan-- an annotated checklist. Mosquito Systematics 4, no. 3: 93-97.

35. Wojtusiak, J. 1974. A dragonfly migration in the High Hindu Kush (Afghanistan), with a note on high altitude records of *Aeshna juncea mongolica* Bartenev, and *Pantala flavescens* (Fabricius) (Anisoptera: Aeshnidae, Libellulidae). *Odonatologica*, 3, no. 2: 137-42.
36. Zykov, I. E., and A V. Alexeev. 1992. A new species of *Sphenoptera* (Coleoptera, Buprestidae) from central Asia and Afghanistan. [In Russian]. *Zoologiceskij Žurnal* 71, no. 7: 150-53.

## Plants

1. Agachanjanc, O. E. 1964. Botanical - geographical observations in Afghanistan. *Bot. Zhurn* 49: 150-155. [In Russian]
2. ———. 1958. Botanical-geographical survey of Afghanistan. [In Russian]. *Izv. Akad. Nauk. Tadzhik. SSR; Otd. Est Nauk* 1: 25.
3. ———. 1960. Notes on botanical - geographical districts of Tadzhikistan and NE Afghanistan. [In Russian]. *Izv. Akad. Nauk Tadzhik. SSR: Otd. S.-Sh Bilog.* 1, 2.
4. ———. 1961. Vegetation of NE Afghanistan. [In Russian]. *Sb. Tr. Tadszhik. Fil. Geogr. Obsch. SSR.* 2.
5. Agachanjanc, O. E., and S. W. Breckle. 1995. Origin and evolution of the mountain flora in Middle Asia and neighbouring mountain regions. *Ecological Studies* 113: 63-80.
6. Agakhanjanc, O. E., and S. W. Breckle. 2002. Plant diversity and endemism in High Mountains of Central Asia, the Caucasus and Siberia, pp. 117-127. *Mountain Biodiversity - A global assessment: (eds.) Körner, C. and E. Spehn. Parthenon Publ. Group, New York.*
7. Aitchison, J. E. T. 1887. Botany of the Afghan Delimitation Commission. *Trans. Linn. Soc. Series 2. Botany Vol. III.*
8. ———. 1888. The botany of the Afghan Delimitation Commission. *Trans. Linn. Soc. Series 3. 2: 1-139.*
9. ———. 1880. Flora of Afghanistan. Part 1. *J. Linn. Soc. Bot.* 18: 1-122.
10. ———. 1880. Flora of Afghanistan. Part 2. *J. Linn. Soc. Bot.* 19: 1-93.
11. ———. 1881. On the flora of the Kurram Valley. *J. Linn. Soc. Bot.* 18: 1-122.
12. ———. 1881. On the flora of the Kurram valley. *J. Linn. Soc. Bot.* 19: 139-200.
13. ———. 1887. Some plants of Afghanistan. *Pharm. Journal* 3: 465-68.
14. ———. 1887. Some plants of Afghanistan, and their medicinal products. *Amer. J. Pharm.* 59.
15. ———. 1889. A summary of the botanical features of the country traversed by the Afghan delimitation commission during 1884/85. *Trans. Bot.Soc. Edinb.* 17: 421-34.
16. ———. 1879. The vegetation of Kurram and Hariab valleys. *Ind. For.* 5: 179-88.
17. Akram, M. 1967. Blütenpflanzen im Hundukusch, pp. 47-50. *Zwischen Munjan und Bashgal. Göppingen: (ed.) W. Frey.*

18. Alam, M. 2003. A short survey of the botanical bibliography of Afghanistan. *Bulletin De La Societe Vaudoise Des Sciences Naturelles* 88, no. 3: 381-99.
19. Ali, H. 2006. Floristic and ethnobotanical studies in Band-i-Amir National Park Afghanistan. Kabul: Asia Development Bank.
20. Annandale, N., and H. E. Carter. 1919. Notes on the vegetation of Seistan. *J. Asiatic Soc. Bengal* 15: 267-97.
21. Bedunah, D. 2007. Rangeland conditions of the Band-i-Amir area. 14 pp. Wildlife Conservation Society.
22. Bedunah, D. J. 2006. An analysis of Afghanistan's rangelands and management issues for the development of policy and strategies for sustainable management. Report for Chemonics International, Inc.
23. Breckle, S. W. 1982. Afghanische Drogen und ihre Stammpflanzen. III. Hanf und Haschisch. *Afghanistan J. (Graz)* 9: 115-23.
24. ———. 1972. Alpenrosen im Hindukusch? *Jahrb. Ver. Zum Schutze Der Alpenpfl. U.-Tiere* 37: 140-46.
25. ———. 1982. Blumen der Trockengebiete Irans und Afghanistans, pp. 159-62. *Blumenparadiese und botanische Gärten der Erde: (ed.) H. Reisigl. Innsbruck: Pinguin.*
26. ———. 1971. Die Beeinflussung der Vegetation durch hügelbauende Ameisen (*Cataglyphis bicolor* Fabricius) auf der Dasht-i Khoshi (O-Afghanistan). *Ber. Dtsch. Bot. Ges.* 84, no. 1/2: 1-18.
27. ———. 1987. Distribution and ecology of *Cystopteris* (Athyraceae) species within the Flora Iranica region. *Pl. Syst. Evol.* 155: 59-65.
28. ———. 2004. Flora, Vegetation und Ökologie der alpin-nivalen Stufe des Hindukusch (Afghanistan). *Results of worldwide ecological studies: (eds.) Breckle, S. W., B. Schwiezer, and A. Fangmieier. 2nd Symposium A.F.W. Schimper-Foundation: Stuttgart-Hohenheim: Heimbach-Verlag.*
29. ———. 1967. Fossile Pflanzenreste am Latahbandpass in Afghanistan. *Science (Kabul)* 4, no. 1 and 2: 16-21.
30. ———. 1971. Ist *Diarthron vesiculosum* (Thymelaeaceae) ein ökologisches Rätsel? *Studien an Therophyten in der Steppe von Kabul/Afghanistan. I. Allgemeines, Morphologie und osmotische Verhältnisse. Bot. Jahrb. System* 90: 550-61.
31. ———. 1973. Mikroklimatische Messungen und ökologische Beobachtungen in der alpinen Stufe des afghanischen Hindukusch. *Bot. Jahrb. System* 93: 25-55.
32. ———. 1974. Notes on alpine and nival flora of the Hindu Kush, East Afghanistan. *Bot. Not.* 127, no. 2: 278-84.
33. ———. 1971. Ökologie und Mikroklima in der alpinen Stufe des afghanischen Hindukusch. Vortrag Botaniker-Tagung Innsbruck.
34. ———. 1975. Ökologische Beobachtungen oberhalb der Waldgrenze des Safed Koh (Ost-Afghanistan). *Vegetatio (Acta Geobotanica)* 30, no. 2: 89-97.
35. ———. 1971. Ökophysiologischer Tagesgang des Halophyten *Krascheninnikovia* in der Dasht-i-Nawor (Zentral-Afghanistan) an einem Strahlungstag. *Biol. Plantar. (Prag)* 13: 403-4.

36. Breckle, S. W. 2002. Salt Deserts in Iran and Afghanistan, pp. 109-122. *Sabkha Ecosystems: (eds.) Barth & Böer. Kluwer Academic Publ.*
37. Breckle, S. W. 1986. Studies on halophytes from Iran and Afghanistan. II. Ecology of halophytes along salt-gradients. *Proceedings Roy. Bot. Soc. Edinb.* 89B: 203-15.
38. ———. Temperate Deserts and Semideserts of Afghanistan and Iran, pp. 271-319. *Temperate Deserts and Semideserts: (ed.) N.E. West. Amsterdam: Elsevier.*
39. ———. 1971. Vegetation in alpine regions of Afghanistan, pp. 107-116. *Plant Life of South-West Asia: Botanical Soc. of Edinburgh. Aberdeen Univ. Press.*
40. ———. 1981. Zum Stand der Erforschung von Flora und Vegetation Afghanistans. Rathjens, C. *Neue Forschungen in Afghanistan. Leske/ Opladen.*
41. Breckle, S. W., and W. Frey. 1976. Beobachtungen zur heutigen Vergletscherung der Hauptkette des Zentralen Hindukusch (Afghanistan). *Afghanistan J. (Graz)* 3: 95-100.
42. ———. 1974. Die Vegetationsstufen im Zentralen Hindukush. *Afghanistan J. Graz.:* 175-80.
43. ———. 1976. Flora Iranica - Flora des Iranischen Hochlandes und der umrahmenden Gebirge. *Afghanistan J. Graz.* 3: 110-12.
44. Breckle, S. W., W. Frey, and C. Hedge. 1975. Botanical literature of Afghanistan. Supplement 1. *Notes of the Royal Botanical Garden, Edinburgh* 29: 503-21.
45. Breckle, S. W., W. Frey, and I. C. Hedge. 1969. Botanical literature of Afghanistan. *Notes of the Royal Botanical Garden, Edinburgh* 29: 357-71.
46. Breckle, S. W., and U. Kull. 1973. Ist *Diarthron vesiculosum* (Thymelaeaceae) ein ökologisches Rätsel? Studien an Therophyten in der Steppe von Kabul/Afghanistan. II. Die Wirkung der Dürre auf Mineralstoffverhältnisse und Kohlenhydrathaushalt. *Bot. Jahrb. System* 93: 539-61.
47. ———. 1971. Osmotische Verhältnisse und Zuckergehalte im Jahresgang bei Bäumen Ost-Afghanistans. I. *Quercus baloot* Griffith. *Flora* 160: 43-45.
48. Breckle, S. W., and W. Unger. 1977. Afghanische Drogen und ihre Stammpflanzen. I. Gummiharze von Umbelliferen. *Afghanistan J. Graz.* 4: 86-95. Note: *Asafoetida*.
49. Breckle, S. W., and W. Wucherer. 2006. Vegetation of the Pamir (Tajikistan): Land use and desertification problems, pp. 239-251. *Land-use Change and Mountain Biodiversity: (eds.) Spehn, E., C. Körner, and M. Liberman. Boca Raton: CRC Taylor&Francis.*
50. Dieterle, A. 1973. Vegetations kundliche untersuchungen im gebiete von Band-i-Amir (Zentral Afghanistan). 24 pp. Inaug. Diss.
51. Feuerer, T., (ed.). 2006. Checklists of lichens and lichenicolous fungi. Version 1 November 2006e, Web page, [accessed December 2006]. Available at ([http://www.biologie.uni-hamburg.de/checklists/asia/afghanistan\\_1.htm](http://www.biologie.uni-hamburg.de/checklists/asia/afghanistan_1.htm)).
52. Freitag, H. 1971. Die natürliche Vegetation Afghanistans. Beiträge zur Flora und Vegetation Afghanistans I. *Vegetation Acta Geobotanica* 22: 285-349.

53. ———. 1972. Flora und Vegetation. Afghanistan: Natur, Geschichte und Kultur, Staat, Gesellschaft und Wirtschaft. Kraus, W. ed., Tübingen.
54. ———. 1972. Neue Arten aus Afghanistan: *Amygdalus browiczii* und *Leontice silvatica*. (beiträge zur Flora und Vegetation Afghanistans IV (New species from Afghanistan: *Amygdalus browiczii* and *Leontice silvatica*. (Contribution to the flora and vegetation of Afghanistan IV)). Bot. Jahrbuche 91, no. 4: 470-77.
55. ———. 1986. Notes of the distribution climate and flora of the sand deserts of Iran and Afghanistan. Proc. Royal Soc. of Edinburgh Section B (Biological Sciences) 89: 135-46.
56. ———. 1971. Studies in the natural vegetation of Afghanistan, pp. 89-106. Plant life of South-West Asia: (ed.) P.H. Davis. Edinburgh: Royal Botanic Garden.
57. ———. 1971. Zur Kenntnis afghanischer Plumbaginaceen (Beiträge zur Flora und Vegetation Afghanistans. II) (Plumbaginaceae from Afghanistan (contribution to the study of the flora and vegetation of Afghanistan II)). Naturhist-Mus-Wien-Ann. 75: 67-75.
58. Freitag, H., and P. Wendelbo. 1970. The genus *Bellevalia* in Afghanistan. Studies in the flora of Afghanistan. Israel J. Bot. 19, no. 2/3: 220-24.
59. Frey, W. 1969. Beiträge zur Moosflora Afghanistans. i. Bartramiaceae (Contribution to the moss flora of Afghanistan. i. Bartramiaceae). Nova-Hedwigia 17, no. 1/4: 351-57.
60. ———. 1972. Beiträge zur Moosflora Afghanistans. II. die pleurokarpen Laubmoose (Contribution to the moss flora of Afghanistan. II. the pleurocarpous mosses). Bryologist 75, no. 2: 125-35.
61. ———. 1968. Beobachtungen im Zentralen Hindukusch. Zwischen Munjan Und Bashgal. Goeppingen. 224-35.
62. ———. 1974. Die Lebermoose des Iran und Afghanistans. Bryologist 77, no. 1: 40-56.
63. ———. 1967. Zur Vegetation des Zentralen Afghanischen Hindukusch. Zwischen Munjan Und Bashgal. Goeppingen 1: 17-46, 51-56.
64. Froehlich, J. 1963. Bryophyten aus Afghanistan und nordwest-Pakistan. An. Naturhist. Mus. Wien 67: 149-58.
65. ———. 1955. Die von Dr. A. Gilli in den Jahren 1949 - 1951 in Zentral-, Ost-, und Nordost-Afghanistan gesammelten Bryophyten. Mitt. Thurr. Bot. Gess. 1: 59-70.
66. Gilli, A. 1969. Afghanische Pflanzengesellschaften. Vegetatio 16: 307-75.
67. ———. 1958. Beiträge zur Flora Afghanistans. Fedd. Rep (Berlin) I - 61: 86 - 92; II - 64: 204-31; III - 68: 239-59; IV - 69: 155-75; V - 72: 49-68.
68. Groombridge, B. (ed.). 1992. Global Biodiversity: Status of the Earth's Living Resources. 594 pp. London: Chapman and Hall.
69. Gubanov, I. A., R. V. Kamelin, and V. N. Pavlov. 1983. New materials concerning Afghanistan flora. Bulletin' Moskovskogo Obshchestva Ispytatelei Prirody Otdel Biologicheskii 88, no. 6: 79-88.

70. Gubanov, I. A., and N. I. Libizov, 1970. Medicinal and industrial plants of Afghanistan. *Rastitel-Resursy*, 6, no. 1: 128-37.
71. Hayon, J. C., G. Kilbertus, and J. M. Pelt. 1970. Flore et vegetation d'un barrage de travertins en Afghanistan central (Ziarat de Band-I-Amir) (Flora and vegetation of a travertine barrier in central Afghanistan (Ziarat in Band-I-Amir)). *Acad. Sci. Compt. Rend. Ser. D.* 270, no. 25: 3075-78.
72. Hayon, J. C., J. M. Pelt, and C. Younas. 1970. Les formations vegetales de la moyenne vallee du Kabul et des massifs montagneux du Nuristan (Afghanistan). *Vegetation* 20: 279-360.
73. Hedge, I. C., and P. Wendelbo. 1972. Studies in the flora of Afghanistan. XIII. Various new taxa and records. *Edinb. Roy. Bot. Gard. Notes* 31, no. 2: 331-50.
74. Hedge, I. C., and P. Wendlebo. 1970. Some remakes on endemism in Afghanistan. *Israel J. Botany* 19: 401-17.
75. Henderson, D. M. 1970. Studies in the flora of Afghanistan. XII. Uredinales, 2. *Edinb. Roy. Bot. Gard. Notes* 30, no. 1: 197-202.
76. Herzog, T. 1938. Bryophyta. *Botanische Ergebnisse der deutschen Hindukusch-Expedition 1935. Feddes Repertorium. Beiheft* 108: 3-12.
77. Iramshahr, M. 1981. New species of *Anthemis Compositae* from Iraq and Afghanistan. *Plant Systematics & Evolution* 139, no. 1-2: 159-62.
78. Jacquemin-Roussard, M., and G. Kilbertus. 1971. Quelques lichens d'Afghanistan ebauche ecologique. *Bull. Acad. Soc. Lorraines Sciences* 10, no. 2: 59-65.
79. Jarmal, K., and D. Podlech. 1977. Nachtrage und Ergänzungen zur Brassicaceen-Flora Afghanistans (Beitrage zur Flora Afghanistans, IX) (Additions and supplements to the Brassicaceae flora from Afghanistan (contributions to the flora from Afghanistan, IX). *Mitt-Bot-Staatssamml-Munch* 13: 545-77.
80. Khan, M. I. R., and A. R. Beg. 1968. A phytogeographical excursion in Afghanistan. *Paksitan J. Forestry*, July: 287-300.
81. Khaurin, H. H. 1996. Survey and identification of fodder trees and bushes in Afghanistan. AFG/93/004. FAO.
82. Kitamura, S. 1960. Flora of Afghanistan. Results of the Kyoto University scientific expedition to the Karakorum and Hindu Kush, 1955. 486 pp. Kyoto Univ., Japan: Committee Kyoto Univ. Scien. Exped. Karakoram & Hindukush.
83. ———. 1964. Plants of West Pakistan and Afghanistan. Kyoto Univ, Japan: Committee Kyoto Univ. Scien. Exped. Karakoram & Hindukush.
84. Knapp, H. D. 1987. On the distribution of the genus *Cousinia*: Compositae. *Plant Systematics & Evolution* 155, no. 1-4: 15-26.
85. Kull, U., and S. W. Breckle. 1975. Fettsäuren in einigen Therophyten der Steppe von Kabul/Afghanistan. *Z. Pflanzenphysiol.* 75: 332-38.
86. ———. 1972. Osmotische Verhältnisse und Zuckergehalte im Jahresgang bei Bäumen Ost-Afghanistans - II. *Cercis griffithii* und *Pistacia cabulica*. *Flora* 161: 586-603.

87. Kumler, K. L. 1969. Plant distribution on hills surrounding Kabul, Afghanistan. *Transact. Illin. State Acad. Sci.* 62, no. 2: 141-53.
88. Lalande, P. 1967. Généralités sur la végétation de Safed-Koh et de son prolongement occidental. *Bull. Soc. Hist. Nat. Toulouse* 103: 297-304.
89. ———. 1968. Observation sur quelques arbres Afghans. *Bull. Soc. Hist. Nat. Toulouse* 104: 131-37.
90. Lamond, J. M. 1970. The Afghanistan collections of William Griffith. *Notes, Royal Botanic Garden Edinburgh* 30, no. 1: 159-75.
91. Lang, J. 1968. La série néogène de Bamian (Afghanistan). *C. R. Acad. Sc. Paris* 266: 2383-84.
92. Lapparent, A. F. de. 1962. Observations sur les conglomérates de Bamian (Afghanistan). *C.R. Sommaire De Seances De La Société Géologique De France* 3: 68.
93. Larsson, J. Y. 1978. Status of alpine rangelands in central Afghanistan with special reference to the Ajar Valley Wildlife Reserve. *Kabul: FAO.*
94. Linchevsky, I. A., and A. V. Prozorvosky. 1949. The basic principles of the distribution of the vegetation of Afghanistan. *Kew Bulletin* 2: 179-214.
95. May, S. nd. Poplars in Afghanistan. Web page, [accessed January 2006]. Available at [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/docrep/n2550e/n2550e06.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/n2550e/n2550e06.htm).
96. Mirazai, N. A., and S. W. Breckle. 1978. Untersuchungen an afghanischen Halophyten. I. Salzverhältnisse in Chenopodiaceen Nord-Afghanistans. *Bot. Jahrb. System* 99: 565-78.
97. Nedialkov, S. T. 1978. Ecological areas of the forest tree and bush vegetation in Afghanistan. *Goreskostopanska Nanka (Sofia)* 15, no. 2: 71-89.
98. Nedialkov, S. T. 1975. Ecological classification of the natural woody vegetation in Afghanistan. *FAO Project AFG/74/004. FAO.*
99. Nedialkov, S. T. 1973. Etude sur la classification écologique de la végétation legneuse naturelle en Afghanistan. *UNDP/FAO/67.*
100. Neubauer, H. F. 1954. Die Wälder Afghanistans. *Angew. Pflanzensoz. (Wien). Festchr. E. Aichunger.* 1: 494-503.
101. ———. 1954-1955. Versuch einer Kennzeichnung der Vegetationsverhältnisse Afghanistans. *Ann. Naturhist. Hofmus. Wien* 60: 77-113.
102. Partap, U. 1997. Bee flora of the Hindu Kush-Himalayas: inventory and management. 297 pp. *Kathmandu: International Centre for Integrated Mountain Development.*
103. Pelt, J. M., J. C. Hayon, P. Marlin, and Ch. Younos. 1970. La végétation de la vallée d'Hadjar (Afghanistan central). *Bull. Soc. Bot. France* 117, no. 12: 297-305.
104. Pelt, J. M., J. C. Hayon, and Ch. Younos. 1968. Sur la flore et la végétation d'une zone halophile steppique en bordure de l'Amou-Daria (Afghanistan). *C.R. Acad. Sc. Paris, Serie D* 267: 505-08.



105. ———. 1968. Sur la flore et al vegetation des bords du lac Ab-i-Estada (Afghanistan). C.R. Acad. Sc. Paris, Serie D 267: 1279-82.
106. Pelt, J. M., J. C. Hayon, and Ch. Younos. 1965. Plantes medicinales et drogues de l'Afghanistan. Bull. Soc. Parm. Nancy 66: 16-61.
107. Petrak, F., and I. Lohwag. 1974. Beitrag zur Uredineenflora Irans and Aghanistans (Contribution to the Uredinales [rust fungi] flora of Iran and Afghanistan). Sydowia 26, no. 116: 140-43.
108. Podlech, D. 1976. Eine neue *Anthochlamys*-Art aus Afghanistan (Beitrage zur Flora von Afghanistan, IX) (A new *Anthochlamys* [afghanica] species from Afghanistan (contributions to the flora of Afghanistan, IX). Mitt-Bot-Staatssamml-Munch 12: 357-59.
109. ———. 1981. Neue Arten aus Afghanistan. Beitrage zur flora von Afghanistan. XIII. Mitteilungen Der Botanischen Staatssammlung Muenchen 17: 477-84.
110. ———. 1970. Neue und bemerkenswerte Arten aus nordost-Afghanistan. II. (Beitrage zur Flora von Afganistan 5) (New and noteworthy plant species from northeastern Afghanistan. II. (Contribution to the flora of Afghanistan 5). Munich. Bot, Staatssamml-Mitt 8, no. 1: 165-89.
111. ———. 1973. Neue und bemerkenswerte Astragalus-Arten aus Afghanistan (Beitrage zur Flora von Afghanistan VI.) (New and noteworthy Astragalus species from Afghanistan (contribution to the flora of Afghanistan VI). Mitt-Bot-Staatssamml-Munch 11: 259-321.
112. ———. 1980. Neue und bemerkenswerte Caryophyllaceen aus Afghanistan. Beitrage zur Flora von Afghanistan XI. (New and noteworthy Caryophyllaceae from Afghanistan. Contributions to the flora of Afghanistan XI). Mitt-Bot-Staatssamml-Munch 16: 529-46.
113. ———. 1975. Zur Kenntnis der Chenopodiaceen--Flora Afghanistans (Beitrage zur Flora von Afghanistan VII). (Contribution to the flora of Afganistan VII. Study of the Afghanistan Chenopodiaceae). Mitt-Bot-Staatssamml-Munch 12: 51-90.
114. Podlech, D., and O. Anders. 1976. Nachtrage und Ergänzungen zur Graserflora von Afghanistan (Beitrage zur Flora von Afghanistan VIII) (Additions and supplements to the grass flora of Afghanistan (contributions to the flora of Afghanistan VIII)). Mitt-Bot-Staatssamml-Munch 12: 299-334.
115. Podlech, D., and K. Yarmal. 1980. Die Unkrautflora der Reisfelder Ost- und Nordostafghanistans. (The weed flora of the rice fields of eastern and northeastern Afghanistan). Mitt-Bot-Staatssamml-Munch 16: 463-70.
116. Poelt, J., and V. Wirth. 1868. Flechten aus dem nordöstlichen Afghanistan gesammelt von H. Roemer im Rahmen der Deutschen Wakhan-Expedition 1964. Mitt. Bot. Staatssamml. München 7: 219-61.
117. Rechinger, K. H. nd. Flora iranica; Flora des Iranischen Hochlandes und der Umrahmenden Gebirge, Persien, Afghanistan, Teile von West Pakistan, Nord-Iraq, Azerbaidjan, Turkmenistan. Graz: Akademische Druck und Verlagsanstalt.
118. ———. 1981. The genus *Mesostemma*, *Caryophyllaceae*, in the flora of Iran and Afghanistan. Plant Systematics & Evolution 137, no. 1-2: 135-38.
119. Riedl, H., and H. Freitag. 1972. Drei neue Boraginaceen-Species der Flora von Afghanistan. Plant Systematics and Evolution 120, no. 1-2: 137-42.

120. Riehmer, E., I. Haeckel, and W. Troll (eds). 1938. Lichenes, pp. 13-25. Botanische Ergebnisse der deutschen Hindukusch-Expedition, 1935: (eds) Haeckel I., and W. Troll. Vol. 108. Repertorium spec. nov. regni veg. Beih.
121. Robinett, D., D. Miller, and D. Bedunah. 2008. Central Afghanistan Rangelands: a history of tribal rule, grazing, war and rebuilding. *Rangelands* 30, no. 2, April.
122. Sadat, F. 1989. Revision of selected critical genera of the Boraginaceae from the flora of Afghanistan. *Mitteilungen Der Botanischen Staatssammlung Muenchen* 28: 1-210.
123. Sayer, J. A., M. S. Yunus, and J. Y. Larsson. nd. The flora of Afghanistan. [Web page, accessed February 2006]. Available at <http://fwie.fw.vt.edu/afghanistan/Flora.htm>.
124. Scholz, H. 1988. Eine neue *Stipagrostis* (Gramineae) aus den Sand-Wusten Irans und Afghanistans. *Willdenowia. Berlin-Dahlem : Botanischer Garten Und Museum.* 17, no. 1 - 2: 107-09.
125. Sharma, G. K., and C. Clary. 1989. Ethnobotany and cuticular dynamics of alpine flora in central Asia. *J. Ethnobiology* 9, no. 2: 251.
126. Steiner, M., and H. Mayrhofer. 1987. Flechten aus Afghanistan - IV. Die Gattungen *Buellia*, *Dimelaena* und *Rinodina*. *Nova Hedwigia* 45, no. 3-4: 315-26.
127. Steiner, M., and J. Poelt. 1987. Drei parasitische Flechten auf *Caloplaca polycarpoides*. *Plant Systematics Evolution* 155: 133-41.
128. ———. 1984. Flechten aus Afghanistan I. *Acarospora* subgen. *Acarospora*. *Nova Hedwigia* 39: 559-67.
129. ———. 1986. Flechten aus Afghanistan. II. Die Laub- und Strauchflechten. (Lichens from Afghanistan. II. Foliaceous and fruticose lichens). *Nova-Hedwigia-Z-Kryptogamenkd* 42, no. 2/4: 213-36.
130. ———. 1986. *Lichenotheca Afghanistanica*. Faszikel 1. Graz: Institut für Botanik.
131. ———. 1987. *Lichenotheca Afghanistanica*. Faszikel 2. Graz: Institut für Botanik.
132. ———. 1988. *Lichenotheca Afghanistanica*. Faszikel 3. Graz: Institut für Botanik.
133. Toderich, K., and T. Tsukatani. 2005. *Water/Pasture Assessment of Registan Desert (Kandahar and Helmand Provinces)*. Kyoto Japan: Kyoto University.
134. Uotila, P. 1993. Taxonomic and nomenclatural notes on *Chenopodium* in the Flora Iranica area. *Annales Botanici Fennici* 30, no. 3: 189-94.
135. Volk, O. H. 1955. Afghanische drogen. *Planta Medica (Stuttgart)* 3: 171-78.
136. ———. 1954. Klima und Pflanzenverbreitung in Afghanistan. *Vegetatio (Den Haag)* 5/6: 422-33.
137. Wendelbo, P. 1970. Flora des iranischen Hochlandes und der umrahmenden Gebirge; Persien, Afghanistan, teile von West-Pakistan, Nord-Iraq, Azerbaidjan, Turkmenistan: *Amaryllidaceae* (Flora of the Iranian highland and the surrounding mountains, Persia, Afghanistan, parts of West Pakistan, North Iraq, Azerbaijan, Turkmenia: *Amaryllidaceae*). *Flora Iranica.* 67: 1-8.
138. Wendelbo, P. 1966. Trekk av Afghanistans plantegeografi. *Botanica Gothoburgensia* 5: 1-20.

139. ———. 1969. Two new species of iris from Afghanistan. *Studies in the flora of Afghanistan*-- 10. Bot. Notes 122, no. 2: 204-06.
140. Zielinski, J. 1989. *Bergia aestivosa* (Elatinaceae), a new species for the flora of Afghanistan. *Willdenowia*. Berlin-Dahlem, W. Ger.: Botanischen Garten Und Museum 19, no. 19: 165-67.
141. Zohary, M. 1973. *Geobotanical Foundations of the Middle East*. Stuttgart: Gustav Fischer Verlag; 2 vols.

## Fungi

1. Batra, L. R. 1983. Edible Discomycetes and Gasteromycetes of Afghanistan, Pakistan and northwestern India. *Biologia (Pakistan)* 29, no. 2: 293-304.
2. Geerken, H. 1978. Zur Mykologie Afghanistans. *Afghanistan Journal* 5: 6-8.
3. Mochtar, S. G., and H. Geerken. 1979. Die Halluzinogene Muscarin und Ibotensäure im Mittleren Hindukusch: Ein Beitrag zur volkheilpraktischen Mykologie. *Afghanistan Journal* 6: 62-65.
4. Watling, R., and N. M. Gregory. 1977. Larger fungi from Turkey, Iran and neighboring countries. *Karstenia* 17, no. 2: 59-72.

## Environmental Description

1. Ahmadi, A. N., A. W. Modaqiq, A. Khairzad, A. G. Ghoryani, and G. M. Malikyar. 2000. The status of the environment in Afghanistan. Kabul: Save the Environment Afghanistan (SEA).
2. Azimi, A., and D. McCauley. 2002. Afghanistan's environment in transition. Asian Development Bank. 32 pp.
3. Connolly, E. 1840. Sketch of the physical geography of Seistan. *J. Asiatic Soc. Bengal* 9, no. 2: 710-25.
4. Groombridge, B. (ed.). 1992. *Global Biodiversity: Status of the Earth's Living Resources*. 594 pp. London: Chapman and Hall.
5. Groombridge, B., and M. Jenkins (eds.). 1994. *Biodiversity Data Sourcebook*. WCMC, UNEP, IUCN, WWF.
6. ———. 2002. *World Atlas of Biodiversity: Earth's living resources in the 21st century*. 3440 pp. University of California Press.
7. Habibi, K. 2002. Physiography. Web page. Available at <http://fwie.fw.vt.edu/afghanistan/Physiography.htm>.
8. Habibi, K. nd. The war in Afghanistan and its affect on wildlife. Web page. Available at <http://fwie.fw.vt.edu/afghanistan/WarandWildlife.pdf>.
9. Kamber, M. 2002. Afghanistan's environmental casualties. Web page [accessed February 2006]. Available at [http://www.motherjones.com/news/feature/2002/03/afghan\\_enviro.html](http://www.motherjones.com/news/feature/2002/03/afghan_enviro.html).
10. Kirby, A. 2003. War 'has ruined the Afghan environment'. Web page [accessed January 2003]. Available at <http://news.bbc.co.uk/1/hi/sci/tech/2704989.stm>.

11. MacPherson, N. 1991. Opportunities for improved environmental management in Afghanistan. Report of an IUCN mission under contract to the Office for the Coordination of United Nations Humanitarian and Economic Assistance Programmes relating to Afghanistan.
12. Saba, D. 2001. Afghanistan: Environmental degradation in a fragile ecological setting. *Int. J. Sustain. Dev. World Ecol.* 8: 279-89.
13. Sayer, J. A., and A. P. M. Van der Zon. 1981. National Parks and Wildlife Conservation, Afghanistan. A Contribution to a Conservation Strategy. Rome: FAO; Technical Report.
14. UNEP. 2003. Afghanistan: Post-conflict environmental assessment. 176 pp. Geneva, Switzerland: United Nations Environment Programme.
15. ———. 2008. Biodiversity and Wetlands Working Group: final thematic report. UNEP and GEF.
16. Zahler, P. 2003. Top-down meets bottom-up: conservation in a post-conflict world. *Conservation in Practice* 4, no. 1: 23-29.

## **Environmental Policy**

1. Adil, A. W. 2001. The Integration of Biodiversity into National Environmental Assessment Procedures: National Case Studies: Afghanistan. Biodiversity Support Programme (UNDP, UNEP, GEF).
2. ———. 2000. National Biodiversity Strategies and Action Plans (NBSAP): Afghanistan. 1st Workshop on National Biodiversity Strategies & Action Plans in Northeast and East Central Asia: Experience and Lessons; 26 - 28 April; Beijing, China.
3. MacPherson, N. 1991. Opportunities for improved environmental management in Afghanistan. Report of an IUCN mission under contract to the Office for the Coordination of United Nations Humanitarian and Economic Assistance Programmes relating to Afghanistan.
4. Petocz, R. G. 1973. Reorganization and improvement of the Marco Polo sheep hunting programme. Unpublished Report to the Government of Afghanistan.
5. Sayer, J. A., and A. P. M. Van der Zon. 1981. National Parks and Wildlife Conservation, Afghanistan. A Contribution to a Conservation Strategy. Rome: FAO; Technical Report.
6. Shank, C. C., and J. Y. Larsson. 1977. A Strategy for the establishment and development of Band-e-Amir National Park. FO: DP/AFG/741016. FAO.
7. Shank, C. C., R. G. Petocz, and K. Habibi. 1977. A preliminary management plan for the Ajar Valley Wildlife Reserve. Field Report. FAO.
8. UNEP. 2003. Afghanistan: Post-conflict environmental assessment. 176 pp. Geneva, Switzerland: United Nations Environment Programme.
9. ———. 2008. Biodiversity and Wetlands Working Group: final thematic report. UNEP and GEF.
10. Zahler, P. 2003. Top-down meets bottom-up: conservation in a post-conflict world. *Conservation in Practice* 4, no. 1: 23-29.

## **Forestry**

1. Anonymous. nd. Afghanistan, forests and forestry. Web page. Available at <http://www.iranica.com/articles/sup/AfghanistanForestry.html>.
2. Chandrasekharan, C. 1988. Forests and Forestry in Afghanistan. Web page, [accessed April 2006]. Available at [http://www.fao.org/documents/show\\_cdr.asp?url\\_file=/DOCREP/003/Y1797E/y1797e06.htm](http://www.fao.org/documents/show_cdr.asp?url_file=/DOCREP/003/Y1797E/y1797e06.htm).
3. Nedialkov, S. T. 1976. Ecological and silvicultural study about the forestry vegetation of Kunar region. FAO.
4. Tandon, J. C. 1988. Forest and Forestry in Afghanistan: Sector Review. FAO Project

## **Livestock**

1. Khan, U-u-N., and M. Iqbal. 2002. Role and size of livestock sector in Afghanistan. Web page. Available at [http://inweb18.worldbank.org/SAR/sa.nsf/Attachments/95/\\$File/afLvstk.pdf](http://inweb18.worldbank.org/SAR/sa.nsf/Attachments/95/$File/afLvstk.pdf).
2. Toderich, K., and T. Tsukatani. 2005. Water/Pasture Assessment of Registan Desert (Kandahar and Helmand Provinces). Kyoto Japan: Kyoto University.



## **Further information**

*Further technical information may be obtained from the UNEP Post-Conflict and Disaster Management Branch website:  
<http://postconflict.unep.ch/>*



UNEP



NEPA



GEF