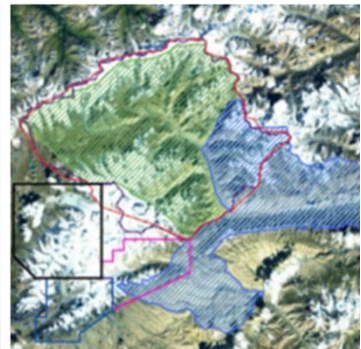


centerra**GOLD**



Biodiversity Management Strategy and Plan

Revised Version: December 2017



Approved By:

Dan Desjardins, President _____

Date: _____

Kumtor Gold Company

Table of Contents

1	Executive Summary	1
1.1	Biodiversity Policy	1
1.2	Background.....	1
1.3	Regional biodiversity context	1
1.4	Brief History	2
1.5	Biodiversity Management Strategy and Plan (BMSP)	2
1.6	BMSP Structure	3
1.7	Contact	3
2	Regional Biodiversity Context	4
2.1	Kumtor’s Land Use	4
2.2	Regulatory Context	4
2.3	Kumtor and the Sarychat Ertash Reserve.....	8
2.4	Summary of Regional Biodiversity	8
2.4.1	Fauna	9
2.4.2	Flora.....	11
2.5	Climate Change	14
3	Cultural Heritage and Sites.....	17
3.1	Cultural sites	17
3.2	Natural sites.....	17
3.3	Cultural Heritage.....	18
4	Stakeholders.....	19
4.1	Introduction	19
4.2	Regulators.....	19
4.3	Financial Stakeholders.....	19
4.4	Local Communities.....	19
4.5	Hunting and Tourism.....	21
4.6	Other Key Stakeholders.....	22
5	Biodiversity Management Strategy	23
5.1	Introduction	23
5.2	Policy and Operating Standards.....	24

5.3	Environmental Management System.....	25
5.4	Climate Change	25
5.5	Mine Closure.....	25
5.6	Engagement and Communications	26
6	Proposed Biodiversity Management Plan.....	27
6.1	Policies, Operational Standards and Instructions	27
6.2	Further Reduce and Mitigate Operational Impacts	27
6.3	Initial Screening of Exploration Projects	28
6.4	Monitoring and Inventories.....	29
6.5	Biodiversity and Mine Closure	30
6.6	Climate Change	31
6.7	Partnerships and Communications	31
7	Biodiversity Enhancement Opportunities.....	34
7.1	Introduction	34
7.2	Kumtor Biodiversity Research Center	34
7.3	Research Focused on Regional Flora.....	35
7.4	Species Specific Support Initiatives.....	35
7.5	Information Technology and Systems.....	36
7.6	Ecotourism Strategy and Planning	36
7.7	Veterinary Health of Regional Livestock	37
7.8	Collaboration to Address Regional Biodiversity Threats	37
7.9	Wetland Protection and Enhancement Initiative	38
7.10	Support of Regional and National Protected Areas	38
7.10.1	Sarychat Ertash Nature Reserve.....	38
7.10.2	Proposed Khan Tingri Nature Reserve.....	39
7.10.3	Naryn Nature Reserve	39
8	References.....	42

List of Tables

Table 1: Key species of mammals reported in Kumtor region.....	10
Table 2: Notable bird species recorded in the SCER (draft) Management Plan	11
Table 3: Opportunities to improve stakeholder engagement and communication channels	33
Table 4: Summary of Proposed Kumtor Biodiversity Enhancement Portfolio.....	40

List of Figures

Figure 1: General location map of the Kumtor Mine in the Kyrgyz Republic	5
Figure 2: Location of Kumtor Concession, exploration licenses, SCER and planned buffer zones	6
Figure 3: Location of Kumtor, Exploration License Area, SCER and designated hunting areas	7
Figure 4: Distribution of eight major floral habitat types in the Sarychat Ertash Nature Reserve	12
Figure 5: Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change	16
Figure 6: Moraine boulder with vandalized petroglyphs at 14 km distance from the Kumtor Mine	18
Figure 7: Livestock grazing during summer in high altitude pastures en route to the Kumtor mine	20
Figure 8: Headquarters of SCER (left) visited en route to Ak Shyrak (right) in October 2012	21
Figure 9: Hunting Camp located approximately 20 km from the SCER headquarters.	22
Figure 10: Moving Kumtor’s BMSP from compliance to innovation	23
Figure 11: Identifying opportunities for biodiversity conservation or enhancement (from S. Johnson in ICMM, 2006)	24

List of Appendices

Appendix 1: Legal Basis of Biodiversity Conservation in the Kyrgyz Republic (cut off 2008)	45
Appendix 2: International Conventions and Agreements (cut off 2008)	48
Appendix 3: Summary of 19 October 2012 Biodiversity Focus Group Meeting in Bishkek (English).....	50
Appendix 4: Program and Participants of Kumtor’s October 2012 Biodiversity Focus Group Meeting	58
Appendix 5: Plant Species found in the region of the Kumtor Mine Site (G. Lazkov, 1992, in Russian)	60
Appendix 6: Revised Management Plan for the SCER approved by KR government in 2016	677
Appendix 7: Kumtor Biomonitoring Quality Assurance and Quality Control Protocol	136

Photo credits (cover page, clockwise): Snow leopard trap camera picture provided by FFI / Panthera; mine site, argali (Marco Polo sheep) and petroglyphs from KGC; map and livestock from Ak Shyrak provided by Prizma.

Abbreviations

AER	Annual Environmental Report	KBRC	Kumtor Biodiversity Research Center
BE	Biodiversity Enhancement	KGC	Kumtor Gold Company
BEP	Biodiversity Enhancement Portfolio	KOC	Kumtor Operating Company
BMSP	Biodiversity Management Strategic Plan	KR	Kyrgyz Republic
BMY	Balykchy Marshaling Yard	Kumtor	KOC or KGC
Bpy	Before present year	LEAD	Leadership for Environment and Development
CBD	Convention on Biological Diversity	LLC	Limited Liability Company
CCP	Conceptual Closure Plan	LOM	Life of Mine
CDP	Carbon Disclosure Project	MAC	Mining Association of Canada-
Centerra	Centerra Gold Inc.	Masl	meters above sea level
CITES	Convention on International Trade of Endangered Species	Mbs	meters below surface
CSR	Corporate Social Responsibility	mg/l	milligrams per liter
EBRD	European Bank for Reconstruction & Development	MOU	Memorandum of Understanding
EHS	Environment, Health & Safety	MP	Management Plan
EIA	Environmental Impact Assessment	NAS	National Academy of Science of KR
EMAP	Environmental Management Action Plan	NBSAP	National Biodiversity Strategy and Action Plan
EMS	Environmental Management System	NGO	Non-governmental Organization
FFI	Fauna and Flora International	PS	IFC Performance Standard
GIIP	Good International Industry Practice	Prizma	Prizma LLC
GIS	Geographical Information System	RLC	Regional Liaison Committee
Ha	Hectares	SCER	Sarychat Ertash Reserve (<i>Zapovednik</i>)
ICMM	International Council on Mining and Metals	SCEZ	Sarychat Ertash <i>Zapovednik</i>
ICR	Interagency Commission Report	SOE	State Owned Enterprise
IFC	International Finance Corporation	UN	United Nations
ISLT	International Snow Leopard Trust	UNFCCC	UN Framework Convention on Climate Change
IUCN	International Union for the Conservation of Nature	UNDP	United Nations Development Program
PCR	Parliamentary Commission Report	WWF	World Wildlife Fund
		Zapovednik	Reserve or Nature Reserve

1 Executive Summary

1.1 Biodiversity Policy

Kumtor is committed to contributing to the protection and conservation of biodiversity, including the application of integrated approaches to land-use planning throughout the mining lifecycle in line with Good International Industry Practice. Kumtor also recognizes the need for and value of dialogue with local stakeholders, and to reduce or eliminate significant impacts on biodiversity and ecosystem services. Where feasible, Kumtor also seeks to identify opportunities to enhance and improve local ecosystems and related economic development.

1.2 Background

Centerra Gold Inc.'s (Centerra) Kumtor Project is the largest gold mine operated in Central Asia by a Western-based company. Approximately 27% of Centerra Gold's shares (listed on the Toronto Stock Exchange) are owned by Kyrgyzaltan, a Kyrgyz state-owned enterprise. Kumtor is an open pit mine and has been producing gold since 1997. Kumtor's current Life of Mine (LOM) is 2026.

KGC invited Prizma LLC (Prizma) to support the development of this Biodiversity Management Strategy and Plan (BMSP). As part of this process, Prizma facilitated a biodiversity focus group meeting (workshop) in Bishkek in October 2012. A summary of the meeting is contained in Appendix 3. Prizma's experts had previously visited the Kumtor mine site numerous times. Prizma also conducted a site visit to the Sarychat Ertash Nature Reserve (SCER), so-called "hunting camps" (also referred as "hunting farms") and Kumtor's exploration license areas. Prizma also discussed draft versions of this BMSP with Kumtor and Centerra Gold. These activities and input helped shape this BMSP.

1.3 Regional biodiversity context

The Kumtor mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated Tien Shan region. This region features a number of rare and endangered species, which are detailed further in this report, including the threatened snow leopard. The Kyrgyz Government established the Sarychat Ertash Nature Reserve (SCER), a *Zapovednik*¹, adjacent to the Kumtor project in 1995. The SCER also serves as a 'core zone' for the UNESCO Issyk-Kul Biosphere Reserve, which was established in 2001. Large areas have also been designated for as hunting areas and several of these surround the SCER and overlap with the planned Buffer Zones and Kumtor's former exploration license areas. The latest and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic is dated 2008, which is expected to be updated in 2013.

¹ *Zapovednik* describes a "Protected Area - sacred, protected from disturbance, committed to heritage" intended to be kept "forever wild", originating in Soviet era where strong restrictions limit access to scientific research, education and management activities. Historically, no tourism has been allowed in most *Zapovedniks* and this restriction continues today in Kyrgyzstan.

1.4 Brief History

Kumtor, along with its multilateral lenders, have been involved in a number of collaborative, grant-funded and conservation-oriented projects. These have been largely supported, developed or implemented by national and international non-governmental organizations (NGOs), local communities, staff of the SCER and other experts.

This process started with the review of Kumtor's EIA by the International Snow Leopard Trust in 1995 on behalf of multilateral lenders. This resulted in Kumtor's adoption of no-hunting policies and support for conservation NGO-led capacity building and monitoring programs. Over the past 15 years, grant-funded and NGO/expert-supported studies and surveys associated with Kumtor and the SCER have generated relatively large amounts of biodiversity baseline and monitoring information which almost certainly exceed the information available from all other Kyrgyz *Zapovedniks*.

The results of these studies have confirmed that issues such as poaching and lack of institutional support have been, and continue to be, the main risks and barriers to broader wildlife biodiversity conservation. The data also confirms a substantial rebound (increase) in numbers of snow leopards, Siberian ibex and Marco Polo sheep (argali). However, more recently, some stakeholders have raised concerns about Kumtor's exploration activities within the context of so called "Buffer Zones" to the SCER, and potential impact on certain flora.

There appears to be some misinformation as to the exact boundaries, size and legal standing of these "Buffer Zones". The Kumtor Concession predates the establishment of the SCER by the KR government. The size of the SCER is well defined and does not include any designated buffer zones. However, in 1999 a Resolution of the regional Jety-Oguz District Administration established a "Buffer Zone" to the SCER. To date, this designation has not been approved by the KR government, as required by KR Law 182. This issue is expected to be addressed in the 2013 revision of the KR National Biodiversity Strategy and Action Plan (NBSAP). However, the presence and location of these "Buffer Zones" (and related issues) do not seem to relate to material biodiversity risk and impacts, as also confirmed during the October 2012 biodiversity stakeholder workshop.

In the long term, the projected Climate Change effects to regional biodiversity of Central Asia, which exhibits the characteristics of island biogeography, are expected to be dramatic. In Kyrgyzstan, up to 95% of glaciers are expected to disappear by the end of this century and boundaries of ecosystems (for example, the tree lines) are expected to shift significantly.²

1.5 Biodiversity Management Strategy and Plan (BMSP)

Kumtor has identified the need to develop this formalized BMSP for three main reasons. First, Kumtor plans to further integrate the aspect of biodiversity into its Environmental Management System (EMS) and Conceptual Closure Plans (CCP) in line with its corporate policies and evolving Good International Industry Practice (GIIP). Second, Kumtor views biodiversity conservation and related enhancements as important leadership and stewardship opportunities to exceed its corporate 'zero harm goal' and, if

² Forrest, Jessica, L. et al. Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation*, 150: (2012) 129-135.

feasible, generate net-positive sustainability outcomes. This will provide an opportunity to move from compliance oriented approach towards generating broader biodiversity additionality (biodiversity enhancement and upside). This approach is also expected to innovate the mining sector and its approach to biodiversity conservation in the Kyrgyz Republic. Third, a more structured program is expected to facilitate collaboration and communication with conservation partners and other stakeholders interested in Kumtor's biodiversity impacts.

The key components of the Kumtor's BMSP identified at this time include three work-streams. First, updating Kumtor's environmental and closure policies, systems, plans and reporting to further integrate (mainstream) biodiversity aspects. Second, conclude a multi-year partnership through a Memorandum of Understanding (MOU) and related funding commitment with an international conservation NGO active in Kyrgyzstan. Third, through this partnership, support and co-finance the validation and implementation of the SCER's (Draft) Management Plan and related and/or broader research and monitoring programs. This includes plans for a seamless integration of Kumtor's obligatory biodiversity related studies and monitoring with those of the SCER's annual work/action plans. Kumtor will also pursue Biodiversity Enhancement (BE) opportunities and a related portfolio of projects and programs to promote net-positive biodiversity actions have been identified and presented in this document.

Subject to support by the Kyrgyz Government, Kumtor's medium and long-term elements of the BMSP are expected to increasingly focus on leveraging the outcomes of its partnership and research activities to collaboratively develop a sustainable post-closure land use strategy that might include biodiversity, ecosystem services, Climate Change research and eco-tourism.

1.6 BMSP Structure

This BMSP contains eight Sections. Following this Executive Summary, the regional biodiversity context and cultural heritage issues are summarized in Sections 2 and 3, respectively. Section 4 describes the key stakeholders and Appendix 3 contains the summary of the biodiversity focus group meeting conducted on 19 October 2012 in Bishkek. Kumtor's Biodiversity Management Strategy and Plan are contained in Sections 5 and 6, respectively. These cover also partnership and communication. A proposed Biodiversity Enhancement portfolio is presented in Section 7. Key references used are provided in Section 8.

1.7 Contact

Kumtor welcomes your comments and questions about this BMSP and all related activities. Please direct your communication by email to environment@kumtor.com.

2 Regional Biodiversity Context

2.1 Kumtor's Land Use

Centerra Gold Inc.'s (Centerra) Kumtor Project is the largest gold mine operated in Central Asia by a Western-based company. Approximately 33% of Centerra Gold's shares (listed on the Toronto Stock Exchange) are owned by Kyrgyzaltan, a Kyrgyz state-owned enterprise. Kumtor is an open pit mine and has been producing gold since 1997. Prior to its development, the Kumtor project was subject to an Environmental Impact Assessment (risk assessment), an 'Expertisa Review' by the Kyrgyz regulatory authorities, and due diligence by international lenders (including EBRD, IFC and EDC). Kumtor's current Life of Mine (LOM) has been recently expanded to 2026.

The Kumtor Mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated region. The general location of Kumtor is shown in Figure 1. The Kumtor Concession, the SCER and planned buffer zones are depicted in Figure 2. Until mid-2012, the Kumtor Gold Company maintained two exploration licenses which are also depicted in Figure 2. These comprised the Karasay License (125 km²) and the Koendy (Koenduu) License (134 km²). The Kyrgyz Government rescinded these exploration licenses in mid-2012. KGC's exploration license areas overlap other land use designations, including planned "buffer zones" to the SCER. The relevant ecosystems are summarized further below. The Kumtor Concession and the SCER are surrounded by designated hunting areas, known as hunting camps or farms. These are depicted in Figure 3.

The operation is supplied from a marshaling yard located in the industrial center of the city of Balykshy on the western edge of Lake Issyk-Kul. Trucks deliver their goods via paved roads along the southern shores of Lake Issyk-Kul, where, near the village of Barskaun (or Barskoon), Kumtor's trucks exit the paved road and move along a technical (gravel) road for about 95 km along the Barskaun and Arabel rivers through the Barskaun valley and pass to reach the mountain valley plateau leading further up to the mine site.

2.2 Regulatory Context

The Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic was prepared for submission to the Convention Secretariat on Biodiversity in 2008. This report details also the legal basis for biodiversity conservation and relevant International Conventions and Agreements. These are reproduced in Appendix 1 and Appendix 2, respectively. The KR State Agency of Environment Protection and Forestry Management published its Fifth National Report on Conservation of Biodiversity in 2013.

Figure 1: General location map of the Kumtor Mine in the Kyrgyz Republic



Figure 2: Location of Kumtor Concession, exploration licenses, SCER and planned buffer zones

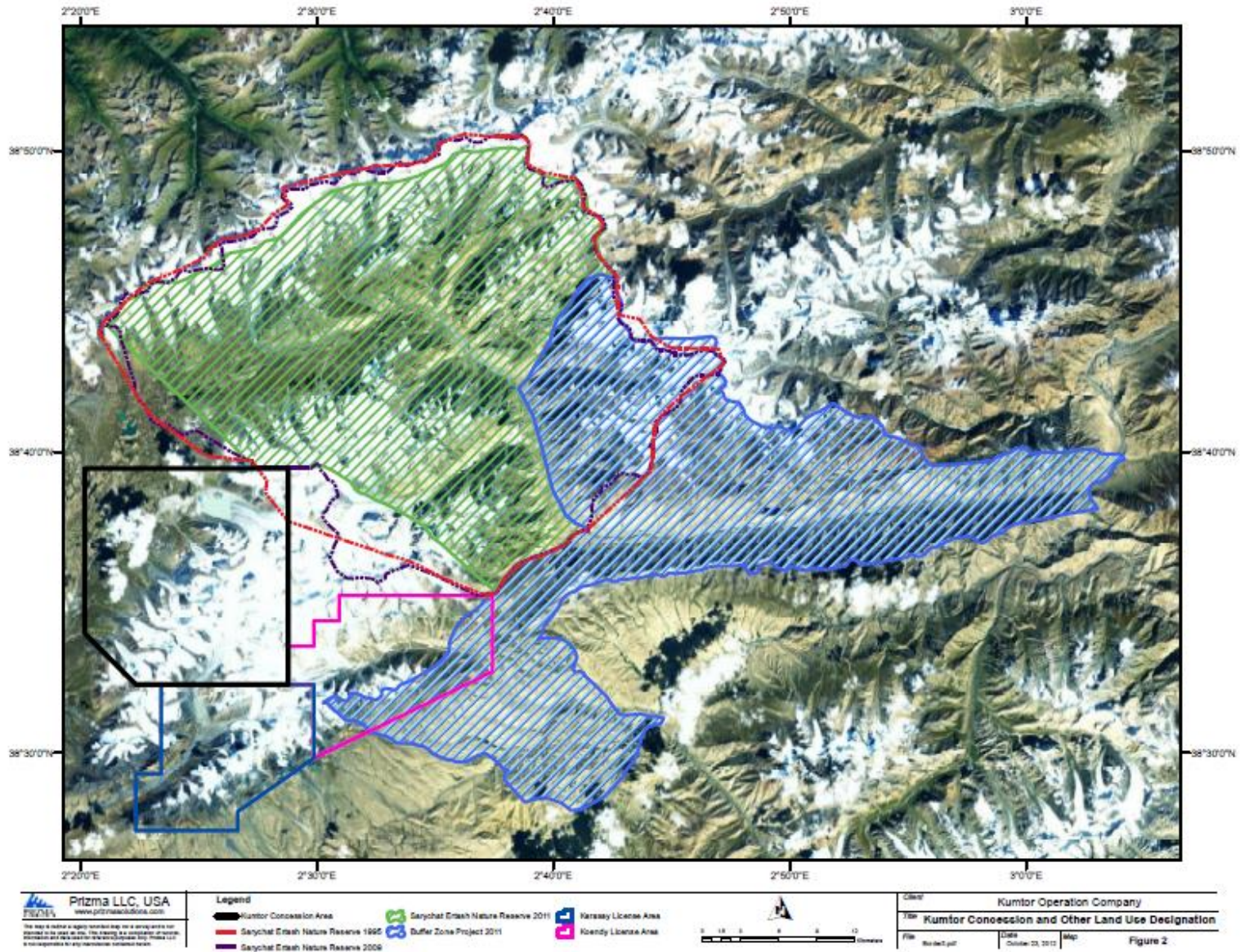
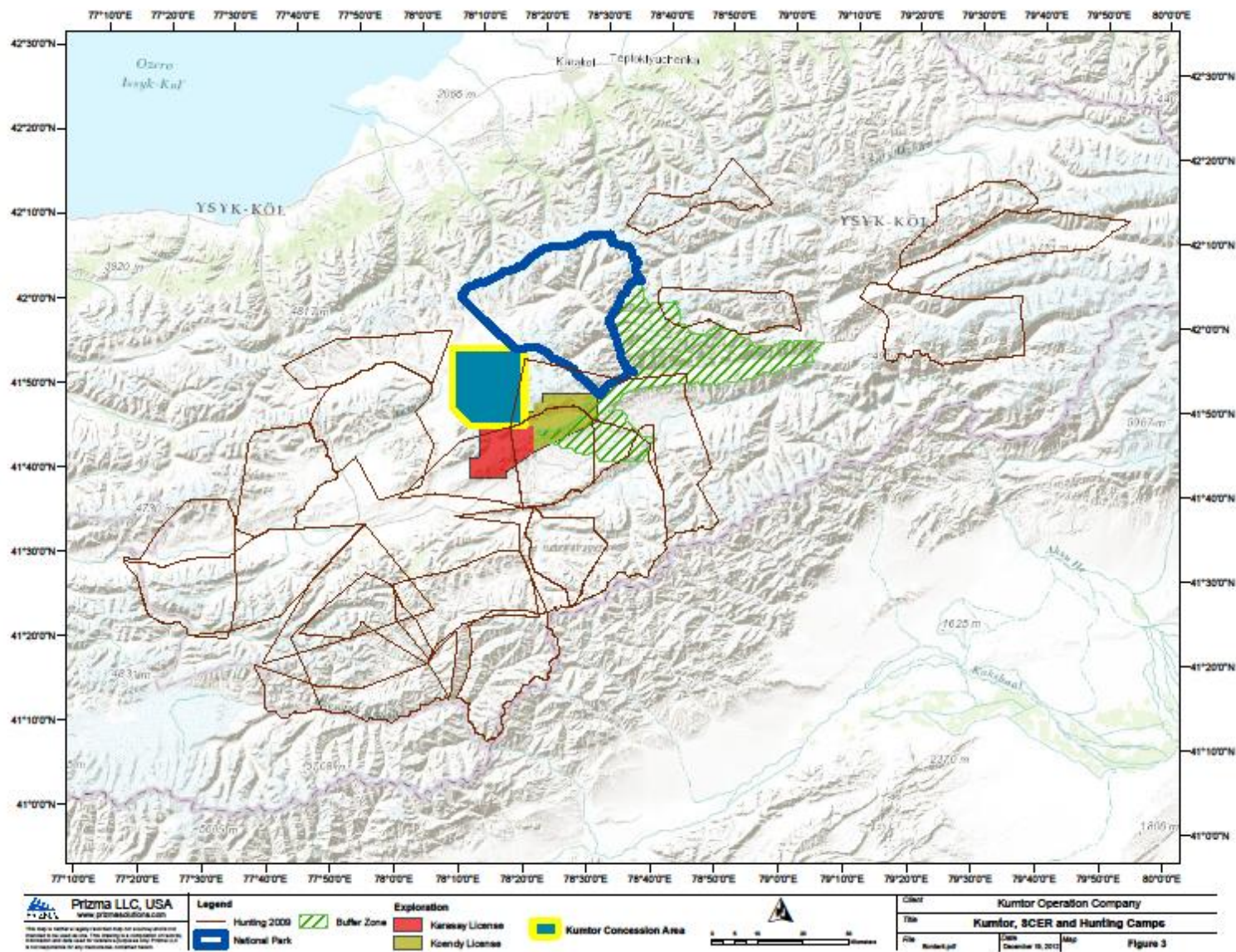


Figure 3: Location of Kumtor, Exploration License Area, SCER and designated hunting areas



2.3 Kumtor and the Sarychat Ertash Reserve

Prior to the onset of the Kumtor Concession and the Kumtor Mine there was no formally protected area. There was, however, a study area to justify establishment of a mountain nature reserve at the junction of the Central and Inner Tien Shan Mountains, when Kyrgyzstan was still a Republic of the USSR.

The EIA generated for the Kumtor operation in 1993 had identified the presence of a number of “Kyrgyz Red Book” and IUCN Red Listed species (meaning species considered to be Vulnerable, Threatened, Rare and/or Endangered), adding to earlier Soviet research of the region. A dedicated review by the International Snow Leopard Trust (ISLT) on behalf of multilateral lenders had confirmed that mining activities *per se*, if combined with no-hunting policies and other responsible mining practice, were not believed to be posing a material risk to the regional wildlife biodiversity. Instead, the NGO review identified, *inter alia*, overgrazing in the high-altitude meadows, related and unrelated poaching (high-value species for trophy hunting, traditional medicinal markets and retaliatory killing), and lack of sufficient resources to support conservation efforts as the main biodiversity risks in the region.

This triggered efforts by Kumtor, international lenders and the Kyrgyz Government to formally establish the SCER, which was achieved by Government Decree in 1995. Also, Kumtor – along with other stakeholders such as the EBRD, IFC, FFI and ISLT - were able to directly support conservation initiatives, including through wildlife monitoring activities, support for biodiversity conservation groups, and capacity building in the SCER.

2.4 Summary of Regional Biodiversity

Kyrgyzstan is very rich in biodiversity for its relatively small size, possessing some 2 % of the world’s flora and 3% of the world’s fauna.³ The Kumtor mine is located in a remote, high altitude (about 4,000 m elevation) and partially glaciated Tien Shan region. This region of Eastern Kyrgyzstan includes a large system of rugged mountain ranges extending from China and Kyrgyzstan into India, Pakistan, Uzbekistan and Kazakhstan. From a zoogeographic perspective, this area is part of the Palearctic Realm and constitutes the Mountainous Asian Province of the Southern-Palearctic sub region. The biodiversity of the Central Tien Shan Mountains is internationally recognized for its uniqueness and importance as a high priority region for biodiversity conservation. This region features a number of rare and endangered species, which are detailed further in this report, and include the Vulnerable snow leopard. The Mountains of Central Asia are one of 34 global biodiversity ‘hotspots’⁴.

³ Samanchina, Jarkyn, 2007. Capacity Building of Women in Kyrgyzstan: An example of International Cooperation.

⁴ Mallon, D., Kreuzberg-Mukhina, E., Bykova, L., Kreuzberg, A. 2004. Mountains of Central Asia. In Mittermeier, R. et al. (Editors). *Hotspots Revisited*. Pp. 297-307. Cemex/Conservation International, Washington D.C.

The EIA⁵ for the Kumtor Project describes the baseline environmental parameters observed at the inception of the project in 1993. This includes climate, air quality, ground and surface water resources (including: fishery resources, plankton, benthic macroinvertebrates, aquatic macrophytes, and fish distribution), terrestrial resources (including: soils, vegetation and habitat types and important vegetation species), mammals, birds and reptiles and amphibians. The EIA identified 13 major biodiversity habitat types, including glaciers, permanent snow fields, vegetated and unvegetated slopes, moraines, stream channels, vegetated valleys and others.

This baseline information, which included numbers of target animals observed from aerial surveys, has been supplemented over the years of operation, with monitoring and support of external studies, in addition to information accumulated by the SCER throughout the history of that protected area. Relevant information from the EIA and SCER is summarized below.

2.4.1 Fauna

2.4.1.1 Mammals

The Kumtor EIA reported 18 species of mammals expected to occur at the Mine site, confirming 10 species with direct observation. The 2008 SCER (Draft) Management Plan⁶ (see **Error! Reference source not found.**) reports that 25 species of mammals occur within the SCER boundaries, which also includes elevations substantially lower than the Kumtor Mine concession. The important mammals of the region are listed in Table 1.

The important mammals of the region include: snow leopard (*Panthera uncia*), manul or (Pallas's cat), (*Otocolobus manul*), grey wolf (*Canis lupus*), red fox (*Vulpes vulpes*), brown bear (*Ursus arctos*), stone marten (*Martes foina*), mountain weasel (*Mustela altaica*), least weasel (*Mustela nivalis*), ermine (*Mustela erminea*), steppe polecat (*Mustela eversmanni*), Siberian ibex (*Capra ibex sibirica*), argali (*Ovis ammon*), grey marmot (*Marmota baibacina*), Tian-Shan vole (*Sicista tianschanica*), narrow-headed field-vole (*Microtus gregalis*), tolai hare (*Lepus tolai*), Royle's pika (*Ochotona roylei*) and others. Kumtor recognizes five of these species as indicators for biodiversity monitoring and studies, including the snow leopard, argali, Siberian ibex, grey marmot and the narrow-headed field vole. Mammals listed as KR Red Data Book species include: snow leopard, brown bear, manul and argali. These are also recognized by IUCN. The Convention on International Trade of Endangered Species (CITES) recognized species include: the snow leopard and manul brown bear, grey marmot, red fox, grey wolf, six species of mustelids (ermine and martens) and the argali (Marco Polo sheep).

⁵ Kilborn Western Inc., 1993. Kumtor Feasibility Study and Environmental Impact Assessment.

⁶ Sarychat-Ertash State Reserve Management Plan 2007-2015, Draft Plan, January 2008 for consultation

Table 1: Key species of mammals reported in the Kumtor region⁷

Species		Conservation Recognition			
Common Name	Scientific Name	IUCN Red List	Kyrgyz Red Book	CITES Appendix	CMS Appendix
Snow leopard	<i>Panthera uncia</i>	Vulnerable	YES	I	I
Manul	<i>Otocolobus manul</i>	Near Threatened	YES	II	
Gray wolf	<i>Canis lupus</i>	Least Concern		II	
Red fox	<i>Vulpes vulpes</i>	Least Concern		III	
Brown bear	<i>Ursus arctos</i>	Least Concern	YES	II	
Stone marten	<i>Martes foina</i>	Least Concern			
Mountain weasel	<i>Mustela altaica</i>	Least Concern			
Least weasel	<i>Mustela nivalis</i>	Least Concern			
Ermine	<i>Mustela erminea</i>	Least Concern			
Steppe polecat	<i>Mustela eversmanni</i>	Least Concern	YES		
Siberian ibex	<i>Capra sibirica</i>	Least Concern		III	
Argali	<i>Ovis ammon</i>	Near Threatened	YES	II	II
Grey marmot	<i>Marmota baibacina</i>	Least Concern			
Tien-Shan vole	<i>Sicista tianschanica</i>	Least Concern			
Narrow-headed vole	<i>Microtus gregalis</i>	Least Concern			
Tolai hare	<i>Lepus tolai</i>	Least Concern			
Royle's pika	<i>Ochotona roylei</i>	Least Concern			

2.4.1.2 Aquatic Organisms

Only two species of fish are known to inhabit portions of the Kumtor Mine site. These are: Tian-Shan scaly osman (*Diptychus gymnogaster*) and Tibetan loach (*Nemachilus stoliczkai*). No amphibians or reptiles have been observed in the baseline or subsequent studies at the Kumtor concession, but the SCER (Draft) Management Plan reports one amphibian (*Bufo viridis*) and one taxonomically unidentified species of reptile within the protected area. The EIA and Kumtor monitoring includes sampling of water quality, fish species and other aquatic data (benthic macroinvertebrates, aquatic macrophytes, habitat, plankton, sediments, etc.) from the Kumtor River and Tagai River (further downstream of the Kumtor Mine site). Knowledge of regional aquatic organisms has also been supplemented by recent studies detailed in SCER surveys and reports.⁸

2.4.1.3 Birds

The EIA noted that 194 species of birds may potentially breed in the Kumtor Project area and observed 26 species present during the baseline study activities. The SCER has recorded 84 species of birds in the reserve, including 31 resident species and 55 migratory (or breeding) species. The notable species among these are listed in Table 2 and include golden eagle (*Aquila chrysaetos*), bearded vulture (*Gypaetus barbatus*), Himalayan griffon (*Gyps himalayensis*), Eurasian griffon (*Gyps fulvus*), cinereous

⁷ Kumtor EIA, SCER Draft Management Plan, SCER monitoring report 2009

⁸ Aquatic Fauna of the Sarychat-Ertash Reserve

vulture (*Aegypius monachus*) and saker falcon (*Falco cherrug*). Galliforms include Himalayan snowcock (*Tetraogallus himalayensis*), chukar (*Alectoris chukar*) and Daurian partridge (*Perdix dauuricae*). Ruddy shelduck (*Tadorna ferruginea*) and lesser sandplover (*Charadrius mongolus*) can also be found at mountain lakes. Passerine birds include red-billed chough (*Pyrrhocorax pyrrhocorax*), yellow-billed chough (*Pyrrhocorax graculus*), horned lark (*Eremophila alpestris*), Brandt’s mountain finch (*Leucosticte brandti*), plain mountain finch (*Leucosticte nemoricola*), wallcreeper (*Tichodroma muraria*) and other species. These include four Kyrgyz Red Data Book bird species: golden eagle, bearded vulture, Himalayan vulture and saker falcon. Recent detailed studies of birds in the adjacent SCER have also been recently completed.⁹

Table 2: Notable bird species recorded in the SCER (draft) Management Plan

Species		Conservation Status	
Common Name	Scientific Name	IUCN Red List	KR Red Data Book
Golden eagle	<i>Aquila chrysaetos</i>	Least Concern	listed
Bearded vulture	<i>Gypaetus barbatus</i>	Near Threatened	listed
Himalayan griffon	<i>Gyps himalayensis</i>	Near Threatened	listed
Eurasian griffon	<i>Gyps fulvus</i>	Least Concern	
Cinereous vulture	<i>Aegypius monachus</i>	Near Threatened	
Saker falcon	<i>Falco cherrug</i>	Endangered	listed
Himalayan snowcock	<i>Tetraogallus himalayensis</i>	Least Concern	
Chukar	<i>Alectoris chukar</i>	Least Concern	
Daurian partridge	<i>Perdix dauuricae</i>	Least Concern	
Ruddy shelduck	<i>Tadorna ferruginea</i>	Least Concern	
Lesser sandplover	<i>Charadrius mongolus</i>	Least Concern	
Red-billed chough	<i>Pyrrhocorax pyrrhocorax</i>	Least Concern	
Yellow-billed chough	<i>Pyrrhocorax graculus</i>	Least Concern	
Horned lark	<i>Eremophila alpestris</i>	Least Concern	
Brandt’s mountain finch	<i>Leucosticte brandti</i>	Least Concern	
Plain mountain finch	<i>Leucosticte nemoricola</i>	Least Concern	
Wallcreeper	<i>Tichodroma muraria</i>	Least Concern	

2.4.2 Flora

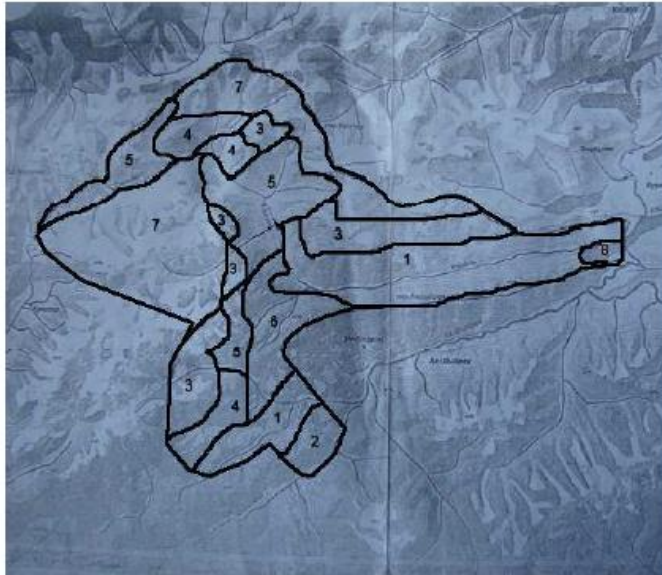
The regional vegetation has evolved under the influence of extreme factors - sharply continental, cold and dry climate, elevation, intensity of solar radiation, open wide flat areas dominated by wind with no snow cover in winter time. This has led to a prevalence of bushy and blanket cover type plants, with a dominance of high altitude, mono-dominant wormwood (*Artemisia*) steppes deserts and shallow *Festuca* steppes.¹⁰

⁹ SCER Survey Report 2009, A.P Vereshagin; 2014, A.T. Davletbakov

¹⁰ SCER MP at 10

The 13 major vegetation habitat identified in the EIA include: Glaciers, High Altitude Pastures, Alpine Belt, Nival Belt, Riparian habitats, Wetland Communities, and Aquatic ecosystems. More recent surveys of the flora of the SCER and adjoining planned buffer zones indicate eight major floral communities in the SCER (see Figure 4), of which five are in close proximity to the Kumtor concession.

Figure 4: Distribution of eight major floral habitat types in the Sarychat-Ertash Nature Reserve¹¹



Legend:

1. Turano-dzungari subshrub deserts, Halophytic communities, Central Asian “gammads” and dry steppes with fragments of white forest and relict large-scale cerials.
2. Meadow-steppes and meadows.
3. Cryoxerophilous cushion plant formations.
4. Cryophile steppes.
5. Cryomesophilous grass carpets (highland waste plots) and saz steppes.
6. Dry steppes and true steppes.
7. Glaciers and Petrophilic vegetation.
8. Mountain taiga.

¹¹ Laskov, Georgy, 2012. State of Flora around the Kumtor Mine. Presentation at Kumtor’s 19 October 2012 Stakeholder Biodiversity Workshop, Bishkek, Kyrgyzstan

The Kumtor EIA recorded 159 species of vascular plants, belonging to 22 families that were collected in the EIA study area, of which 8 were noted to be endemic to the Tien Shan Mountains. The most recent survey of the Kumtor area records 205 species in 33 families. The updated list of plant species, and results of 2012 KGC vegetation monitoring studies are attached as Appendix 5¹² and Appendix 6¹³. In addition, a biophysical map was generated for the EIA identifying 13 distinct habitat types and both terrestrial vegetation and wildlife components were assessed for the environmental baseline including the upper Targai River and the Kumtor River Valley. These baseline studies also included the access roads and utility corridors.

Surveys and studies of regional vegetation are a high priority for the SCER, which reports 118 species presently identified, with this number expected to increase significantly as more of the region is studied. SCER also identifies five altitudinal zones, including more than 30 basic vegetation communities.

Species identified within the SCER and described as endemic to Kyrgyzstan include: *Ranunculus popovii* (species of buttercup), *Ranunculus transiliensis* (buttercup), *Ranunculus brotherusii* (buttercup), *Rhodidola linearifolia* (sedum), *Gagea michaelis* (a lily species), *Taraxacum syrtorum* (dandelion), *Crepls nana* (hawksbeard), *Hedysarum larghisorum* (sweet vetch). *Minuartia stricta* (species of sandwort), a plant endemic to the Tien-Shan and Pamir Mountains, is also documented within the Kumtor Concession.

Hedysarum kirghisorum is the only species encountered that was listed in the Red Book of Kyrgyzstan (1985) at the time of the initial baseline for Kumtor. This plant grows in alpine and subalpine meadows near streams and springs, and along river banks. It has been documented on southwest-facing slopes at three sites in the Kumtor valley including: the Dzukutshak canyon on the Terskey-Alatau ridge, the origin of the Kumtor River on the Akshirak ridge and the Chong-Sarytor Creek canyon on the Akshirak ridge. This species was not included, however, in the most recent edition of the Kyrgyzstan Red Data Book on Endangered Species (2007)¹⁴, but should still be considered in management objectives of KGC.

CITES lists only one species of plant from Kyrgyzstan, which is an orchid (*Cephalanthera longifolia*) not observed with the Kumtor Concession.

2.4.2.1 Invertebrates

Aquatic invertebrates were included in the EIA baseline and subsequent monitoring. In total, 21 taxonomic groups were identified from the Kumtor River during each of the EIA sampling periods (June and July 1993). The Taragay River contained a total of 18 and 16 taxonomic groups in the June and July samples, respectively.

¹²Lazkov, Georgy, 2012.

¹³ Report on soil and vegetation research of Kumtor Mine Site to implement rehabilitation 06/1/2012- 09/30/2012.

¹⁴ Kyrgyz Republic Red Data Book. 2008

The taxonomic diversity and abundance of both the phytoplankton and the zooplankton communities in Petrov Lake are very low. They consist of two genera of phytoplankton and four zooplankton species, which are widespread in the alpine regions of the Tien Shan and Pamir.

The macroinvertebrate community in Petrov Lake is poorly developed, consisting of only two species of chironomids (midges). This is attributed to low water temperatures and the low influx of nutrients from the toe of Petrov Glacier. Samples from the Kumtor River and the Taragay River are dominated by the larval stages of chironomids, both in the numbers of species present and biomass. The following higher taxonomic groups have also been identified from stream samples: Plecoptera (stoneflies), Coleoptera (beetles), Tricoptera (caddisflies), Ephemeroptera (mayflies), Oligochcates (aquatic earthworms), Platyhelminthes (flatworms) and Nematodes (roundworms).

Terrestrial invertebrates in the Kumtor Mine region have been poorly studied and are noted as a priority for surveys by the SCER. Butterflies are widespread in the region and some important high-altitude communities have been identified, including many species believed to be endemic to the Tien Shan region. A survey of the butterflies of SCER reported 17 species including Red Data Book species the swallowtail (*Papilio machoan*) and four species of Apollo (*Parnassius* spp)¹⁵.

2.5 Climate Change

The projected effects from climate change to regional biodiversity of the Central Asian Mountain ecosystems are expected to be among the more dramatic climate driven impacts to biodiversity around the world. Given that the high altitude glaciated areas of Central Asia are residual Ice Age (Pleistocene Era- or 2.5 million bpyto approximately 11,700 bp) formations, and predictions that up to 95 percent of these ancient geographical features will likely disappear in the short span of about 100 years, the scope of change affecting basic habitats, ecosystems, communities and species that have evolved with natural constraints of the harsh and glaciated region is likely to be rapid and dramatic.

Further, the Tien Shan Mountains, together with other Central Asian Mountains (Pamirs and Himalayas) are effectively islands of unique biodiversity, surrounded by the Mongolian and Gobi deserts and lower elevations on all sides. This region exhibits classic characteristics of island biogeography. Therefore, as expected, there are very high levels of endemism and unique species assemblages.

The Kumtor Mine is situated in a partially glaciated region in the Central Tien Shan Mountains. There are five active glaciers adjoining, or partially within the KGC license boundaries. The largest of these is the Petrov Glacier, which also is the source for Petrov Lake, used as a water source for the mine. The others are Davidov Glacier (which is in partial contact with the main pit), Lysyi Glacier (which partially covers the upper portion of the Kumtor deposit), Sary-Tor Glacier and Boordu Glacier. The lowest portions of these glaciers (toes) have an approximate elevation of 3,800 to 3,900 m above sea level (asl).

Combined, these five glaciers currently occupy a surface area of approximately 100 km². As is the case with most glaciers, the ones in and around the Kumtor Mine continue a relatively slow down-slope

¹⁵ Milko, D.M. 2009. Baseline Survey of the Butterflies in Sarychat Ertash State Nature Reserve (Zapovednik, SCEZ).

movement and have a negative mass balance. This means that there is a net loss of glacial ice mass each year.

Over the last 50 years, scientists have documented a significant retreat – or ablation – of all of these glaciers, as has been observed and documented throughout all of Central Asia. These include the discussions and predictions of Climate Change impacts on glaciers across Kyrgyzstan contained in the Second National Communication of the Kyrgyz Republic to the United Nation Framework Convention on Climate Change (UNFCCC) and recent studies by the United Nations Development Program (UNDP).

The predicted state of glaciation in 2025 compared to KR’s glacier catalogue developed in the 1960s is presented in Figure 5. KR’s UN submission notes that for “the Republic as a whole, the reduction of the glaciated area from 64 percent up to 95 percent from year 2000 to year 2100 is predicted, depending on the accepted variant of climatic scenario.”¹⁶

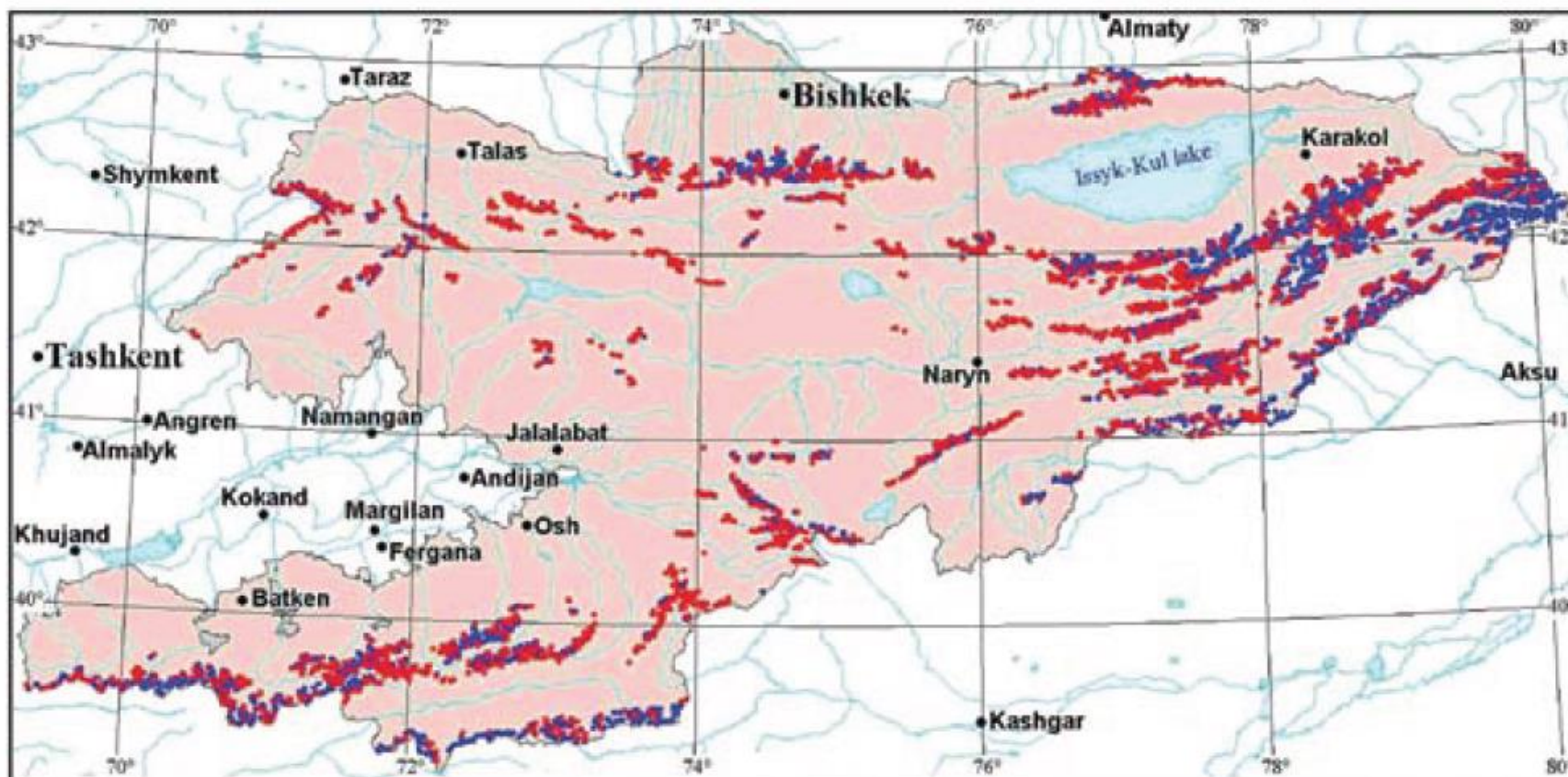
While the most significant impacts on biodiversity in general from climate change in the Tien Shan region are expected to manifest at somewhat lower elevations than the Kumtor Mine and are associated with tree-line shifts to higher relative elevations, higher elevation habitats –such as those in the region of the Kumtor Mine remain important as areas that should be insulated and less vulnerable to impacts. More importantly, areas that have stable populations of important species such as snow leopards and argali become a priority for conservation efforts.¹⁷ Further, current international research points out that it is also essential to identify and address non-climate related anthropogenic threats to biodiversity, that include over-grazing, hunting and other land-use practices.¹⁸

¹⁶ Iliasov, S. and V. Yakimov, 2009.

¹⁷ Forrest, Jessica, L. et al. 2012 Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation* 150 (2012) 129-135.

¹⁸ Op cit.

Figure 5: Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change



Note: Predicted state of glaciation in 2025 in the Kyrgyz Republic due to Climate Change impacts compared to glacier catalogue developed in the 1960s (extinct glaciers marked with red, extant glaciers marked with dark blue). Source: Kyrgyzstan's Second National Communication of the Kyrgyz Republic to the United Nation Framework Convention on Climate Change (UNFCCC).

3 Cultural Heritage and Sites

Cultural heritage aspects of the central Tien Shan region have important historic and on-going influence and relevance to regional biodiversity. Traditional practices of herding in the high-altitude pastures, in addition to hunting and broader perceptions of animals (and more indirectly, vegetation communities) as resources to be exploited are deeply ingrained in local communities and inhabitants. The SCER Management Plan also describes “Sacred Sites” that occur in the region, including cultural and natural sites as detailed further below. None of these is located within the immediate vicinity of the Kumtor mine or related infrastructure. The nearest significant petroglyph pictured below is located approximately 14 km distance from the mine site. Kumtor also maintains Chance Find Operating Instructions. Explorations activities require logging any cultural heritage sites and reporting to the KR Government.

3.1 Cultural sites

There are a number of burial sites within the SCER. These consist of ruined *mazar* and graveyards from different historical periods and various ethnic groups. Tashtar-Ata, a place of worship, is located in the area described as the buffer zone of the SCER, some 12 km from Koenduu SCER headquarters. Other cultural heritage sites include Kalmyk burial grounds and historical *kumbez*. Approximately 8 km from the check-point to the Kumtor mine is a very large glacial moraine boulder that features extensive petroglyphs. This site has experienced partial vandalism and a portion of the petroglyph has been destroyed.

Another important cultural site at a distance of approximately 40 km from the Kumtor Mine is Bedel Pass, which connected Kyrgyzstan to China via Barskaun and Xinjiang Province. Some researchers relate that up to 100,000 Kyrgyz died here during the Urkun (revolt against the Tsar) in 1916. A number of other sites where Kyrgyz who revolted against the Tsar were shot are also places of pilgrimage. A number of other rock paintings, such as the petroglyphs portraying animals and hunting scenes, are also found at Saimaluu-Tash.

3.2 Natural sites

The natural geomorphic processes of alpine rivers and moving glaciers create numerous glacial lakes in the general region of the Kumtor Mine such as Bash-Kel, Achy-Kel and Kyzyl, and natural springs such as those at Eshek-Art, Koiluu, Koenduu and Uch-Kel. According to the SCER Draft Management Plan, all of these are worshiped and considered sacred. In addition, several peaks occur in the region with elevations of 6,000 to 7,000 m and many are revered or considered sacred to some local inhabitants. This includes Khan Tengri, the tallest mountain in Kyrgyzstan. A decree on the establishment of Khan Tengri Nature Park (275,800 ha) was signed on 16 February 2016¹⁹. This Nature Park borders SCER, together forming an extensive protected landscape extending from the Central Tien Shan to the borders

¹⁹ <https://new.wwf.ru/en/resources/news/>

with Kazakhstan and China, and providing connectivity via corridors of movement for many important species.

Figure 6: Moraine boulder with vandalized petroglyphs at 14 km distance from the Kumtor Mine



3.3 Cultural Heritage

Additional activities occurring in the region that pertain to cultural heritage include: subsistence hunting, traditional grazing of livestock in the high-altitude pastures of the region, traditional customs, folk-arts and crafts. These include producing clothing and other objects from felt, leather and other materials, use of native wild berries, nuts and fruits for preserves and fresh food sources. Additionally, long standing cultural perceptions regarding human dominion over wildlife, and animals in general, have a subtle, yet significant, influence on meaningful implementation of conservation measures, particularly pertaining to biodiversity within the greater region.

4 Stakeholders

4.1 Introduction

The presence of threatened, endangered and rare flora and fauna in the broader Kumtor project area, the existence of the SCER (*Zapovednik*) which also serves as the core zone of the Issyk-Kul Biosphere Reserve, and the presence of “hunting camps” which provide opportunity for lucrative international trophy hunting²⁰ mean that a number of stakeholders will be interested in Kumtor’s activities that may be related to biodiversity issues in the region.

As part of the development of this BMSP, a stakeholder focus group meeting was convened in October 2012 in Bishkek. This meeting gathered eminent Kyrgyz experts, representatives from the SCER and the Naryn Reserves, regulators and conservation NGOs. The meeting was facilitated by Prizma, LLC and hosted by KGC. A summary of this workshop generated by a representative of Fauna & Flora International (FFI), along with a list of participants is provided in Appendix 3 and Appendix 4, respectively. Prizma also attended parts of the international Snow Leopard and Argali conservation workshops in Kyrgyzstan, and – along with Kumtor’s senior management – met with representatives of WWF (Russia, Kyrgyzstan) and the Snow Leopard Trust Kyrgyzstan²¹ in December 2012.

4.2 Regulators

At this time, there appears to be no specific legislation that would require research and monitoring of the status of biodiversity by economic actors like a mining company. However, key stakeholders include Kyrgyz regulatory agencies, particularly the State Agency of Environmental Protection and Forestry, which maintains responsibility for the implementation of the KR biodiversity conservation strategy, is a key stakeholder. This agency includes a number of departments, including Natural Reserves and National Parks, Department of Hunting Control, and Regulation of Hunting Resources Population.

4.3 Financial Stakeholders

Approximately 33% of Centerra Gold’s shares are owned by Kyrgyzaltyn, a Kyrgyz State Owned Enterprise. Approximately 50% of Centerra Gold is owned by Institutional Shareholders and the remainder by retail shareholders. The European Bank for Reconstructions and Development (EBRD) was an original project financier of the Kumtor Project. It maintains a revolving corporate loan facility with Centerra Gold. The EBRD (and IFC) provided grant-funding for a number of conservation-oriented technical cooperation programs involving Kumtor and the SCER.

4.4 Local Communities

Given its remote and high-altitude location, there are no permanent communities immediately next to the Kumtor mine site. During the short summer months, shepherds graze their livestock (mostly sheep and, to a lesser extent, horses and cattle) in the valleys en route to the Kumtor mine, as well as

²⁰ According to information contained in the Parliamentary Commission Report (2012), 70 licenses are issued annually for hunting of argali.

²¹ WWF explored opportunities to collaborate on small grants programs, anti-poaching and hunting monitoring, and social baseline studies.

throughout the greater region. These shepherds are typically housed in traditional (temporary) yurts or caravan-style facilities. During the summer months, these can be seen located tens of kilometers away from the mine site and several hundreds of meters off Kumtor's technical road, adjacent to small lakes or streams (see Figure 7).

Figure 7: Livestock grazing during summer in high altitude pastures en route to the Kumtor mine



During the Soviet era, the number of sheep was much larger and contributed to overgrazing of the high-altitude pastures (competing with the Marco Polo sheep and ibex). Following the collapse of the Soviet Union the number of livestock dropped dramatically, although they appear to be rebounding. Based on the discussions during the October 2012 stakeholder meeting, it is understood that, in general, the flocks of sheep grazed in the high-altitude pastures are not vaccinated. In addition to adverse impact on livelihoods of shepherds and owners of the sheep, lack of vaccination has also been hypothesized to be adversely impacting wildlife by spreading disease.

The nearest village to the mine site is Ak-Shyrak, located well above the tree line and originating from Soviet-era geological camps and outposts. This village is situated some 147 km from the mine site, via an unpaved and difficult road maintained mostly by Kumtor. Ak Shyrak is approximately 18 km eastward of the SCER headquarters at Koenduu which is the only access point to the southern border of the SCER.

Figure 8: Headquarters of SCER (left) visited en route to Ak Shyrak (right) in October 2012



The estimated total village population is approximately 120. This includes a number of the Reserve’s rangers and their families. The village also features a newly constructed school for approximately 50 children. The community is very isolated and even inaccessible for several months of the year due to high flows of rivers and boggy conditions of the terrain and deep snow during parts of the winter.

In addition to government provided incomes and subsidies, the subsistence-oriented livelihood of the community appears to be reliant on flocks of sheep and goats, and other livestock that is pastured in surrounding meadows, which the local residents do not own. Local communities also harvest fruits, berries and other native vegetation when available. In addition to electrical power supplied through a power line extending approximately 200 km to the town of Naryn, dried dung collected from the livestock serves as heating and cooking fuel.

The village of Barskaun is located near the beginning of Kumtor’s Technical Road, an unpaved gravel road which starts near Lake Issyk-Kul. This road serves also as an access road to the SCER and hunting areas. The distance from Barskaun to the Kumtor mine is approximately 90 km along a gravel road that is maintained by Kumtor.

4.5 Hunting and Tourism

It is understood that the SCER is presently surrounded by seven “hunting camps” or “farms” (such as “Sevian”). Their location is depicted in Figure 3. The hunting farms are large tracts of land that leased to license holders and trophy hunting quotas are approved based on numbers of target species such as argali and ibex. These hunting concessionaires appear to mainly target international trophy hunters who pay international outfitters in the order of US\$25,000 and US\$5,000 to hunt Marco Polo sheep and Siberian ibex, respectively. Poaching and poorly-regulated trophy hunting along with lack of sufficient income generation for local communities remain key areas of concern to a number of local stakeholders, as highlighted during recent surveys and reports published from the SCER²² and discussions during the October 2012 stakeholder workshop.

²² Vereshagin, Alexander, 2009.

Figure 9: Hunting Camp located approximately 20 km from the SCER headquarters.



There appears to be no other substantial tourism activities in and around Kumtor and the SCER. In addition to lack of appropriate infrastructure (qualified staff, transport, hotels, environmental paths, observation points etc.), this may be due to restrictions associated with the status of the SCER as a *Zapovednik*. This limits land use strictly to conservation and scientific studies and does not provide an opportunity for eco-tourism or similar income generation opportunities. Regional ecotourism projects supported in the past by Kumtor have been largely perceived to be unsuccessful due to lack of sustainability without continued Kumtor funding.

4.6 Other Key Stakeholders

Other important stakeholders include biodiversity conservation oriented academic and non-governmental organizations. These include Fauna & Flora International (FFI), the Snow Leopard Trust (SLT), World Wildlife Fund for Nature (WWF), Naturschutzbund Deutschland (NABU) and *Panthera* and others involved in the Snow Leopard Network and Argali conservation.

The research community includes a group associated with Professor Shigeyuki Izumiyama from Japan involved with the SCER staff in tagging and satellite monitoring of wildlife. Ornithological expeditions have been mounted by Bastin Chez (France), Michel Louis Jean (Belgium). Botanical researches at the SCER were also conducted by the SCER staff. Surveys of the flora, butterflies, aquatic invertebrates, birds and mammals of SCER have been conducted by scientists from the Kyrgyz Academy of Sciences and supported by FFI. A herbarium consisting of 250 plants species was provided to the National Academy of Science to be identified by Dr. G. Lazkov. There are also scientists studying Climate Change and glaciers who have been conducting their research in the Kumtor valley and glaciers around the Kumtor mine. Their research may have mine closure and biodiversity conservation relevance.

In addition to NGOs and academic researchers, management and staff of other Kyrgyz protected areas and reserves, such as the closest reserve in Naryn, are also considered stakeholders for the purpose of this BMSP.

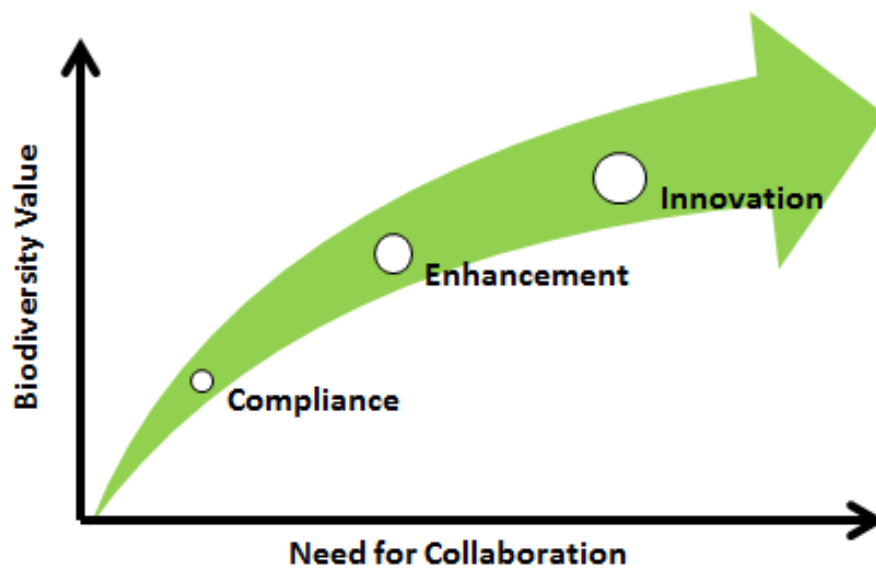
5 Biodiversity Management Strategy

5.1 Introduction

The overall goal of the Kumtor Biodiversity Management Strategy and Plan (BMSP) is to expand, develop additional programs (as needed), and further integrate the aspect of biodiversity into Kumtor’s existing and/or updates of social and environmental management and mine closure frameworks. The BMSP will build on current KGC activities that pertain directly, or indirectly, to biodiversity; seek to enhance the existing and/or develop new partnerships with key stakeholders and government; further supplement the substantial baseline and monitoring data accumulated over the past 20 years; and enable and support related engagement and communication efforts. The purpose and scope of the BMSP will be included as training for key personnel and staff, including biodiversity conservation awareness. The BMSP will specifically target remaining years of operation and into closure, including post-closure. The BMSP will be regularly tracked and updated annually to verify that the plan is appropriate and being implemented. In addition, the BMSP will be subject to external review at every three years

Kumtor and its BMSP recognize that the most significant biodiversity conservation value and innovation can be achieved and leveraged through a more collaborative effort as conceptually depicted in Figure 10. This figure depicts a trajectory that expands biodiversity efforts from those only required for compliance to broader, regional based initiatives that promote lasting benefits and seeking ways to take a leading role in regional biodiversity conservation. In structuring its platform, this BMSP also adopted a conceptual model promoted by ICMM that identifies biodiversity conservation opportunities that range from ‘Within the Fence Line’ (Kumtor Concession) to broader ‘Areas of Influence’ (see Figure 11, reproduced from Figure 7.1 in ICMM, 2006).

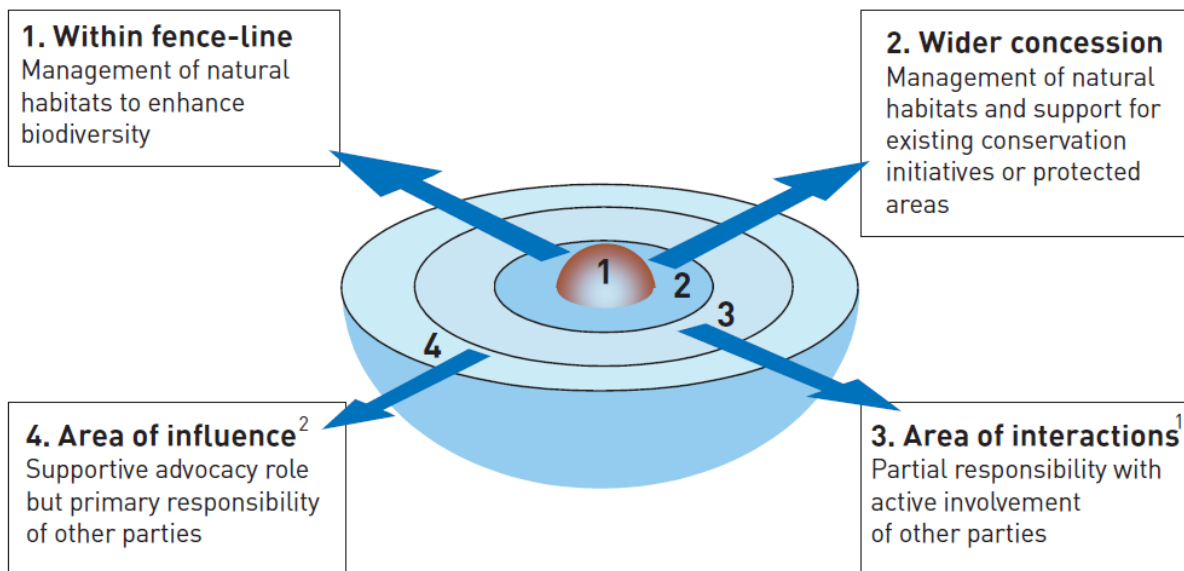
Figure 10: Moving Kumtor’s BMSP from compliance to innovation



5.2 Policy and Operating Standards

Centerra’s corporate policy and operating standards note its commitment to contribute to the protection and conservation of biodiversity and requires the application of integrated approaches to land-use planning throughout the mining lifecycle. Centerra also recognizes the need for and value of dialogue with local stakeholders, and to reduce or eliminate significant impacts on biodiversity and ecosystem services. Where feasible, Centerra also seeks to identify opportunities to enhance and improve local ecosystems and related economic development. Each Centerra site is required to develop biodiversity management plans, programs and procedures which apply to the entire mining lifecycle, including exploration, evaluation, operation and closure with appropriate resources from annual budgeting. These are to be aligned with Good International Industry Practice. This means also that such management plans will apply the mitigation hierarchy, beginning with avoidance and followed by minimization, mitigation and then offsetting if appropriate. Kumtor will also develop and implement Biodiversity Enhancements (BE) as an additional component of the mitigation hierarchy approach.

Figure 11: Identifying opportunities for biodiversity conservation or enhancement (from S. Johnson in ICMM, 2006)



Note 1: This refers to the wider area of environmental and social interactions, for example receiving waters for effluents, local communities that interact with the mine, etc.

Note 2: This refers to the advocacy role that Rio Tinto operations can play in regional environmental initiatives, support for developing the capacity of conservation organizations, etc.

5.3 Environmental Management System

Kumtor already maintains an Environmental Management System (EMS), aligned with ISO 14,001 framework, and is part of commitments under Kumtor’s Environmental Management Action Plan (EMAP). The EMAP was originally developed in 1995. It has been updated from time to time (last revision: 2010) is also referenced in the latest (2009) Restated Investment Agreements. It defines Kumtor’s commitments to maintain the Kumtor Mine operations in material compliance with Canadian, Saskatchewan and World Bank environmental health and safety laws, regulations, policies and guidelines, in addition to meeting regulatory requirements of the Kyrgyz Republic. This BMSP will serve as a vehicle to further develop and integrate (mainstream) key aspects of biodiversity management into Kumtor’s EMS and its mine closure planning process in line with corporate policies and evolving GIIP.

5.4 Climate Change

Although Kumtor will not be able to combat the broader effects of Climate Change in the region, Kumtor is in a unique situation with regard to monitoring the impact of Climate Change. Kumtor maintains a modern meteorological station at its high-altitude location, which is a registered national meteorological station as defined by a partnership agreement with KyrgyzHydromet weather service. Data from the Kumtor weather station is transmitted directly to Bishkek and contributes to the Tien Shan weather report provided to internet meteorological sites. Kumtor has also accumulated a substantial data set of related information, including glacial movement, changes in volumes of Lake Petrov (and studying its moraine dam), groundwater and surface water flow rates and volumes, climatological information and temperature profile (mostly related to its TMF). Climate Change related data monitored at Kumtor will not only be able to inform its future mining and closure planning processes, but can also inform the biodiversity conservation community and improve their Climate Change impact assessment and development of adaptation/resilience strategies, including regional and international programs to better enable ecologically appropriate land use and management.²³

5.5 Mine Closure

Both Centerra and KGC corporate policies and the most recent Investment Agreements detail a number of Mine Closure related commitments. These include the development of a reclamation plan and a Conceptual Closure Plan (CCP). This is regularly updated throughout the life of the mine, and is expected to culminate in a Final Closure Plan (FCP), which must be completed within two years of cessation of mining operations. Provisions pertaining to closure planning, financing, regulatory approval and/or government intervention are outlined in the Kumtor CCP and are also described in Kumtor’s Annual Environmental Reports and include:

²³ Forrest, Jessica, L. et al. 2012 Conservation and Climate Change: Assessing the vulnerability of snow leopard habitat to treeline shift in the Himalaya. *Biological Conservation* 150 (2012) 129-135.

- Maintaining a strict no-hunting policy
- Continuance of wildlife studies emphasizing critical areas, dispersion routes and migration corridors for ungulates
- Management of the KR Ministry of Environment Protection monitoring control station at the bottom of Sary Monok Pass (also called Barskaun Pass) and at a monitoring station established seven km from the Kumtor gate entrance to limit poaching

Important components of the above that relate to biodiversity include: reclamation activities that support function as a high alpine wildlife habitat and return land to a suitable post-mining end-use, geochemical and geotechnical stability of the site and efforts that ensure that effluents and discharges meet acceptable national and international water quality standards. In line with evolving GIIP, KGC will further integrate biodiversity related issues into the next iterations of the CCP. As per the latest (2009) investment agreement, following notification about planned termination of operation, the Kyrgyz Government will have the ability to change plans and, for example, choose to continue operations.

5.6 Engagement and Communications

Kumtor is committed to active and on-going stakeholder engagement regarding the development and implementation of its biodiversity strategy. Cross-sectorial workshops and meetings, including one conducted on October 19, 2012 (summarized in Appendix 3) have confirmed the importance and value of such activities. Stakeholders have identified the utility in alignment of Kumtor's biodiversity management strategy with national planning, regional institutions, such as the SCER, and active and interested stakeholders, such as FFI. Further, communication and dissemination of important developments, adoption of management strategies and plans, as well as publication of significant research and studies are acknowledged as valuable opportunities.

6 Proposed Biodiversity Management Plan

6.1 Policies, Operational Standards and Instructions

In line with its Biodiversity Management Strategy, KGC will be further integrating (mainstreaming) biodiversity into its broader exploration, operations, closure and related environmental and social programs. The BMSP will be subject to updates and approval by senior management in response to significant changes in the life cycle of the operation. KGC will establish a designated format for employee training for biodiversity awareness, management of biodiversity information and data, procedures for documentation and record keeping, including in Annual Environmental Reports. Monitoring and reporting of biodiversity impacts, gains and trends will be conducted with an attempt to seamlessly integrate these with regional activities and institutions that pertain to biodiversity conservation, such as the activities associated with the SCER.

The current policies and operational standards outlined in corporate policies and the Kumtor EMAP, which require monitoring wildlife in three-year intervals, will be amended and refer to this BMSP, which has a broader scope and collaborative implementation of biodiversity monitoring activities that include: continuous tracking (documenting) wildlife on-site through broader participation of Kumtor employees, annual biodiversity monitoring and studies, broader inclusion of vegetation communities, invertebrates and aquatic organisms in monitoring and closure planning activities, and more structured engagement with relevant stakeholders, including the SCER.

6.2 Further Reduce and Mitigate Operational Impacts

This biodiversity management strategy will allow Kumtor to further reduce and mitigate any significant ongoing or future impacts to biodiversity by tracking and monitoring key components, indicator species described herein and incorporated from future investigations, and patterns of abundance, distribution and/or movement of key species in, or through, the Project area. To accomplish this, KGC will implement a GIS based monitoring strategy that tracks important activities throughout the concession, including biodiversity data. This will also require an understanding of broader, regional biodiversity risks and impacts which are not related to Kumtor's mining footprint and are believed to be the main risks to regional biodiversity.

It is intended that important information collected to date and supplemented with additional information obtained from implementation of this BMSP will facilitate assessment of existing or potential future impacts to biodiversity resulting from on-going operations or any expansion activities, such as increases in LOM, future exploration and changes to project design or infrastructure.

KGC will maintain its no-hunting policy. KGC will also improve recording, analysis and reporting of wildlife observations and responses to ongoing activities and infrastructure. This will include monitoring impacts to wildlife and water fowls from the TMF pond (if any) and impacts associated with the use of wolf repellent; expanding biodiversity baseline (discussed below); and employing a mitigation hierarchy approach to evaluating, avoiding, mitigating or offsetting impacts to biodiversity resulting from expanded footprint areas, including prescreening exploration or new footprint areas for biodiversity

(including cultural heritage)²⁴ and environmental parameters. Any additional biodiversity concerns which may be raised by KR commissions and other KR regulatory authorities will also be considered. At this time, such concerns raised include potential historic impacts to wildlife in relations to Kumtor's exploration activities outside of the Kumtor Concession and within formerly licensed exploration areas. Related activities involved using and improving existing roads to, for example, the Ishigard pass, which were already constructed during the Soviet time. Kumtor has already refilled its exploration trenches. In addition, a review of historic exploration areas will be undertaken to determine the need for any additional reclamation activities. It is noteworthy, that at the time of drafting this BMSP, no new exploration outside of the concession is underway, and none is anticipated in the immediate future.

6.3 Initial Screening of Exploration Projects

KGC will adopt a formal screening process prior to the onset of exploration activities once such priority exploration targets have been identified and a formal screening/ checklist to be completed for any currently undisturbed areas proposed to be impacted within the Concession area. This screening will be conducted or supervised by Kumtor's Environmental Department. Adopting the guidance provided by ICMM²⁵, the objective of the screening is an initial appraisal of the biodiversity context of an exploration site or expansion project. The following primarily desk-based steps can help to initially establish the biodiversity context and risks:

- obtaining readily available information on biodiversity through review of maps, external publications, stakeholder perspectives - which can provide insights on traditional or cultural value and use of area - and any information that may be readily available;
- identifying whether the site or surrounding area falls within a protected area – that is, whether it is an area designated for biodiversity protection at a local, national, regional or international level;
- identifying whether the site or surrounding area is not currently protected but has been identified by governments or other stakeholders as having a high biodiversity conservation priority;
- identifying whether the site or surrounding area has particular species that may be under threat (although the area may not currently be officially protected); and
- reviewing relevant legal provisions relating to biodiversity.

Where this initial screening stage identifies areas of high importance for biodiversity (or cultural heritage), more detailed consideration should be given to possible impacts on such areas, both direct and indirect, such as the impacts from ancillary infrastructure, such as roads, etc. This review may trigger the need for baseline studies to support further decision-making processes. Also, each exploration program should include a recovery and reclamation plan and budget.

²⁴ KOC already maintains a chance find procedures (latest version: 12/9/2009).

²⁵ ICMM,2006. Good Practice Guidance for Mining and Biodiversity

6.4 Monitoring and Inventories

On-going and new biodiversity monitoring programs will be reviewed and developed to address Kumtor's immediate operational requirements. These will also be adjusted, if needed, to complement and support research objectives identified in SCER Management Plan, expected to be revised and updated in early 2013. Much of this is expected to be accomplished in tandem with and through global and regional partnerships as detailed below.

Kumtor has accumulated a detailed baseline data set describing the biodiversity of the project area in a regional perspective. In line with emerging GIMP, this BMSP provides a framework to conduct on-going biodiversity monitoring as a vehicle to monitor and track important biodiversity developments related to the project through the remaining years of operation and through closure of the project. This initiative will include the following initial specific objectives:

- On-going review and study of the changes in biodiversity within the project area (and associated infrastructure) and implications for surrounding or adjacent areas, including the SCER;
- Observe (through engagement and knowledge management) major changes and trends in biodiversity impacts (+/-) adjacent/outside the immediate Kumtor Concession and exploration license areas;
- Periodic evaluation of impacts to, and/or net positive biodiversity gains, primarily focused on, but limited to, floral and faunal components (Kumtor Concession and the regional ecosystem);
- Periodic assessment of changes in presence or absence of species with special conservation status, including to updated changes in relevant catalogues of protected species (i.e. IUCN listed species, KR Red Data Book species, species with special conservation status under CITES, etc.);
- Further incorporate standardized methodologies of data collection – such as GIS-supported methodologies - and data management to interface with, and support, similar programs in SCER and other third-party initiatives; and
- Identification of areas of high in biodiversity and conservation value, such as corridors for movement, migration corridors, connectivity to other regional protected areas, or areas important for reproductive fitness (breeding, rearing, etc.), or unique habitat types with high conservation value.

Initial monitoring objectives to be addressed in this first iteration of the Kumtor BMSP will update or enhance understanding of the following specific components:

1. Fauna monitoring initiatives with focus on:
 - (a) initiating a program of a more formalized and routine on-site monitoring whereby wildlife observations may be recorded on standard data sheets – or via radio communication - to more closely track and document wildlife observations by employees and staff of KGC *en route* to and at the mine site. This effort will be supplemented with an employee education/ training program to explain the importance of biodiversity monitoring and key species identification;
 - (b) define corridors of movement and migration patterns of key species, including through and/or near the Kumtor Concession and exploration areas. Indicator species include argali, ibex, snow leopards, brown bear, eagles, vultures and falcons. The effort will also seek to leverage

opportunities for synergy and integration of existing remote sensing studies for indicator species such as argali, and consider opportunities to expand these to other key species such as ibex and wolves and identify areas of high biodiversity value.

2. Flora monitoring initiatives with focus on:
 - (a) vegetation within the project footprint area. Specific objectives of the Flora monitoring will include: a) how vegetation community assemblages relate to specific vegetation zones (such as vegetated slopes, vegetated valleys, riparian zones, etc.);
 - (b) identification of important species and groups of species with utility for reclamation and closure,
 - (c) identification and documentation of other major impacts to regional vegetation important to greater ecosystem services (i.e. food base for key species);
 - (d) identification of species and groups of species to be targeted for vegetation test plots. Monitoring of test plots should be designed to evaluate length of time required for recovery (re-vegetation), important soil and other environmental conditions required for feasible and successful re-vegetation or identification of suitable “reclamation offsets” that can provide more feasible and more desirable sustainable land use options and ecosystem services with enhanced socio-economic impacts; (see Skryabin, K.I. and Turgunbaev K.T, 2012 for most recent flora monitoring);
 - (e) use of strategically placed exclusion plots, with same size configuration as those in use in the SCER to evaluate and document non-mining related impacts to regional and site vegetation.
3. Other activities identified as areas of key concern through stakeholder engagement.

A Biomonitoring Quality Assurance/Quality Control (QA/QC) Protocol has been developed (KGC, 2017) to provide a guiding framework for the conduct and reporting of monitoring; the protocol is attached as Appendix 7. As stated elsewhere, monitoring strategies and methodologies will be performed to include similar methodologies adopted by the adjacent SCER, and in turn develop data management strategies that will also be capable of integrating, and supporting similar needs identified by the revised SCER Management Plan 2016-2020 (attached as Appendix 6).

6.5 Biodiversity and Mine Closure

Kumtor will further integrate biodiversity aspects into all phases of the project life cycle, including: exploration, reclamation, and closure. The following represent key components that will be integrated into future CCPs, including the final closure plan required 2 years prior to closure:

- Develop feasible, sustainable and desirable post-closure land use objectives that specifically consider biodiversity and ecosystem services;
- On-going development of reclamation plan to include: native vegetation and community assemblages associated with appropriate habitat types as identified in current and future monitoring;
- Engagement with key stakeholders to identify nearby off-site important habitats degraded by anthropogenic activities – such as over grazing – that may provide more appropriate reclamation targets (conceptual approach as offsets) as compared to reclaiming high altitude “flora deserts” such as waste rock areas and pit;

- Implementation of Progressive Reclamation Strategy to include both central mining operations and exploration areas, where feasible and appropriate, with due regard to climatic and habitat limitations considering high-altitude nature of the site;
- Initiation (or continuance/ enhancement) of test plots for key habitats and vegetation community assemblages;
- Integration with native seed collection project/ herbarium support activities/ SCER interface on vegetation research/ monitoring; and reclamation activities;
- Biodiversity related closure planning to integrate with several Biodiversity Enhancements (see next Section) and components of the Biodiversity Management Strategic Plan

6.6 Climate Change

Kumtor will initiate a program to annually estimate its Greenhouse Gas (GHG) emission and adopt related Key Performance Indicators (KPI) in line with GIIP²⁶. The result of this program will be reported in Kumtor's AERs or similar types of disclosure, including Centerra's annual report to the Carbon Disclosure Project (CDP). In addition to continuing to provide a variety of climatic data through its on-site meteorological station, Kumtor will also consider augmenting its monitoring program to enable and support Climate Change related impact monitoring. This may include permafrost/ground conditions away from Kumtor's immediate infrastructure (possibly within the SCER). Such an initiative would be consistent with research objectives stated in the SCER Management Plan, and could become an important regional data point for global Climate Change monitoring. This monitoring, in turn, can improve forecasting of expected impacts and related biodiversity resilience and adaptation strategies.

KGC will consider supporting (and signal the availability of such support) in form of valued in-kind contributions, such as site access (accommodation) and transportation to co-funding existing/proposed programs involving academic, conservation or multilateral organizations, such as those involving UNEP and others. Other options may include improving facilities at the SCER headquarters/offices and/or Ak Shyrak to make this an attractive destination for Climate Change research that can contribute to communal livelihood improvement related to visiting researchers and scientists.

6.7 Partnerships and Communications

In addition to engaging with a variety of other stakeholders, Kumtor has chosen Fauna & Flora International (FFI) as a principal partner related to Kumtor's biodiversity conservation initiatives. A formal MOU between FFI and Kumtor was signed in November 2012. Key goals and specific objectives of the MOU include that the "parties wish to cooperate on the primary objective of the delivery of biodiversity conservation and management in the Sarychat-Ertash *Zapovednik* (SCER) and the wider surrounding Central Tien Shan landscape area. The MOU serves as the platform for more formal arrangements that may be required to facilitate achievement of this objective on a project-by-project basis."

As outlined in the MOU, cooperation will be focused on the following initial areas:

²⁶ GHG emissions in the mining industry are typically reported as a total figure (tons of CO₂ equivalent) and put into context by providing specific emission rates (based on total tons of materials mined/moved).

1. The development of a program of work to include direct support to the SCER and proposals for the delivery of biodiversity conservation activities across the Central Tien Shan landscape area. The scope of work is to be developed in detail following an FFI scoping mission funded by KGC.
2. Undertake a review and update of the SCER Management Plan and submit and champion the Plan through the Government's approval process.
3. Provide technical support to the SCER administration to deliver the Management Plan over the next 5 years.
4. Explore the potential for further development of mutual areas of interest relating to biodiversity conservation and management in SCER and the wider landscape.

A key component of FFI's activities will involve validating, finalizing and championing approval for the Management Plan of the SCER and its implementation with the staff of the SCER and other stakeholders. In addition, KGC will adopt a more structured engagement and communication program. Key elements of such a program are outlined in the following table.

Table 3: Opportunities to improve stakeholder engagement and communication channels

Key Stakeholders	Communication Vehicle	Opportunities & Comments
Government	Meetings, AER and other reporting, KGC’s website, engagement and participation; KGC press releases and Kumtor Newsletters	Involve in workshops and research, participate and support UNEP-co funded national strategy development. Consider disclosure of summaries in liaison with KGC PR/Media team and include communication to KGC staff and employees through training and education.
NGOs	Annual Environmental Reports, KGC website and reporting, structured engagement; Centerra’s Sustainability Report; Centerra’s website	Participate in and contribute to relevant NGO workshops and networks; adopt structured engagement, such as quarterly to semi-annual meetings; assign responsibility; All grant funded programs should include requirement for brief quarterly updates and final reporting of outcomes achieved (including 1-page summary, pictures, etc..). Consider disclosure of summaries in liaison with KGC PR/Media team.
Public	Annual Environmental Reports, KGC website and reporting, Kumtor Newsletters and more frequent and routine media stories and press releases; Centerra’s Sustainability Report	Inform about on-going developments and partnership activities in regular interval (not just when there is a concern). All grant funded programs should include requirement for brief quarterly updates and final reporting of outcomes achieved (including 1-page summary, pictures, etc..). Consider disclosure of summaries in liaison with KGC PR/Media team.
SCER and other Zapovedniks	Website, engagement in workshops and structured meetings (quarterly, annually)	Review availability, quality and barriers (access, resources, training, equipment) for Zapovednik-specific or centralized website to assist with dissemination of information, publications, research reports etc. (for all KR Zapovedniks and protected areas). Consider supporting/co-funding or technical support to develop, manage and host website(s) for a3-year period.
Academic Institutions	Website, research publications, conferences	KGC to provide co-funding and support (logistics, transportation, site access/accommodation) resulting in academic journal (conference) publications; provide co-funding for conferences and events that support science-driven decision making in KR

7 Biodiversity Enhancement Opportunities

7.1 Introduction

Biodiversity Enhancement (BE) is defined as an action, or initiative, taken to improve biodiversity conservation, or protect, stabilize and/or enhance important species, assemblages, communities or ecosystems on a local or regional scale. A BE differs in principle from a Biodiversity Offset in that it is not driven by identified significant negative impacts to, or loss of, biodiversity and/or Critical Habitat (as defined by IFC Performance Standard 6).

As such, individual BE initiatives and actions can combine to form a portfolio of positive biodiversity activities for a project. In most cases, development of Kumtor's BEs will include engagement and interaction with a variety of stakeholders identified in this BMSP. Kumtor's BEs will also be aligned with the (latest) Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic (2008), and next iteration of the National Report on Biodiversity of KR and/or upcoming updates to the National Biodiversity Strategy (expected in 2013). Preliminary recommendations for the Kumtor Biodiversity Enhancement Portfolio are detailed below and are summarized in Table 4, further below.

7.2 Kumtor Biodiversity Research Center

Kumtor will develop a Kumtor Biodiversity Research Center (KBRC) to support a broader approach to biodiversity monitoring and develop relevant monitoring capacity, facilities or activities. Target initiatives of the KBRC will focus on key topics pertaining to terrestrial and aquatic ecology of the Tien Shan Mountains. Where feasible, Kumtor may provide on-site equipment, data management capabilities and other logistical support such as transportation, housing and field requirements for biodiversity monitoring. Conceptually, this initiative can also incorporate cultural heritage components of the region. KGC will also initiate an employee education and training program to explain the importance of biodiversity monitoring and conservation in general, including key species identification and strategy for a simple on-going reporting of wildlife sightings.

Principle objectives of this initiative are:

- 1) To accomplish monitoring of key biodiversity components related to Kumtor, while promoting, enabling and supporting active research on relevant biodiversity topics for the SCER and Tien Shan region.
- 2) To actively support protection, conservation and management of important species, including mammals, birds, vegetation and invertebrates.
- 3) To facilitate scientific access and logistical support to conservation activities in the western portion of the SCER and surrounding areas.
- 4) To leverage support provided by KGC with national and international sources for expansion of biodiversity research and understanding of the Tien Shan region.
- 5) To incrementally contribute to a network of facilities or initiatives that will support the accumulation of important biodiversity information through the remaining years of operation and into closure.

- 6) To interface with other long-term biodiversity related initiatives, such as regional ecotourism strategy (as described in the SCER Management Plan) and other closure related opportunities, where feasible and appropriate.

KGC would also encourage a collaborative approach with international conservation and Climate Change entities, such as UNEP, NGOs and universities.

7.3 Research Focused on Regional Flora

As a core biodiversity activity, KGC will implement a monitoring and management initiative with focus on project footprint area vegetation. This process will employ a key vegetation community approach, with linkage to goals and objectives of the SCER and considers also recent efforts of KR Commissions that have established 10 monitoring stations in the project region.

The SCER management plan targets identification and surveys of vegetation communities both in the reserve and in the so-called buffer zones. KGC research and monitoring of regional flora is intended to be cooperative and synergistic with similar efforts in the region that include participation from the SCER, the KR National Academy of Sciences, the Kyrgyz State Agency for Environmental Protection, regional higher education institutions and involved stakeholders such as FFI.

The initiative will seek to build on the baseline and historic monitoring of vegetation and other programs such as collection of native seeds in the project area, and provide guidance and linkage with eventual reclamation and closure planning and other biodiversity enhancement activities as described above. KGC will also explore opportunities to support or contribute to existing regional Herbariums or collections. KGC will also seek opportunities for including community-based monitoring or involvement, in addition to long range support of regional initiatives focused on conservation and protection of the unique flora of this high-altitude biome of Central Asian.

Flora monitoring and surveys will also be designed to include non-mining related regional impacts that have been cited by key stakeholders as priority concerns to maintaining ecosystem stability in the region, including impacts from overgrazing and projected implications of climate change to the vegetation communities and the forage base for key wildlife species.

7.4 Species Specific Support Initiatives

Species specific initiatives may range from in-kind contributions to on-going conservation projects or research programs such as remote sensing of argali, expansion of remote sensing projects to include ibex, wolves and others, to re-introduction of a species to a portion of its former range. KGC has a history of supporting conservations efforts for the snow leopard, and will explore ways to support newly emerging international conservation programs for this species which are expected to be hosted by Kyrgyzstan in 2013. Although the snow leopard may be the most high-profile candidate, KGC will also explore supporting other species that may provide simpler and overlooked options with disproportionately large biodiversity rewards.

Species specific support programs will also target organisms identified in future research, monitoring, or studies to be in particular need of conservation assistance or reintroduction programs. Initial support

efforts will target a possible endemic species of dandelion *Taraxacum syrtorum* and *Tulipa tetraphylla* (species of tulip) found in the Kumtor project region that are believed to be largely impacted by over-harvest, agricultural practices and/or over-grazing. KGC will also contribute to National/International Species Action Plans (still in development) in conjunction with regional and international stakeholders (e.g. snow leopard and argali species action plans).

Species that may benefit from reintroduction into a portion of their native range include important prey species, such as marmots, that have been extirpated from some areas by poisoning. Another example of a species-specific program is in-kind or logistical support for on-going university based remote monitoring studies with radio tags and satellite-based monitoring technologies for species such as argali, ibex, and wolves which have been identified as priorities by SCER and others.

7.5 Information Technology and Systems

Kumtor has a well-established system of data collection, processing and storing of information. This includes a myriad of technical information pertaining to project infrastructure, HSE related information, environmental data, etc. Kumtor has also access to satellite communication. Kumtor and its partners (FFI) will consider supporting the SCER and other key stakeholders to both develop a strategy to ensure biodiversity data (and important relevant abiotic data pertaining to climate change, glacier activity, water resources, soils and regional hydrology) will be compatible and capable of supporting this high priority need for SCER. The data management strategy will incorporate current GIS technologies to facilitate accessibility of information with broader scale regional and international projects. Kumtor's access to satellite communication is also a very valuable asset that could be expanded to the SCER and support associated scientific researchers and programs.

7.6 Ecotourism Strategy and Planning

Ecotourism is seen regionally as both a potential economic opportunity for the relatively poor area of Kyrgyzstan, and also as a potential threat to the mission and stated objectives of the SCER. KGC will participate as a stakeholder with SCER and others to explore ways to support regional ecotourism planning in line with legal constraints of SCER associated with its status as a *Zapovednik*. In other regions of the world, where natural resources and inherent natural values have been protected, while at the same time establishing infrastructure and capacity to allow travelers to experience regional landscapes and beauty, ecotourism has often thrived, becoming a significant part of a sustainable local or regional economy. The SCER targets several key objectives relating to ecotourism planning, including overall strategic planning, identification of acceptable "eco-tourist routes" and zoning for tourism activities.

This will be a "long range" objective that needs to start with public/community/stakeholder engagement. It will also need to coordinate and integrate with SCER activities outlined in SCER MP (to be validated and updated) and include input from local communities, "hunting camps" and appropriate government entities.

7.7 Veterinary Health of Regional Livestock

Stakeholder engagement identified an opportunity to avoid or mitigate potential risks to regional wildlife from diseases which may be present in domestic livestock that are pastured in high altitude meadows, valleys and vegetated slopes near the Kumtor Concession and the broader region. This presents also an opportunity to improve the livelihoods of those dependent on livestock by promoting vaccination and veterinary health support. KGC will consider pilot projects which seek to explore cost-effective programs aimed at researching interaction of livestock and wildlife diseases in the broader project regions and/or support (including in-kind) local vaccination of livestock. Examples of such programs that have been successful in neighboring Pakistan may provide insight for this opportunity.

7.8 Collaboration to Address Regional Biodiversity Threats

As an economic leader in Kyrgyzstan, Kumtor has an opportunity to engage as a participant with other local, national and international stakeholders to develop and implement a plan to address identified threats to regional biodiversity. Key stakeholders have confirmed that poaching and lack of institutional support (including funding for *Zapovedniks*) have been, and continue to be, the main risks and barriers to broader biodiversity conservation. Other contributing factors are believed to include prevailing poverty, weak governance structures and other cultural influences. At the same time, scientific data from recent studies conducted by SCER also confirms a substantial rebound (increase) in numbers of snow leopards, ibex and Marco Polo sheep. However, more recently, some stakeholders have raised concerns about Kumtor's exploration activities within the context of proximity to proposed "buffer zones" to the SCER, and potential impact on certain flora.

The Draft SCER Management Plan contains the following listing of specific threats to regional biodiversity:

1. Poaching of snow leopard, argali, ibex, marmot and other animals.
2. Lack of resources for study and conservation of biodiversity.
3. Global climatic change.
4. Mining explorations – anticipated threat in future [presumably large-scale mining].
5. Impact of the Kumtor Gold Mine (including those expected from closure).
6. Tourism – anticipated threat in future.
7. Overgrazing in the buffer zone and on the border with adjoining territories – anticipated threat in future.
8. Increase in the number of hunting concessions along the border with, or in close proximity, to the Reserve.

Supporting efforts aimed at controlling poaching and over-hunting, while integrating needs of local populations to satisfy cultural heritage needs that include subsistence hunting for argali, ibex and other prey species is a challenging task. Stakeholder discussions identified the need to better understand the role and impact of "hunting camps" which enable trophy hunting. This often results in the elimination of the largest and potentially most ecologically fit animals out of the gene pool, unless properly managed, based on scientifically approved quotas, with acceptable wildlife management methodology that can be controlled, monitored and enforced.

KGC has effectively taken a leading role in the process of controlling poaching and other impacts by prohibiting hunting on the concession and reporting hunters trying to access or enter the SCER. In collaboration with key stakeholder, KGC will consider opportunities to engage and support stakeholders and responsible government entities that are more fully engaged with this issue (such as WWF, NABU, FFI and SCER), with due regard to observing the Voluntary Principle on Security and Human Rights. Beneficial programs may include co-sponsoring a conference or training programs aimed at incorporating best-practice wildlife management practices and/or supporting anti-poaching programs. These might include those which are currently co-funded by NABU and the German Government in the context of the Issyk-Kul Biosphere Reserve, and other programs under consideration by WWF and SLT.

7.9 Wetland Protection and Enhancement Initiative

Wetland areas, typical of the high alpine tundra and meadows, are widespread (including within and near the Kumtor Concession). Wetland protection and/or rehabilitation or enhancement is important for two reasons. First, wetlands can be important as a key habitat for many species of plants and animals, both resident (including some endemic species of plants) and migratory. In addition, these areas have potential to help mitigate water quality impacts which may be associated with mining activities. KGC has already initiated a program to collect native seeds for future reclamation and closure efforts. In conjunction with this effort, KGC will consider also wetland areas (within the Kumtor Concession) which might be suitable candidates for monitoring and progressive reclamation, as well as areas of importance for closure planning.

Key activities might include the following:

- a) Focus on endemic species (facultative aquatic plants - e.g. 3 species of endemic buttercup; birds and mammals that rely on wetland habitats; and others);
- b) Protection of important wildlife habitat;
- c) Monitoring of migratory birds;
- d) Enhancement, protection and/ or rehabilitation of specific wetland areas that may become effective for passive treatment of water being discharged to the environment.

7.10 Support of Regional and National Protected Areas

KGC has identified the importance of national protected areas to the stated goals and commitments of the Kyrgyz Republic through stakeholder engagement and participation in recent international biodiversity meetings and workshops hosted by the Kyrgyz Republic. In an effort to promote long term regional biodiversity stability, KGC will explore opportunities to support existing and proposed protected areas, particularly in the Central Tien Shan region where the mine is centrally located.

7.10.1 Sarychat-Ertash Nature Reserve

KGC is committed to continue and expand its historic support of SCER, including operation and monitoring of the Reserve. Key objectives for this BE were identified, in part, through stakeholder engagement and as a result of Kumtor site visit to SCER and Ak Shyrak in November 2012. Initial key areas of focus will target:

- Direct Support of SCER Management Plan updates and revisions in 2012-2013 and 2016 with FFI
- Logistical Support for SCER Monitoring Activities
- Engagement of SCER staff and director to coordinate and perform wildlife and vegetation monitoring in line with SCER protocol and methodology,
- Logistical support and supplies for SCER activities, including fuel (heating), transportation and field equipment,
- Materials and equipment to upgrade SCER headquarters infrastructure on Koenduu River site
- Contribution of vehicle for SCER activities

7.10.2 Khan Tengri Nature Park

The KR government, through the State Agency on Environment and Forestry, with assistance from international bodies, such as the UNDP, national stakeholders (such as SCER) and leading NGOs such as FFI, WWF, SLT and others have recently advanced the creation of a new protected area in eastern Kyrgyzstan. KGC has initiated efforts to explore opportunities to support this initiative. The KR government confirmed the establishment of the Khan Tengri Nature Park (2758 km²) on 16 February 2016.

7.10.3 Naryn Nature Reserve

Naryn Reserve, founded in 1983 is one of the oldest protected areas in Kyrgyzstan. Leadership from the Naryn Reserve participated with Kumtor in regional stakeholder engagement. The Naryn Zapovednik is well recognized as an important part of the Central Tien Shan protected areas network. The Naryn Reserve presently has several on-going projects that have been developed and are largely supported with limited resources and through strong dedication from the approximate 20 staff members. These include: the development of a nursery and captive breeding program for the endangered Kyrgyzstan Tien Shan maral (red deer); the establishment of the Naryn Environmental Center and Museum of Nature; and development of a local Environmental Ecotourism effort to highlight the value and unique characteristics of the regional flora and fauna. KGC will explore opportunities to support the Naryn Zapovednik in its various programs and activities.

Table 4: Summary of Proposed Kumtor Biodiversity Enhancement Portfolio

Proposed Biodiversity Enhancement- or opportunity	Broad Objective or Category of Biodiversity Enhancement ²⁷	Area of influence (refer to Figure 11 for number designation)	Potential Strategic Partners	Priority (I= high, III= Long range objective) ²⁸
Monitoring migration corridors for indicator species	Satisfying GIIP and monitoring requirements	Kumtor, SCER 2	SCER, FFI, NAS-KR	I
Incorporating Monitoring migration corridors for indicator species with SCER data	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER 2	SCER, FFI	I
Initiatives with focus on Flora: Herbarium contribution and support; support of community based regional monitoring/ baseline studies	Enhancing scientific knowledge and/or satisfying monitoring requirements	Kumtor, Regional and National 4	SCER, FFI, KR-NAS, others	I
Kumtor Biodiversity Research Center	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER 3	SCER, KR-NAS, regional and international institutions, NGOs	II and III
Incorporation of Biodiversity initiatives, goals and activities in reclamation and closure planning	Restoring habitats to increase biodiversity value	Kumtor, 1	Communities, Regional Institutions	II and III
Species specific programs and Species Action Plans: Support for ongoing radio tag studies (in-kind, or logistical)	Enhancing scientific knowledge and/or satisfying Monitoring requirements	Kumtor, SCER, International scientific community 4	SCER, FFI, International researchers	II

²⁷ Adapted after IUCN: Integrating Mining and Biodiversity Conservation

²⁸ In general, high priority enhancements are necessary to meet monitoring needs and/ or issues raised in KR Interagency Commission Report (2011), Parliamentary Commission Report (2012) and State Commission Report (on-going). Related activities will be generally carried out during the calendar years 2013 and 2014. Medium term priority enhancements would be expected to be implemented with stakeholder participation and support over the next five years. Long terms priority enhancements are expected for later stages of the Kumtor Project and into reclamation/ closure stage.

Proposed Biodiversity Enhancement- or opportunity	Broad Objective or Category of Biodiversity Enhancement ²⁷	Area of influence (refer to Figure 11 for number designation)	Potential Strategic Partners	Priority (I= high, III= Long range objective) ²⁸
SCER Management Plan, In kind support of SCER	Supporting Protected Areas	Regional with international implications 3	SCER, FFI	I
Species specific programs that target ecosystem services, including Climate Change Wetland Protection and Enhancement	Linking to on-going conservation initiatives	Kumtor, Regional 4	SCER, FFI, National and International researchers	II and III
	Managing Natural Habitats to increase biodiversity	Kumtor 1	FFI	II and III
	Engage with Stakeholders, Documenting and Addressing regional threats to Biodiversity	Linking to on-going conservation initiatives	Regional- include Cultural Heritage concerns 4	SCER, FFI, KR National Agencies
MOU with FFI with well-defined objectives	Direct Support of important conservation organizations in a regional context	Regional, with international 3	FFI- potentially others	I
Regional Ecotourism initiatives and development support	Integrate conservation and development initiatives that link biodiversity conservation with local social and economic development	Local Communities and National 4	SCER, FFI	III
Support of Regional Protected Areas	Supporting Protected Areas	Local, Regional, National 4	FFI, other stakeholders	II

Note: Table format adopted from IUCN Integrating Mining and Biodiversity Conservation

8 References

Aquatic Fauna of the Sarychat-Ertash Reserve. 2009

Bio Banking Assessment Methodology and Credit Calculator. Operational Manual
<http://www.environment.nsw.gov.au/resources/biobanking/09181bioopsman.pdf>.

Business and Biodiversity Offset Programme. bbop.forest-trends.org/.

Centerra Gold Inc., 2011. 2010 Corporate Responsibility Report: Responsible Mining Everywhere We Work.

Centerra Gold, 2012. Annual Information Forum For the Year Ended December 31, 2011, dated March 15, 2012.

Centerra Gold, 2012. Centerra Operating Standards, revised Draft June 18, 2012.

Conservation International, CI Hotspot: Mountains of Central Asia.

http://www.conservation.org/where/priority_areas/hotspots/europe_central_asia/Mountains-of-Central-Asia/Pages/default.aspx

Davletbakov, A. T. 2013. Report on birds and mammals monitoring in Sarychat-Eertash Reserve, as a basis for sustainable management of SPAs. FFI, Cambridge, UK.

Equator Principles 2012 Draft. www.Equator-Principles.com/.

Fauna & Flora International, 2003. Kyrgyzstan - Moving Mountains. Issue 5, October 2003, pages 6-12.

Fauna & Flora International, 2008. Sarychat-Ertash State Reserve Management Plan 2007-2015, Draft Plan, January 2008 for consultation.

FFI, 2013. Biodiversity Conservation & Management in the Sarychat-Eertash Zapovednik (SCEZ). Report on activities in 2013. Cambridge, UK.

FFI, 2014. Biodiversity Conservation & Management in the Sarychat-Eertash Zapovednik (SCEZ). Report on activities in 2013. Cambridge, UK.

FFI, 2015. Biodiversity Conservation & Management in the Sarychat-Eertash Zapovednik (SCEZ). Report on activities in 2013. Cambridge, UK.

Greenhouse Gas Protocol: <http://www.ghgprotocol.org/>
ICMM: Integrating Mining and Biodiversity Conservation.

Iliasov, S. and Yakimov, V. 2009. Second National Communication of the Kyrgyz Republic to the UN Framework Convention on Climate Change – Bishkek: – “Полиграфоформление”, 2009. 206 с.

International Finance Corporation, 2006. Kumtor Gold: Building Sustainable Biodiversity Management Out of Adversity, web-published.

International Finance Corporation, 2007. Environmental, Health and Safety Guidelines for Mining, December 10, 2007.

International Finance Corporation, 2012. IFC Performance Standards and Guidance Notes - 2012 Edition www.IFC.org/performancestandards.

Japarov Commission, 2012. REPORT of the Interim Parliamentary Commission to inspect and review KGC compliance with standards and requirements on rational use of natural resources, environmental & operational safety, and community social protection in the Kumtor Mine impact area as well as government control status established by the KR Parliament Resolution #1642-V of February 15, 2012.

Kilborn Western Inc., November 1993. Kumtor Feasibility Study and Environmental Impact Assessment. Volumes 1 through 6.

Kumtor Gold Company, 1993. Feasibility Study Vol. 3.

Kumtor Gold Company, 2010. Annual Environmental Report 2009.

Kumtor Gold Company, 2011. Annual Environmental Report 2010.

Kumtor Gold Company, 2012. Annual Environmental Report 2011.

Kumtor Gold Company, 2017. Report on Development of a Biomonitoring Quality Assurance and Quality Control (QA/QC) Protocol.

Kustareva, L.A. 20014. Inventory of the invertebrate fauna of water bodies in Sarychat-Ertash Zapovednik. FFI, Cambridge, UK. In Russian.

Kyrgyz Republic, 2009. Second National Communication of the Kyrgyz Republic to the UN Framework Convention on Climate Change – Bishkek.

Laskov, Georgy, 2012. State of Flora around the Kumtor Mine. Presentation at Kumtor’s 19 October 2012 Stakeholder Biodiversity Workshop, Bishkek, Kyrgyzstan

Lazkov, G.A. 2013. report on inventorization of flora of higher plants in Sarychat-Eertash reserve, as a basis for sustainable management of SPAs. FFI, Cambridge, UK.

Lazkov, G.A. 2014. Research on vegetation communities of Sarychat-Ertash Zapovednik. FFI, Cambridge, UK. In Russian.

Milko, D.A. 2009. Baseline Survey of the Butterflies in Sarychat-Ertash State Strict Nature Reservation (or Zapovednik, SCEZ). Recommendations for the Implementation of Butterflies for Monitoring, and some another material for inventory of the regional entomofauna. Compiled by Dmitry A. Milko, 2008–2009. FFI, Cambridge, UK

Lorax International, 2011. Kumtor Gold Project, 2010 Conceptual Closure Plan, August 2011, Unpublished.

Nazari, M., Entwistle, A., O’Keefe, E., and C. Dyikanova, 2001. EBRD, mining and biodiversity in Central Asia. European Nature, Issue 7, November 2001, pp 28-29.

Nazari, M. and Proebstel, D., 2008. Biodiversity Offset in Mining. Mining.com Magazine, January 2009, pp 42-44.

Prizma LLC, 2012. Independent Assessment of the “Interagency Report” and the “Moran Comments” on Compliance with Environmental and Industrial Safety Standards at the Kumtor Gold Mine, Final Report, 23 April 2012.

Prizma, LLC, 2012. Independent Assessment of the Japarov Commission Report, Final Report 23 September 2012.

Samanchina, Jarkyn, 2007. Capacity Building of Women in Kyrgyzstan: An example of International Cooperation.

Skryabin, K.I. and Turgunbaev K.T, 2012. Report on study of vegetative ground cover for reclamation activities at Kumtor Mine Site (from 1.06.2012 y. to 30.09.2012 y.)

Shukurov, E.J. (Chief editor) 2007. The Red Book of the Kyrgyz Republic. 2nd Edition. Bishkek.

State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic, 2013. Fifth National Report on Conservation of Biodiversity of the Kyrgyz Republic. Bishkek.

State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic, 2016. The Sarychat-Eertash State Nature Reserve Management Plan 2016-2020.

UNECE Committee on Environmental Policy, 2009. Environmental Performance Reviews, Kyrgyzstan, Second Review, Environmental Performance Reviews Series No. 28.

Appendix 1: Legal Basis of Biodiversity Conservation in the Kyrgyz Republic (cut off 2008)

The following listing is reproduced from the latest (2008) and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic prepared for submission to the Convention Secretariat on Biodiversity.

1. The Law of the Kyrgyz Republic "On Environment Protection" as of June 16, 1999, № 53.
2. The Law of the Kyrgyz Republic "On Specially Protected Natural Territories" as of May 03, 2011.
3. The Law of the Kyrgyz Republic "On protection and use of the vegetation" as of June 20, 2001, № 53.
4. The Law of the Kyrgyz Republic "On Environmental Expertise" as of June 16, 1999, № 54.
5. The Law of the Kyrgyz Republic "On sustainable development of environmental and economic system of the Issyk-Kul" as of August 13, 2004, № 115.
6. The Law of the Kyrgyz Republic "On Biosphere Reserves in the Kyrgyz Republic" as of June 9, 1999, № 48.
7. The Law of the Kyrgyz Republic "On Veterinary" as of December 30, 2014, № 175.
8. The Law of the Kyrgyz Republic "On Fauna" as of June 17, 1999, № 59.
9. The Law of the Kyrgyz Republic "On Plant Quarantine" as of January 12, 2015, №2
10. The Law of the Kyrgyz Republic "On Licensing" as of October 19, 2013, № 195.
11. The Law of the Kyrgyz Republic "On Legal protection of selection achievements" as of June 13, 1998, № 79.
12. The Law of the Kyrgyz Republic "On Accession to the International Convention on protection of the new sorts of plants" as of January 14, 2000, № 10.
13. The Law of the Kyrgyz Republic "On Accession of the Kyrgyz Republic to the Convention on Biological Diversity" as of July 26, 1996, № 40.
14. The Law of the Kyrgyz Republic "On Accession of the Kyrgyz Republic to the Kartakhena Protocol on Biological Safety to the UN Convention on Biological Diversity" as of August 6, 2005, № 140.
15. The Law of the Kyrgyz Republic "On ratification of the UN Convention on Environmental Impact Assessment in transboundary context" as of January 15, 2001, №6.
16. The Law of the Kyrgyz Republic "On Fishery" as of June 25, 1997, № 39.
17. The Law of the Kyrgyz Republic "On Seeds" as of June 19, 1997, № 38.
18. The Law of the Kyrgyz Republic "On Chemicalization and Plant Protection" as of January 25, 1999, № 12.
19. The Law of the Kyrgyz Republic "On basics of technical regulation" as of May 22, 2004, №67.
20. The Law of the Kyrgyz Republic "On Breeding in the livestock-breeding of the Kyrgyz Republic" as of April 27, 2009, № 133.
21. The Law of the Kyrgyz Republic "On Air Protection" as of June 12, 1999, №51
22. The Law of the Kyrgyz Republic "On traditional knowledge protection" as of July 31, 2007, №116
23. The Law of the Kyrgyz Republic "On Public Associations" as of October 15, 1999, №111.
24. The Law of the Kyrgyz Republic "On Jaamats (communities) and their associations" as of February 21, 2005, №362102200.
25. "Code of the Kyrgyz Republic on Administrative Liability" as of August 4, 1998, №114.
26. Forestry Code of the Kyrgyz Republic as of July 8, 1999, № 66.
27. Land Code of the Kyrgyz Republic as of June 2, 1999, №45.
28. Criminal Code of the Kyrgyz Republic as of October 1, 1997, become inoperative on January 1, 2019 by the Law of the Kyrgyz Republic as of January 24, 2017, №10.
29. Decree of the President of the Kyrgyz Republic "On Introduction of the moratorium on logging, processing and selling of the valuable wood growing on territory of the forestry fund of the Kyrgyz Republic" as of June 22, 2006, УП №331.
30. Decree of the President of the Kyrgyz Republic "On Measures protecting and increasing fish stocks in the Issyk-Kul, Son-Kul Lakes and other water bodies of the Kyrgyz Republic" as of January 10, 2008, УП №.7
31. Decree of the President of the Kyrgyz Republic №255 as of September 4, 2000 on approval of "Concept of development of tourism sector of the Kyrgyz Republic to 2010".
32. Decree of the President of the Kyrgyz Republic as of April 30, 2005, №149 "On institutional and structural transformations in field of technical regulation in the Kyrgyz Republic".
33. Resolution of the Government of the Kyrgyz Republic as of September 27, 2006, №693 (in version of the Resolution of the Government of the Kyrgyz Republic as of April 11, 2008, №145) "National Action Plan of the Forestry of the Kyrgyz Republic for 2006-2010".

34. Concept of the Forestry Sector Development of the Kyrgyz Republic approved by the Government of the Kyrgyz Republic as of April 14, 2004, № 256.
35. Resolution of the Government “On Concept of Education Development in the Kyrgyz Republic till 2020” as of March 23, 2012, № 201.
36. Concept of Environmental Safety as basic strategic document to conduct state policy on environment protection and rational nature use. Resolution of the Government of the Kyrgyz Republic as of October 16, 2007, №46
37. National Framework Programme within the Central Asian Countries Initiative on Land Management (CACILM), 2006 #647-p.
38. Concept of continue-based environmental education of the Kyrgyz Republic approved by both ministries – Education and Environment. Resolution of the Government of the Kyrgyz Republic “On Setting up the Coordination Council on Education for Sustainable Development” (11.02.2005, №74).
39. Decree of the President of the Kyrgyz Republic “On state education doctrine” as of August 27, 2000, УП №244.
40. Resolution of the Government of the Kyrgyz Republic as of June 22, 2004, № 465 “Concept of agricultural policy of the Kyrgyz Republic till 2010”.
41. Regulation on State Forest Protection of the Kyrgyz Republic approved by the Resolution of the Government of the Kyrgyz Republic as of June 24, 1997, № 371.
42. Resolution of the Government of the Kyrgyz Republic “On approval of the list of priority directions of science development of the Kyrgyz Republic for 2003-2005” as of August 13, 2003, № 511.
43. Resolution of the Government of the Kyrgyz Republic “On Setting up the Coordination Council on Education for Sustainable Development” (11.02.2005, №74).
44. Resolution of the Government of the Kyrgyz Republic as of June 23, 2003, №374 “On set up of the Interagency Commission under the Government of the Kyrgyz Republic on WTO issues”.
45. Resolution of the Government of the Kyrgyz Republic №369 as of July 23, 2001 “On measures on implementation of the Framework Convention on Climate Change”.
46. Resolution of the Government of the Kyrgyz Republic “On Measures on use of outrun pastures of the Kyrgyz Republic” as of November 30, 1998, № 775.
47. Resolution of the Government of the Kyrgyz Republic “On approval of the regulation on leasing and use of the pastures” as of June 19, 2009, №386.
48. Resolution of the Government of the Kyrgyz Republic “On National Plan of the Kyrgyz Republic on Environment Protection of the Kyrgyz Republic” as of January 29, 1996, № 43.
49. Resolution of the Government of the Kyrgyz Republic “On implementation of the Cartagena Protocol on Biological Safety to the UN Convention on Biological Diversity” as of September 15, 2005, № 433.
50. Resolution of the Government of the Kyrgyz Republic “Concept of cooperation between the public associations, public funds, non-governmental organizations and state bodies of the Kyrgyz Republic” as of March 25, 2004, #200.
51. Resolution of the Government of the Kyrgyz Republic as of April 14, 2004, №256 “On approval of the Concept of Forestry Development of the Kyrgyz Republic till 2025”.
52. Resolution of the Government of the Kyrgyz Republic №310 as of July 25, 2005 “On status of the Chatyr-Kul Lake as a wetland having international importance”.
53. Resolution of the Government of the Kyrgyz Republic №901 as of December 30, 2006 “On control and surveillance of safety measures in field of veterinary, plant quarantine, epidemiology, sanitary and environment conducted by the state authorities”.
54. Resolution of the Government of the Kyrgyz Republic №802 as of November 25, 2002 “Action Plan on implementation of proposals on comprehensive tourism development in the Issyk-Kul region”.
55. Resolution of the Government of the Kyrgyz Republic as of November 23, 2007, №506 “Concept of environmental safety of the Kyrgyz Republic”.
56. Resolution of the Government of the Kyrgyz Republic as of August 3, 2002, № 524 “On approval of the Biodiversity Conservation Strategy of the Kyrgyz Republic”.
57. Resolution of the Government of the Kyrgyz Republic as of January 24, 2000, №40 “On approval of the regulation on the Biosphere Reserve Issyk-Kul”.

58. Resolution of the Government of the Kyrgyz Republic as of April 28, 2005, №170 “On approval of the list of rare and endangered species of animals and plants for their inclusion in the Red Book of the Kyrgyz Republic” under the Government regulation of the Kyrgyz Republic 25.07.2009 # 471
59. Resolution of the Government of the Kyrgyz Republic as of April 11, 2008, № 145 “On the National Forest Inventory”.
60. Decision of the Security Council of the Kyrgyz Republic “On status, draft concept and measures ensuring environmental safety of the Kyrgyz Republic” as of August 4, 1997.
61. Directive of the State Agency on Environmental Protection and Forestry under the Government of the Kyrgyz Republic as of August 6, 2007, №01-13/180 “On approval of the Strategy and Action Plan on development of the electronic informational resources in the forestry sector of the Kyrgyz Republic”. The Law of the Kyrgyz Republic “On Plant Quarantine” as of January 12, 2015, №2.

Appendix 2: International Conventions and Agreements (cut off 2008)

The following listing is reproduced from the latest (2008) and Fourth National Report on Conservation of Biodiversity of the Kyrgyz Republic prepared for submission to the Convention Secretariat on Biodiversity.

Conventions:

1. Convention on protection of the World Cultural and Natural Heritage (1995)
2. Convention on Biological Diversity (1996)
3. Convention on Combating Desertification in the countries facing severe draught and/or desertification especially in Africa (1999)
4. Convention on transboundary air pollution on long distances (2000)
5. Convention on Environmental Impact Assessment in transboundary context (2001)
6. Convention on access to information, public participation in decision-making process and access to justice on issues related to environment (2001)
7. Convention on Wetlands having international importance mainly as habitats of the waterfowl (Ramsar) (2002)
8. UN Framework Convention on Climate Change (2000)
9. Kyoto Protocol to the UN Framework Convention on Climate Change (2003)
10. Cartagena Protocol on Biological Diversity to the UN Convention on Biological Diversity (2005)
11. UN Convention on International Trade of Endangered Species (CITES) (1973)
12. Stockholm Convention on Persistent Organic Pollutants (2002)
13. Rotterdam Convention on procedure of preliminary sound agreement in terms of specific hazardous chemicals and pesticides in international trade (2002)
14. UN Convention on protection new sorts of plants (2000)
15. Basel Convention on control of transboundary transportation of hazardous waste and its removal (1996)
16. Convention of the European and Mediterranean organization on plants protection (ratified by the Resolution of the Government of the Kyrgyz Republic as of April 12, 1999, № 214)
17. Vienna Convention on ozone layer protection and Montreal Protocol on depleting substances (2000)

Agreements:

18. Agreement on partnership and cooperation between the European Community and its states-members from one hand and the Kyrgyz Republic from other hand as of 09.02.1995, Brussels (ratified by Law of the Kyrgyz Republic as of 05.07.1997, № 43);
19. Agreement between the Government of the Kyrgyz Republic, the Government of the Republic of Uzbekistan and the Government of the Republic of Kazakhstan on Cooperation in field of conservation of biodiversity of the Western Tien-Shan as of 17.03.1998, Bishkek (signed by the Prime-Minister of the Kyrgyz Republic on 17.03.1998);
20. Agreement on Intention between the Interstate Sustainable Development Commission (ISDC) and the Central Asian WWF Programme on implementation of "Econet" in the region. ISDC's decision №3 as of November 16, 2007, Bishkek.
21. Agreement between the CIS countries on cooperation in field of plant quarantine as of November 13, 1992, Moscow (signed by the Prime-Minister of the Kyrgyz Republic on November 13, 1992);
22. Agreement between the Ministry of Agriculture, Water Resources and Processing Industry of the Kyrgyz Republic and the Ministry of Agricultural Policy of Ukraine on Cooperation in field of testing and protection of the plant sorts (Kiev, March 28, 2003).
23. Agreement between t Government of the Republic of Kazakhstan, the Government of the Kyrgyz Republic, the Government of the Republic of Tajikistan and the Government of the Republic of Uzbekistan on Cooperation in field of plant quarantine as of June 8, 2000, Astana (signed by the Prime-Minister of the Kyrgyz Republic on June 8, 2000).

24. Agreement on Cooperation in field of environmental protection (the Almaty's Declaration of the Presidents of Central Asia, 1997; the Tashkent's Declaration of the Special UN Programme for Central Asia, 1998; the Dushanbe's Declaration, 2002).
25. Agreement between the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and the Republic of Uzbekistan on Cooperation in field of integrated management in use and protection of interstate water resources (1992).
26. Agreement on Cooperation in emergency prevention and mitigation between the Republic of Kazakhstan, the Kyrgyz Republic, the Republic of Tajikistan and republic of Turkmenistan (1997).
27. Agreement TRIPS within WTO (1998)
28. Agreement on Sanitary and Phytosanitary control within WTO (1998)

Appendix 3: Summary of 19 October 2012 Biodiversity Focus Group Meeting in Bishkek (English)

Summary Document for Kumtor Gold Company Biodiversity Strategy workshop Prepared by Fauna & Flora International in the Kyrgyz Republic (26 November 2012)



On 19 October 2012, “Kumtor Gold Company” (KGC) and “PRIZMA” LLC held a workshop entitled “Development of Biodiversity Strategy” in Bishkek, Kyrgyzstan. This involved a wide range of stakeholders, including representatives of state, academic and non-governmental institutions, as well as international conservation organizations (see attached program and list of participants).

Presentations by the Participants and Discussion

The workshop was opened by **Mr. Ben Ferris**, Director for Environment of KGC and facilitated by **Mr. Mehrdad Nazari**, Director of “Prizma” LLC. The aim of the seminar was to discuss the development of KGC’s Biodiversity Strategy. Taking into consideration KGC’s planned closure in 2021, the company has set a goal of ensuring that biodiversity value and continued collaboration remain high on the agenda in its compliance, enhancement and global strategy orientation. Thus, the organizers outlined three main directions for the Biodiversity Strategy:

- further integration of biodiversity conservation in the environmental and closure planning;
- seeking net-positive conservation measures; and,
- collaboration and cooperation with stakeholders.

According to Mr. Nazari, the KGC Biodiversity Management Strategy and Plan is intended to cover KGC’s licensed area, but would also consider including a larger region to ensure its effectiveness and to avoid missing possible collaboration opportunities. The Kumtor-Biodiversity Management Plan is to be completed before the end of 2012. Mr Nazari also emphasized that the Plan is intended to seek shared solutions to biodiversity conservation among stakeholders, while seeking opportunities for positive impacts and interactions.

KGC’s readiness to develop its own Biodiversity Strategy received warm welcome from participants. The workshop participants recognized that whilst KGC operated within a framework of international environmental standards, the mining industry in general is intrinsically disruptive to eco-systems, which often cannot be restored to their original state following mine closure. It was noted that the Rio +20 Conference has recently demonstrated that despite global efforts to protect nature, no country in the world has achieved significant progress in halting the loss of nature. It was agreed that Kyrgyzstan, a signatory of many international conventions, finds itself in a similar situation. The national-level Biodiversity Strategy developed in 1995 has not been effectively implemented.

The first guest speaker, **Professor Emil Shukurov**, prominent scientist and the Director of the ecological movement “Aleyne”, suggested that the Biodiversity Strategy should be systematic and complex. Prof. Shukurov prefaced his comments with general concerns about the mining industry posing a threat to nature and also criticism about any country’s hopes for development relying solely on supply of natural resources.

Professor Shukurov also began by stating that the fact that KGC will develop a Biodiversity Management Plan is a productive step and could contribute toward developing a new National cause for Biodiversity Conservation, in light of the fact that despite creation of Nature Reserves, passing laws, etc. “nature continues dying”. He then highlighted a brief history of the KR National Biodiversity Plan – and emphasized that “actions and good examples are needed to demonstrate commitment to biodiversity conservation”, moving to concrete ideas and proposals that adopt a systematic, ecosystem approach that protect habitats and ecosystems in a comprehensive manner – instead of focusing on only species. Prof. Shukurov also expressed his deep concern regarding hunting concessions in the vicinity of the Kumtor mine and the Sarychat-Ertash State Reserve (SESR). Remembering expeditions held in the 1950s, when he was able to observe herds of argali thousands strong, he noted that there were no such herds left. Prof. Shukurov believes that hunting agencies should be improving livelihoods of local communities; however, this is not the case. Hunting agencies are practically engaged in exploitation of wildlife resources. Other threats to biodiversity include competition through overgrazing, loss of food base, and the spread of infectious diseases via contacts with domestic animals leading to weakening of populations of ungulates.

At the same time, the Prof. Shukurov pointed towards means of addressing these issues, which were not always costly and recommended looking for simple solutions that use “natural processes”. He recommended conservation efforts for forested areas which hold half of the biodiversity of KR, but occupy only 17% of the area of the country. For example, reforestation could be achieved, not through planting new trees, but through fencing, since nature has very powerful regeneration resources and is able to restore itself if adequately protected.

He also emphasized the importance of pasture ecosystems and an important task is to identify natural ecosystems as genetic reserves, managing for “correct use” and including all components, including herbs, forbs, invertebrates, etc. He suggested that terracing could be used to improve quality of grassland and reduce erosion.

Prof. Shukurov recommended conservation directions that enable “maximum participation with the maximum number of stakeholders”. Professor Sukurov also introduced the concept of “Micro-Reserves” and/or “demonstration plots” that involve working with local communities, especially youth groups, re-iterating the need for support groups within the general population.

He also recommended vaccination programs for livestock and guarding dogs, creation of a small public council and having “advisors” to settlements, creation of jobs – such as planting of quick growing trees, or culturing of plants used for indigenous handicrafts, creation of various forms of Co-ops, and continuous awareness raising work about the importance of the environment and conservation.

The overall approach, according to Prof. Shukurov, should be ecosystem based rather than focused on particular species.



Mr. Kylychbek Jundubaev, Senior Biodiversity Specialist from the State Agency of Environmental Protection and Forestry under the Government of the Kyrgyz Republic, gave a clear overview of the Agency's work and also informed participants about Agency restructuring planned for 2013. Mr. Jundubaev pointed out that continuous changes of status, and restructuring of the institution, has been the major reason for weak biodiversity conservation to date. This has impacted not only on KGC's neighbor, the SESR, but also other nature reserves and national parks. The number of specialists in the Department of Specially Protected Areas and Biodiversity Protection within the Agency has decreased from 7 to 2 in the last few years. Frequent changes in senior management, lack of staff and limited capacity, are some of the reasons causing delay in approval of such documents as the SESR's Management Plan. Mr. Jundubaev reassured participants that the Agency highly respected its partners' initiatives; however, these kinds of factors sometimes prevented the adoption of excellent documents.

Mr. Jundubaev also stated that a government discussion of "SCER buffer Zones" will be addressed in the upcoming National Biodiversity Action Plan (2013). He expected (some form) of the KGC biodiversity plan to be included as an appendix to the new National Action Plan.

He also recognized the need for National inventories of all "zapovedniks and national parks, and the urgent need for biodiversity monitoring", also stating he was happy to see actions taken by KGC to include environmental monitoring (land, air, water) in addition to complex monitoring of biodiversity.

He also stated a specific need to identify "routes of migration" and mechanisms of assessment within the framework of Socio-economic development; a priority to look at ecosystem functioning; addressing issues arising from Protected areas located near sub-soil resources; and synergy of geological and environmental issues. Mr. Jundubaev closed in stating that he hoped Kumtor's biodiversity management plan would serve as an example for other industry in KR.

Director of the Kyrgyz branch office of the UK-based conservation organization Fauna & Flora International (FFI), **Ms. Jarkyn Samanchina**, shared the organization's experience in biodiversity conservation efforts in Central Asia and China. She particularly emphasized FFI's global corporate partnership experience encompassing almost 40 countries where FFI implements its programs. In Kyrgyzstan, in 2005–2008, together with its local partners, FFI implemented the first Technical Cooperation project titled "Institutional Capacity Building for Biodiversity Conservation in Kyrgyzstan". The project was funded by the European Bank for Reconstruction and Development, International Finance Corporation, and KGC. The project focused on the SCSR and included several main components, such as: 1) strengthening the material and technical base of

the Reserve; 2) developing an anti-poaching strategy; 3) developing a biodiversity monitoring strategy; 4) developing the SESR Management Plan; and, 5) improving livelihoods of local communities through a targeted Small Grants Program.

This project was an excellent example of cooperation and yielded many positive outcomes with relatively modest funding. Ms. Samanchina stated that despite the Reserve's Management Plan not having been officially adopted by the State Agency, it had been a good tool for the Reserve's organizational development and had enabled progress with their biodiversity conservation work. However, as the Management Plan was developed more than 5 years ago, it now required revisiting, updating and most importantly, support to implement management actions.

She expressed FFI's openness for future collaboration within that scope of work, and noted that this approach would "need continuity" and also require long-term planning "with greater detail" to achieve maximum efficiency.

Deputy Director of the SESR, **Mr. Alexander Vereschagin**, informed participants about the Reserve and its work, including details of past projects implemented with FFI and Snow Leopard Trust. Mr. Vereshagin highlighted results of over 140 expeditions, the significant restoration of the forage base (within the Reserve); and detailed increases in numbers of argali, ibex and snow leopards (now 18 within the SCER boundaries), showing increases in populations of "all key species". He also shared updates on some more recent activities on radio-collaring of ungulates together with Japanese scientists, and steps towards developing the economic self-sustainability of the Reserve with support from WWF. Mr Vereshagin spoke of good historic relations between KGC and SCER, citing only a recent (2010-2012) dispute over buffer zones. According to Mr. Vereschagin, the territory of the Reserve has been reevaluated using GIS and is the core area is 62,060 ha. In his interpretation, including buffer zones, the Reserve is now believed to be 149,117.9 hectares. The Reserve is also intended to become a corridor to link with a soon-to-be-established new Reserve – *Khan Tengri*. Echoing Prof. Shukurov's concerns about hunting concessions, including pressure from "hunting farms" – suggesting control of "single point of access for hunting",

Mr. Vereschagin mentioned that the people of Ak-Shyirak Village, situated near the Reserve and where most of the rangers lived with their families, did not have its own hunting territory. The land around the village has been bought and is now under private ownership, a violation of local people's rights. Mr. Vereschagin believes that following successful examples from Pakistan, pilot community-based hunting could be implemented in the villages of Ak-Shyirak and Enilchek. Interestingly, the number of ungulates has increased in the recent years despite, or, perhaps, thanks to the presence and guarding measure undertaken by the Kumtor mine. Other issues raised in his presentation included the need for species inventory, improvement of the material and technical base of the Reserve, and, most importantly, more information, awareness, advertising work about the Reserve and the importance of biodiversity conservation work among local community members, as well as broader public.

Mr. Vereshagin also discussed future needs, including: remote sensing (photo traps and radio collars) for ibex and wolves; the pressing need to document and identify migration routes; the creation of a data base; and general lack of resources for the Reserve and staff that has been stated elsewhere.

Mr. Vereshagin asked the rhetorical question "what will happen when Kumtor leave?" and was also keen to emphasize the great opportunities for SCER and Kumtor working together on several fronts, including opportunities with regard to "co-finance" for mutual activities with outside researchers and institutions. Finally, Mr. Vereshagin made a general request for Kumtor support for joint work to preserve the "Natural Wealth" of KR, which belongs to all the people.



Discussions among all the participants, following Mr. Vereshagin's presentation then identified several "Key Problems" pertaining to biodiversity on the National level:

- Hunting Farms
- Logistical Support of protected areas
- Common research goals and strategies
- Maintenance of "ecological corridors"
- Impacts to water
- Preservation of flora and fauna

Mr. Joldoshbek Kyrbashev, Deputy Director of the Naryn State Reserve, gave a very informative presentation about the Reserve's work, including the most recent activities supported by FFI: the baseline surveys in zoology, hydrobiology, entomology, and botany, carried out jointly with specialists from the National Academy of Sciences of the Kyrgyz Republic; and training to help develop a biodiversity monitoring strategy.

The Naryn Reserve's second Deputy Director, **Mr. Orozbek Aliev**, shared with participants the concern felt by residents of the Naryn Region about the Naryn River's change of color and its lack of freezing during the winter. People in Naryn often assume that these changes are caused by KGC's mining activities, and believe that further research is needed to get to the bottom of this issue. He also mentioned the Reserve's lack of a laboratory, which prevents them from performing water quality tests. This question was addressed by Mr. Ferris, who assured the participants that these observed changes could be caused by several other factors, such as city garbage/pollution, but not by Kumtor, which is situated a significant distance from Naryn. He also stressed that KGC worked in accordance with international standards and complied with all regulations.

Mr. Kyrbashev also highlighted several successful initiatives currently underway with the Naryn Reserve, including: the Nursery activities for endangered red deer; the Naryn Environmental Center and Museum of Nature; Environmental eco-tourism efforts to show the unique flora and fauna, yet also stated some of the similar problems stated elsewhere in the workshop - including low salaries and lack of resources and staff; pressures from hunting- including foreign trophy hunting; and general concerns over water quality.

Dr. Georgy Lazkov, Leading Specialist in botany from the National Academy of Sciences, in his presentation about the flora around the Kumtor area, said that there were 205 plants from 30 families found in the area, including only 4 trees in the form of shrubs and semi-shrubs. In the SCER area, there are just over 500 plants. Overall, the flora in the area around Kumtor and in SCER is very depauperate due to severe climate and long winters. It is not unique and very typical of the Central Tien Shan, including China and Kazakhstan. There is only one Red Data Book species, *Tulipa tetraphylla*, actually collected in Barskoon Village area (and noted that this species is, in fact, more widely distributed in the Central Tien Shan region). Dr Lazkov also discussed another "endemic" species of dandelion- that may also have a wider distribution in the Central Tien Shan region.

However, he noted the Red Data Book is lacking in data on many plant species, and it is possible that there are other rare plants in the region. Dr. Lazkov suggested that after the mine closure, it would be very worthwhile to plant seeds of dominant species from native species of vegetation, using an ecosystem approach. It is important to make sure these seeds are from the local area, and not brought from elsewhere, because that would create anthropogenic communities which either cannot grow or, if successful, create problems for the area in future.

In discussions following Dr Lazkov's presentation Professor Shukurov recommended that Kumtor reclamation efforts should also focus on conservation of productive ecosystems, rather than solely focusing on areas with high environmental impact, such as waste rock areas.

Mr. Bakytbek Satybekov, Director of Central Asia Regional Environmental Center (CAREC), provided an overview of the organization's work, which focused on nature preservation; best industry practices; multi-stakeholder dialogues - especially trans-boundary water issues; GAP analysis of Climate Change; and water and energy efficiency. He said that although CAREC did not have projects directly related to biodiversity conservation, it worked on the National Plan on Climate Change Adaptation, and had also worked directly with several projects in the Issyk-Kul, including some 57 youth organizations and smaller projects to raise environmental awareness, such as cleaning of beaches.

Mr. Tolkunbek Asykulov, Director of the Kyrgyz branch office of the German nature protection organization NABU, talked about general activities in the Issyk-Kul Biosphere Reserve, including: monitoring, ecotourism, rehabilitation of environments, tracking numbers of birds in the Issyk-Kul area; and the organization's snow leopard protection activities in Kyrgyzstan, including awareness raising, community work, collaboration with

law enforcement agencies, and NABU's special group of enforcement officers (anti-poaching group), known as "Gruppa Bars" ('snow leopard group'). Mr. Asykulov also informed the participants about the upcoming Snow Leopard Forum to be held in the summer of 2013 in Bishkek, and the steps being taken to organize this event.

Exercises during the Workshop

During the course of the workshop, in addition to discussions during and following presentations, the participants collaborated in several individual and group exercises.

The first, a warm-up exercise, was aimed at developing a model cover page for the future KGC Biodiversity Strategy document. Participants individually chose from a list of choices and constructed their own models to recommend to KGC and explain how and why KGC's Biodiversity Strategy cover page should be different from the country's Biodiversity Strategy cover page. The list of choices included: 1) map (description), 2) mining industry (description), 3) the Marco Polo sheep, 4) snow leopard, 5) ibex, 6) flora (title/description), 7) local community (title/description), 8) climate change (description), and 9) other.

The second exercise was done in two groups. The workshop participants were asked to answer 2 questions: 1) name 3 areas with significant lack of information for KGC's future Biodiversity Strategy, and 2) name 3 areas with significant lack of information in the Kyrgyz Republic's Biodiversity Strategy. Both groups found many similarities on information gaps for both documents.

The first group identified the following gaps for both strategies:

- lack of awareness about what biodiversity is and lack of up-to-date/truthful information about its state;
- lack of information about funding needs and the costs of biodiversity protection measures; the need for more money to be invested into awareness work in the first 3 years to pave the way for future work; the need to create public committees which would decide how resources must be spent;
- lack of information about local communities and their socio-economic situation (e.g.: stratification, poverty level, how the situation is changing, why people are forced to compensate at nature's expense, etc.);
- lack of information about test results on water and air quality, and other tests — this information should be made available to the public;
- lack of information about the plans of the mining industry — decisions must be made in agreement with specially protected areas (e.g. which territories will be affected); and,
- lack of monitoring activities on the part of the Government, although funds for such activities are budgeted.

The second group, in addition to above answers, also suggested the following:

- lack of ecosystem research — it is not possible to observe overall dynamics;
- lack of publicity — research results should be widely publicized; and,
- lack of information about the state of flora and fauna — there is no unified monitoring center.

The third exercise asked participants to give their final recommendations to KGC to consider in developing its Biodiversity Strategy document. The following recommendations were given:

- KGC is to pay attention to biodiversity;
- conduct regular monitoring of environmental and economic aspects of the mining industry;
- support the updating and approval of the SESR's Management Plan; support the implementation of the Plan; and, help to bring the Reserve to a world class level;
- include the broader ecosystem, especially the Naryn Reserve, in KGC's Biodiversity Strategy;
- conduct active research and provide proper coverage of scientific results in the mass media;
- support the training of existing and future specialists in biodiversity;

- collaborate with local communities; implement KGC's own grant program; and, implement projects on strengthening monitoring work; and,
- disregard political motives and be open towards collaboration and partnership;
- understand the context and fulfill expectations.

The workshop organizers summarized the workshop discussions and thanked all participants for active participation. An announcement was made that all materials presented and developed at the workshop would be made available to all on a CD or memory stick.

In closing of the meeting, Professor Shukurov stated that the workshop provided a "good discussion" with much constructive thinking and little conflict of opinion. He recommended several separate major directions for the stakeholders to pursue, including:

A cooperative effort relating to biodiversity with local communities, and with the assistance of stakeholders and experts to address conservation of important ecosystem, within the framework of "Project(s)" including participation of Kumtor and other entities;

Strengthening of biodiversity monitoring with the assistance of experts using appropriate indicators; and

Implementation of specific (biodiversity) programs within the National legal framework, including institutions and public participation with clear goals and objectives.

Appendix 4: Program and Participants of Kumtor’s October 2012 Biodiversity Focus Group Meeting

Program: Workshop “Development of Biodiversity Strategy”; Location: “Zolotoi Drakon” Hotel, Date: 19 October 2012, Organizers: “Kumtor Gold Company” and “Prizma” LLC

Time	Presentation
9.00	Workshop Welcoming Speech by Ben Ferris, Environment Director, KGC, and Mr. Mehrdad Nazari, Director, Prizma
9.20	Speech by Prof. Emil Shukurov <i>“Cooperation with Mining Industry for Conservation of Biodiversity in the Kyrgyz Republic”</i> (includes 10 minutes for Q&A and discussion)
9.55	Presentation by Mr. Kylychbek Jundubaev <i>“The Impact of Mining on Biodiversity”</i> (includes 10 minutes for Q&A and discussion)
10.30	Presentation by Ms. Jarkyn Samancina <i>“FFI’s Activities and Experience Working in the Kyrgyz Republic, including Cooperation with EBRD, IFC, and KGC”</i> (includes 10 minutes for Q&A and discussion)
11.05	Presentation by Mr. Ishemkul Asakeev and Mr. Alexander Verschagin <i>“Activity of the Sarychat-Ertash Reserve for Conservation of Biodiversity”</i> (includes 10 minutes for Q&A and discussion)
11.40-12.00	Coffee- break
12.00	Presentation by Orozbek Aliev and Joldoshbek Kyrbashev <i>“Activity of the Naryn Reserve for Conservation of Biodiversity”</i> (includes 10 minutes for Q&A and discussion)
12.35	Speech by Dr. Georgy Lazkov <i>“State of Flora around the Kumtor Mine”</i> (includes 10 minutes for Q&A and discussion)
13.05-14.00	Lunch
14.00	Presentation by Mr. Bakytbek Satybekov <i>“Activity of CAREC in Kyrgyzstan”</i> (includes 10 minutes for Q&A and discussion)
14.35	Presentation by Mr. Tolkunbek Asykulov <i>“Activity of NABU in Kyrgyzstan”</i> (includes 10 minutes for Q&A and discussion)
15.05-15.25	Coffee- break
15.25-16.30	Workshop Summary and Closing

List of Participants

1. Emil Shukurov – Professor, Director of Environmental Movement “Aleyne”
2. Kylychbek Jundubaev– Senior Biodiversity Specialist, Specially Protected Areas and Biodiversity Protection Department, State Agency of Environmental Protection and Forestry under the Government of the Kyrgyz Republic

3. Ishenkul Asakeev – Deputy Director of the Sarychat-Ertash State Reserve
4. Alexander Vereschagin – Deputy Science Director of the Sarychat-Ertash State Reserve
5. Orozbek Aliev – Deputy Director of the Naryn State Reserve
6. Joldoshibek Kirbashev - Deputy Science Director of the Naryn Reserve
7. Dr. Georgy Lazkov– Leading Specialist of the Flora Laboratory, Institute of Biology and Soil, National Academy of Sciences of the Kyrgyz Republic
8. Jarkyn Samanchina – Director, Fauna & Flora International – Kyrgyzstan
9. Tolkunbek Asikulov – Director, NABU – Kyrgyzstan
10. Bakytbek Satybekov– Director, CAREC – Kyrgyzstan
11. Dr. Don Proebstel, Senior Biodiversity & ESIA Advisor, “Prizma” LLC
12. Mehrdad Nazari, Senior ESIA & CSR Advisor, Director, “Prizma” LLC
13. Douglas Grier – Director, Sustainable Development, KGC
14. Eric Kojomkulov – Health, Safety & Environmental Systems Manager, KGC
15. Ben Ferris - Director, Environment, KGC
16. Aibek Abduvaliev- Manager, Environment, KGC
17. Uran Junusov – Coordinator, Sustainable Development, KGC
18. Aygerim Dyikanbaeva - Coordinator, Sustainable Development, KGC

Appendix 5: Plant Species found in the region of the Kumtor Mine Site (G. Lazkov, 1992, in Russian)

List of species recorded around the Kumtor Mine

№	Семейство, виды (латинское название)	Семейство, виды (русское название)
1	Alliaceae J. Agarrdh.	Луковые
1	<i>Allium atrosanguineum</i> Kar. et Kir.	Лук черно-красный
2	<i>A. platyspathum</i> Schrenk	Лук широкочехольчатый
3	<i>Allium semenowii</i> Regel	Лук Семенова
2	Asteraceae Dumort.	Астровые
4	<i>Ajania scharnhorstii</i> (Regel et Schmalh.) Tzvel.	Аяния Шанхорста
5	<i>Artemisia aschurbajewii</i> C. Winkl.	Полынь Ашурбаева
6	<i>A. dracunculus</i> L.	Полынь эстрагон
7	<i>A. rhodantha</i> Rupr.	Полынь розовоцветковая
8	<i>A. viridis</i> Willd.	Полынь зеленая
9	<i>Aster alpinus</i> L. s. l.	Астра альпийская
10	<i>Cirsium esculentum</i> (Stev.) C. A. Mey.	Бодяк съедобный
11	<i>Crepis multicaulis</i> Ledeb.	Скерда многостебельная
12	<i>C. karelinii</i> M. Pop. et Schischk.	Скерда Карелина
13	<i>Erigeron aurantiacus</i> Regel	Мелколепестник оранжевый
14	<i>E. azureus</i> M. Pop.	Мелколепестник лазоревый
15	<i>E. heterochaeta</i> (Clarke) Botsch.	Мелколепестник разнощетиноквый
16	<i>E. lachnocephalus</i> Botsch.	Мелколепестник шерстистоголовый
17	<i>Inula rhizocephala</i> Schrenk	Девясил корнеглавый
18	<i>Leontopodium ochroleucum</i> Beauverd	Эдельвейс бледно-желтый
19	<i>Ligularia alpigena</i> Pojark.	Бузульник альпийский
20	<i>Pyrethrum karelinii</i> Krasch.	Ромашник Карелина
21	<i>Pyrethrum pyrethroides</i> (Kar. et Kir.) Krasch.	Ромашник ромашковидный
22	<i>Rhinactinidia limoniifolia</i> (Less.) Botsch.	Ринактинидия кермеколистная
23	<i>Saussurea leucophylla</i> Schrenk	Горькуша серебристолистная
24	<i>S. sordida</i> Kar. et Kir.	Горькуша грязноцветковая
25	<i>S. gnaphalodes</i> (Royle) Sch. Bip.	Горькуша сушеницевидная
26	<i>S. glacialis</i> Herd.	Горькуша ледниковая
27	<i>Taraxacum leucanthum</i> (Ledeb.) Ledeb.	Одуванчик белоцветковый
28	<i>T. taracandicum</i> Kovalevsk. (= <i>T. pseudoalpinum</i> Schischk. ex Orazova)	Одуванчик самаркандский
29	<i>T. syratorum</i> Dshanaeva	Одуванчик сыртовый
30	<i>T. sp.</i>	
31	<i>Waldheimia tomentosa</i> (Decne.) Regel (<i>W. stoliczkae</i> (Clarke) Ostenf.)	Вальдгеймия войлочная
32	<i>W. tridactylites</i> Kar. et Kir.	Вальдгеймия трехлопастная

3	Athyridaceae Alst.	Антириевые
33	<i>Cystopteris fragilis</i> (L.) Borb.	Пузырник ломкий
4	Boraginaceae Juss.	Бурачниковые
34	<i>Eritrichium villosum</i> (Ledeb.) Bunge	Незабудочник мохнатый
35	<i>Myosotis</i> ? <i>alpestris</i> F.W. Schmidt	Незабудка ? альпийская
5	Botrychiaceae Horan.	Гроздовниковые
36	<i>Botrychium lunaria</i> (L.) Sw.	Гроздовник полулунный
6	Brassicaceae Burnett	Капустные
37	<i>Braya rosea</i> Bunge	Брайя розовая
38	<i>B. scharnhorstii</i> Regel et Schmalh.	Брайя Шарнхорста
39	<i>Chorispora bungeana</i> Fisch. et C. A. Mey.	Хориспора Бунге
40	<i>C. songarica</i> Schrenk	Хориспора джунгарская
41	<i>Dilophia salsa</i> Thoms.	Двукильник солончаковый
42	<i>Draba altaica</i> (C. A. Mey.) Bunge	Крупка алтайская
43	<i>D. ochroleuca</i> Bunge	Крупка желто-белая
44	<i>Draba oreades</i> Schrenk	Крупка горная
45	<i>D. subamplexicaulis</i> C. A. Mey.	Крупка почти стеблеобъемлющая
46	<i>Eutrema edwardsii</i> R. Br.	Эвтрема Эдвардса
47	<i>Hedinia tibetica</i> (Thoms.) Ostenf.	Хединия тибетская
48	<i>Lepidium apetalum</i> L.	Клоповник безлепестный
49	<i>Neotorularia humilis</i> (C. A. Mey.) Hedge et J. Leonard	Неоторулярия низкая
50	<i>Oreoblastus flabellatus</i> (Regel) Suslova	Ореобластус веерный
51	<i>Sisymbriopsis mollipila</i> (Maxim.) Botsch.	Гулявничек мягковолосый
52	<i>Smelowskia calycina</i> (Steph.) C. A. Mey.	Смеловския чашечная
53	<i>Sophiopsis annua</i> (Rupr.) O. E. Schulz	Софийка однолетняя
54	<i>Sisymbrium brassiciforme</i> C. A. Mey.	Гулявник купустовидный
55	<i>Taphrospermum altaicum</i> C. A. Mey.	Ямкосемянник алтайский
7	Campanulaceae Juss.	Колокольчиковые
56	<i>Adenophora himalayana</i> Feer	Бубенчик гималайский
57	<i>Codonopsis clematidea</i> (Schrenk) Clarke	Кодонопис ломоносовидный
8	Caprifoliaceae Juss.	Жимолостные
58	<i>Lonicera hispida</i> Pall. ex Schult.	Жимолость щетинистая
59	<i>Lonicera semenovii</i> Regel	Жимолость Семенова
9	Caryophyllaceae Juss.	Гвоздичные
60	<i>Cerastium bungeanum</i> Vved.	Ясколка Бунге
61	<i>Cerastium cerastoides</i> (L.) Britt.	Ясколка ясколковидная
62	<i>C. lithospermifolium</i> Fisch.	Ясколка воробейниколистная
63	<i>Gastrolychnis apetala</i> (L.). Tolm. et Kozhanczиков	Гастролихнис безлепестный

64	<i>Minuartia biflora</i> (L.) Schinz et Thell.	Минуарция двухцветковая
65	<i>M. stricta</i> (Sw.) Hiern. (=M. schischkinii Adyl.)	Минуарция прямая
66	<i>M. verna</i> (L.) Hiern.	Минуарция весенняя
67	<i>Silene graminifolia</i> Otth	Смолевка злаколистная
68	<i>Stellaria brachypetala</i> Bunge	Звездчатка коротколепестная
10	Chenopodiaceae Vent.	Маревые
69	<i>Chenopodium foliosum</i> Aschers.	Марь олиственная
70	<i>Microgynoecium tibeticum</i> Hook. fil.	Микрогинециум тибетский
71	<i>Suaeda olufsenii</i> Pauls.	Сведа Олуфсена
11	Crassulaceae DC.	Толстянковые
72	<i>Rhodiola coccinea</i> (Royle) Boriss.	Родиола ярко-красная
73	<i>Rh. gelida</i> Schrenk	Родиола холодная
74	<i>Rhodiola linearifolia</i> Boriss.	Родиола линейнолистная
12	Cyperaceae Juss.	Осоковые
75	<i>Baeothryon pumilum</i> (Vahl) Á. et D.Löve	Пухонос приземистый
76	<i>Carex atrofusca</i> Schkuhr V.Krecz.)	Осока черно-бурая
77	<i>C. dimorphothea</i> Stschegl. (=C. stenophylloides V. Krecz.).	Осока разноплодная
78	<i>C. melanantha</i> C. A. Mey.	Осока черноцветковая
79	<i>C. orbicularis</i> Boott	Осока округлая
80	<i>C. pseudofortida</i> Kuk.	Осока ложновонючая
81	<i>C. stenocarpa</i> Turcz. ex V.Krecz.	Осока узкоплодная
82	<i>Kobresia capilliformis</i> Ivanova	Кобрезия волосовидная
83	<i>Kobresia humilis</i> (Trautv.) Serg.	Кобрезия низкая
84	<i>Kobresia stenocarpa</i> (Kar. et Kir.) Steud.	Кобрезия узкоплодная
13	Dipsacaceae	
85	<i>Scabiosa alpestris</i> Kar. et Kir.	Скабиоза высокогорная
14	Ephedraceae Dumort.	Эфедровые
86	<i>Ephedra regeliana</i> Florin	Эфедра Регеля
15	Fabaceae Lindl.	Бобовые
87	<i>Astragalus abramovii</i> Gontsch.	Астрагал Абрамова
88	<i>A. alatavicus</i> Kar. et Kir.	Астрагал алатавский
89	<i>A. alpinus</i> L.	Астрагал альпийский
90	<i>A. densiflorus</i> Kar. et Kir.	Астрагал густоцветковый
91	<i>A. kuschakewiczi</i> B. Fedtsch.	Астрагал Кушакевича
92	<i>A. nivalis</i> Kar. et Kir.	Астрагал снежный
93	<i>Caragana jubata</i> (Pall.) Poir.	Карагана гривастая
94	<i>Hedysarum kirghisorum</i> B. Fedtsch.	Копеечник киргизский
95	<i>O. chionobia</i> Bunge	Остролодочник приснежный
96	<i>O. globiflora</i> Bunge	Остролодочник шароцветный
97	<i>O. humifusa</i> Kar. et Kir.	Остролодочник стелющийся
98	<i>O. lapponica</i> (Wahlenb.) J. Gay	Остролодочник лапландский

99	<i>O. melanotricha</i> Bunge	Остролодочник черноволосый
100	<i>O. glabra</i> (Lam.) DC.	Остролодочник голый
101	<i>O. platysema</i> Schrenk	Остролодочник плоскопарусный
102	<i>Thermopsis alpina</i> (Pall.) Ledeb.	Термопсис альпийский
103	<i>Vicia semenovii</i> (Regel et Herd.) B. Fedtsch.	Вика Семенова
16	Fumariaceae DC.	Дымянковые
104	<i>Cysticorydalis fedtschenkoana</i> (Regel.) Ikonn.	Цистикоридалис Федченко
17	Gentianaceae Juss.	Горечавковые
105	<i>Comastoma falcatum</i> (Turcz.) Toyokuni	Комастома серповидная
106	<i>Gentiana algida</i> Pall.	Горечавка холодная
107	<i>Gentiana karelinii</i> Griseb.	Горечавка Карелина
108	<i>G. kaufmanniana</i> Regel et Schmalh.	Горечавка Кауфманна
109	<i>G. kirilowii</i> Turcz. (= <i>G. tianschanica</i> Rupr.)	Горечавка Кирилова
110	<i>Gentianella turkestanorum</i> (Gand.) Holub	Горечавочка туркестанцев
111	<i>Gentianopsis barbata</i> (Froel.) Ma	Гентианописис бородатый
112	<i>Lomatogonium carinthiacum</i> (Wulf.) Reichenb.	Ломатогониум каринтийский
113	<i>Swertia marginata</i> Schrenk	Сверция окаймленная
18	Geraniaceae Juss.	Гераниевые
114	<i>Geranium saxatile</i> Kar. et Kir.	Герань скальная
19	Juncaceae Juss.	Ситниковые
115	<i>Juncus triglumis</i> L.	Ситник трехчешуйный
20	Lamiaceae Lindl.	Яснотковые
116	<i>Dracocephalum heterophyllum</i> Benth.	Змееголовник разнолистный
117	<i>D. imberbe</i> Bunge	Змееголовник безбородый
	<i>D. discolor</i> Bunge (<i>D. paulsenii</i> Briq.)	Змееголовник двуцветный
118	<i>D. stamineum</i> Kar. et Kir.	Змееголовник тычиночный
119	<i>Phlomoides oreophila</i> (Kar. et Kir.) Adylov et al. (<i>Phlomis oreophila</i> Kar. et Kir.)	Фломоидес горный
120	<i>Scutellaria oligodonta</i> Juz.	Шлемник малозубый
21	Liliaceae Juss.	Лилейные
121	<i>Gagea michaelis</i> Golosk.	Гусиный лук Михаила
122	<i>G. pseudoerubescens</i> Pasch.	Гусиный лук ложнокраснеющий
123	<i>Lloydia serotina</i> (L.) Reichenb.	Ллойдия поздняя
124	<i>Tulipa heterophylla</i> (Regel) Baker	Тюльпан разнолистный
22	Papaveraceae Juss.	Маковые
125	<i>Papaver croceum</i> Ledeb.	Мак оранжевый
23	Parnassiaceae S. F. Gray	Белозоровые
126	<i>Parnassia laxmannii</i> Pall. ex Schult.	Белозор Лаксманна

24	Poaceae Barnhart	Мятликовые
127	<i>Agropyron schrenkianum</i> (Fisch. et C.A.Mey.) P.Candargy	Пырей Шренка
128	<i>Alopecurus pratensis</i> L. (A. songaricus (Schrenk) V.Petrov)	Лисохвост луговой
129	<i>Anthoxanthium alpinum</i> A. et D. Love	Пахучеколосник альпийский
130	<i>Arctopoa tibetica</i> (Munro ex Stapf) Probat.	Арктопоа тибетское
131	<i>Calamagrostis anthoxanthoides</i> (Munro) Regel	Вейник пахучеколосниковый
132	<i>C. dubia</i> Bunge	Вейник сомнительный
133	<i>Deschampsia caespitosa</i> (L.) Beauv.	Луговик дернистый
134	<i>D. koelerioides</i> Regel	Луговик тонконоговидный
135	<i>Elymus tschimganicus</i> (Drob.) Tzvel.	Колосняк чимганский
136	<i>E. schrenkianus</i> (Fisch. et C. A. Mey.) Tzvel.	Колосняк Шренка
137	<i>Festuca alata</i> (St.-Yves) Roshev.	Овсяница алатавская
138	<i>F. valesiaca</i> Gaudin	Овсяница валезийская
133	<i>Helictotrichon desertorum</i> (Less.) Nevski	Овсец пустынный
140	<i>H. hookeri</i> (Scribn.) Henrard (H. asiaticum (Roshev.) Grossh.)	Овсец Гукера
141	<i>H. pubescens</i> (Huds.) Pilg.	Овсец опушенный
142	<i>Hierochloe odorata</i> (L.) Beauv.	Зубровка душистая
143	<i>Hordeum brevisubulatum</i> (Trin.) Link	Ячмень короткошиловидный
144	<i>Leymus dasystachys</i> (Trin.) Pilg.	Леумус пушистоколосый
145	<i>Paracolpodium altaicum</i> (Trin.) Tzvel.	Параколподиум алтайский
146	<i>Poa alpina</i> L.	Мятлик альпийский
147	<i>Poa litvinoviana</i> Ovcz.	Мятлик Литвинова
148	<i>Ptilagrostis mongolica</i> (Trin.) Griseb.	Птилагростис монгольский
149	<i>Stipa subsessiliflora</i> (Rupr.) Roshev.	Ковыль сидячецветковый
150	<i>Trisetum spicatum</i> (L.) K. Richt.	Трищетинник колосистый
25	Polygonaceae Juss.	Гречишные
151	<i>Aconogonon songaricum</i> (Schrenk) Hara (= <i>Polygonum songaricum</i> Schrenk)	Аконогон джунгарский
152	<i>Bistorta vivipara</i> (L.) S. F. Gray	Бисторта живородящая
153	<i>Oxyria didyna</i> (L.) Hill	Кисличник двустолбиковый
154	<i>Polygonum cognatum</i> Meissn.	Горец родственный
155	<i>Rheum spiciforme</i> Royle	Ревень колосовидный
156	<i>Rheum wittrockii</i> Lundstr.	Ревень Виттрока
26	Potamogetonaceae Dumort.	Рдестовые
157	<i>Potamogeton pectinatus</i> L.	Рдест гребенчатый
27	Primulaceae Vent.	Первоцветные
158	<i>Androsace dasyphylla</i> Bunge	Проломник волосистолиственный

159	<i>A. lehmanniana</i> Spreng.	Проломник Леманна
160	<i>A. septentrionalis</i> L. s. l.	Проломник северный
161	<i>Cortusa brotheri</i> Lipsky	Кортуза Бротеруса
162	<i>Primula algida</i> Adams	Примула холодная
163	<i>P. pamirica</i> Fed.	Примула памирская
164	<i>P. turkestanica</i> (Haage et Schmidt) E. A. White	Примула туркестанская
28	Ranunculaceae Juss.	Лютиковые
165	<i>Aconitum rotundifolium</i> Kar. et Kir.	Аконит круглолистный
166	<i>Batrachium trichophyllum</i> (Claix) Bosch (= <i>B. divaricatum</i> (Schrank) Wimm.)	Водяной лютик волосистolistный
167	<i>Callianthemum alatavicum</i> Freyn	Красивоцветник алатавский
168	<i>Halerpestes sarmentosa</i> (Adams) Kom.	Ползунок отпрысковый
169	<i>Oxygraphis glacialis</i> (Fisch.) Bunge	Оксиграфис ледниковый
170	<i>Pulsatilla campanella</i> Fisch. ex Regel et Til.	Прострел колокольчиковый
171	<i>Ranunculus alberti</i> Regel et Schmalh.	Лютик Альберта
172	<i>R. brotherusii</i> Freyn	Лютик Бротеруса
173	<i>R. karelinii</i> Czer. (= <i>R. gelidus</i> Kar. et Kir., non Hoffmegg.)	Лютик Карелина
174	<i>R. natans</i> C. A. Mey.	Лютик плавающий
175	<i>R. pedatifidus</i> Sm.	Лютик лапчатораздельный
176	<i>R. popovii</i> Ovcz.	Лютик Попова
177	<i>R. pulchellus</i> C. A. Mey.	Лютик изящный
178	<i>R. transiliensis</i> M. Pop. ex Gamajun	Лютик заилийский
179	<i>Thalictrum alpinum</i> L.	Василистник альпийский
180	<i>Trollius lilacinus</i> Bunge	Купальница лиловая
29	Rosaceae Juss.	Розовые
181	<i>Pentaphylloides phyllocalyx</i> (Juss.) Sojak	Пентафиллоидес листочашечный
182	<i>Potentilla gelida</i> C. A. Mey.	Лапчатка холодная
183	<i>P. moorcroftii</i> Wall. ex Lehm.	Лапчатка Муркрофта
184	<i>P. multifida</i> L.	Лапчатка многорассеченная
185	<i>P. nervosa</i> Juss.	Лапчатка жилковая
186	<i>P. nivea</i> L.	Лапчатка снежная
187	<i>P. soongarica</i> Bunge	Лапчатка джунгарская
188	<i>Sibbaldia tetrandra</i> Bunge	Сиббальдия четырехтычиночная
30	Saxifragaceae Juss.	Камнеломковые
189	<i>Chrysosplenium nudicaule</i> Bunge	Селезеночник голостебельный
190	<i>Saxifraga hirculus</i> L.	Камнеломка болотная
191	<i>S. oppositifolia</i> L.	Камнеломка супротивнолистная
192	<i>S. sibirica</i> L.	Камнеломка сибирская
31	Scrophulariaceae Juss.	Норичниковые

193	<i>Euphrasia pectinata</i> Ten.	Очанка гребенчатая
194	<i>Lagotis decumbens</i> Rupr.	Лаготис лежачий
195	<i>Pedicularis cheilanthifolia</i> Schrenk	Мытник краекучниколистный
196	<i>P. dolichorhiza</i> Schrenk	Мытник длиннокорневой
197	<i>P. oederi</i> Vahl.	Мытник Эдера
198	<i>P. rhinanthoides</i> Schrenk	Мытник погремковый
199	<i>Veronica ciliata</i> Fisch.	Вероника реснитчатая
200	<i>Veronica polita</i> Fries	Вероника скромная
32	<i>Umbelliferae</i> Juss.	Зонтичные
201	<i>Angelica brevicaulis</i> (Rupr.) B. Fedtsch.	Дудник короткостебельный
202	<i>Lomatocarpa albomarginata</i> (Schrenk) M. Pimen et Lavrova	Ломатокарпа белоокаймленная
203	<i>Schulzia albiflora</i> (Kar. et Kir.) M. Pop.	Шульция белоцветковая
33	<i>Violaceae</i> Batsch	Фиалковые
204	<i>Viola altaica</i> Ker-Gawl.	Фиалка алтайская
205	<i>V. tianschanica</i> Maxim.	Фиалка тьяншанская

During the period of research in and around the Kumtor Mine, 205 species of flowering plants were recorded, belonging to 33 Families.

The Sarychat-Eertash State Nature Reserve

Management Plan 2016 – 2020





Contents

1.	Introduction	71
1.1	The Management Plan Process and Structure	71
1.2	Overview of the Sarychat-Eertash State Nature Reserve	72
1.3	The Main Goals and Objectives of the Reserve	73
1.4	IUCN classification of the Sarychat-Eertash Reserve	73
1.5	Key legislation relating to the Reserve and Biodiversity Conservation	74
1.6	Process of Management Plan Development	75
1.7	Procedures for modifying the Management Plan	75
1.8	Procedures for approving the Management Plan	75
1.9	Description of the Reserve	76
2.	Zonation	84
3.	Evaluation of the activities and situation of the Reserve	86
4.	The Reserve's management strategy	89
5.	The Goal of the Reserve and Overview of Objectives	91
5.1	Biodiversity Conservation	93
5.2	Scientific Research and Information Technology	99
5.3	Local Communities and Improving Conditions in High Altitude Rural Areas	103
5.4	Public Relations and Education	108
5.5	Administration and Organizational Management	113
5.6	Monitoring	117
6.	Five-year Work plan	120
7.	Summary of budget requirements 2013 to 2018	129
7.1	Budget tables	129
8.	Annex 1: Equipment list	135

We, the staff of Sarychat-Eertash State Nature Reserve, would like to express our deep appreciation to Fauna & Flora International for their invaluable input and support in the first and second management planning processes and for ongoing comprehensive support of the Reserve.

We are also grateful to Kumtor Gold Company for collaboration with the Reserve and for financing the review, update and issuing of this (second) management-plan.

With great appreciation,

The staff of Sarychat-Eertash State Nature Reserve.

The first version of the management plan of Sarychat-Eertash state nature reserve was developed in 2007 by the staff of the reserve with support of Fauna and Flora International. In 2013 the management plan was revised considering the objectives reached, new challenges and tasks. According to the point 1.7 the plan is a “living” document and should be updated as required to reflect the current state of the reserve. Several changes occurred in the reserve from the time of last revision. The reserve acquired new partners as “Panthera”, which conducts snow leopard researches in the park. Besides, some structural changes occurred – the scientific department was taken out of the park staff and included to the biosphere area “Yssyk-Kol” structure, which conducts research in PAs in entire Issyk-Kul region. Furthermore, a lot of work was done to reach the aim and objectives of the current management plan and many activities were implemented. However some of the actions still need to be done.

Considering the abovesaid the management plan was revised and updated in 2016 again to reflect the current status of its implementation.

1. Introduction

1.1 The Management Plan Process and Structure

The Management Plan is a written summary of the policies and actions that govern how the Sarychat-Eertash Zapovednik (referred to as the Reserve from here on) will be managed from July 2013 to June 2018. The contents of the Plan were developed in 2007 and updated in 2013 with the participation of a wide variety of stakeholders, including local inhabitants, local and national Government and a range of organizations, experts and institutions which have experience of the site or of the management plan process. It is therefore a Plan that was formulated with the *participation* of all those who might affect or be affected by the Reserve.

The Plan is intended to be a public document. It should be available for public inspection and comment, and all actions of the Reserve management henceforth will be framed by the agreed Plan. The plan is structured so that it flows through the followings sections:

- Background information
- Goal of the Reserve for the next 20 years;
- Main working themes the reserve will focus on for the next 10 years;
- Objectives the Reserve will strive to achieve over the next 5 years – the period of this Plan;
- Activities, which are prioritized and costed, that are to be implemented to achieve the objectives;
- Monitoring Plan, which allows progress in the implementation of the plan to be measured;
- Detailed work plan and budget.

Six themes have been selected for the Plan. These reflect the main areas of activity for the Reserve. Each has one or more objectives and activities allocated to it. The 6 themes are:

- Biodiversity Conservation
- Scientific Research and Information Technology
- Local Communities and Improving Conditions in High Altitude Rural Areas
- Public Relations and Education
- Administration and Organisational Management
- Monitoring the Plan

Note that while the Themes are considered separately and presented as individual chapters, the Reserve team has tried to ensure that actions which cut-across themes are fully addressed. A process of cross-theme auditing has ensured that Activities in one theme do not act in opposition to objectives and actions in other themes.

1.2 Overview of the Sarychat-Eertash State Nature Reserve

The Sarychat-Eertash State Nature Reserve is national nature conservation scientific research institution organized in accordance with the Decree of the Government of the Kyrgyz Republic № 76 of March 10, 1995. The Reserve is an independent unit of the State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic and belongs to the category of specially protected natural territories.

The territory of the Reserve constitutes a 128,869 hectare core zone, a 16,778 hectare buffer zone and a 3,471 hectare protected zone. The entire territory is secured for scientific research and nature conservation purposes. Economic use of the area is prohibited by law.



The Reserve has its own security, scientific and administrative/technical personnel and is headed by a director. The activities of the Reserve are financed out of the state budget, national and local funds for nature conservation, and other sources including projects and support provided by national and international donors. The Reserve's organizational structure and staffing, annual budget, work plans for scientific research and ecological educational activities, guarding and reproduction operations and logistical support are approved by the Director of the State Agency on Environment Protection and Forestry.

A scientific technical council (STC) consisting of the Reserve director, deputy director (for scientific work), scientific staff, security staff, as well as specialists of other research and higher education institutions, functions at the Reserve. Composition of the STC and its provisions are approved by the Director of the State Agency on Environment Protection and Forestry.



1.3 The Main Goals and Objectives of the Reserve

As a state protected area the Reserve is designated for the aims of:

- Conserving, in their natural condition, all natural complexes (flora and fauna, geological formations, reservoirs, subterranean waters, soils, etc.), typical for this geographic zone / area, as well as any unique natural objects;
- Protecting rare animals and plants, conserving the gene pool of species endemic to this geographic zone / area;
- Conserving and studying natural processes and understanding their dynamics with territories outside the Reserve used for economic purposes;
- Conserving valuable species of wild animals and plants, their propagation and reproduction.

To achieve these aims the Reserve is entrusted with meeting the following main broad objectives:

- Maintenance of the established order on the territory of the Reserve;
- Realization of scientific research, assistance in implementation of scientific research by other research organizations and educational institutions;
- Assistance in training of scientific staff and specialists using the Reserve;
- Raising awareness of issues related to the state of environment and conservation of biodiversity through the publication of scientific papers and articles, as well as the organization of Nature Museums.

1.4 IUCN classification of the Sarychat-Eertash Reserve

A protected area is defined as *“a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”* (IUCN, 2008).

Currently there are almost 160,000 protected areas globally covering around 25 million km² and over 12% of the Earth's territory. The IUCN's World Commission on Protected Areas (WCPA) identified almost 1,400 different terms and names for protected areas in use. This causes confusion, as similar names do not necessarily imply similar management objectives. To resolve this, IUCN WCPA established a system to classify protected areas by their primary management objective. The classification system includes six categories ranging from the most strictly protected areas (classifications 1a and 1b) through to multiple-use management areas (classification 6).

The primary management objective of the Sarychat-Eertash Reserve indicates that the Reserve fits the IUCN WCPA protected area category 1a. Areas classified as Category 1a are strictly protected and set aside to protect biodiversity and geological/ geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.

1.5 Key legislation relating to the Reserve and Biodiversity Conservation

There are some 22 national laws directly relating to the Reserve and its management:

- RED DATA BOOK of Kirgizskaya SSR. – Frunze, Kyrgyzstan, 1985
- Law of the Kyrgyz Republic № 1422-XII of January 14, 1994 “On Water”
- Decree of the Government of the Kyrgyz Republic № 76 of March 10, 1995 “On foundation of Sarychat-Eertash state nature reserve”
- Decree of the Government of the Kyrgyz Republic № 356 of June 5, 2009 “On changes in Decree of the Government of the Kyrgyz Republic № 76 of March 10, 1995 “On foundation of Sarychat-Eertash state nature reserve”
- Land Code of the Kyrgyz Republic № 45 of June 2, 1999
- Law of the Kyrgyz Republic № 48 of June 9, 1999, “On Biosphere Territories in the Kyrgyz Republic”
- Law of the Kyrgyz Republic № 51 of June 12, 1999, “On Protection of Ambient Air”
- Law of the Kyrgyz Republic № 53 of June 16, 1999, “On Protection of Environment”
- Law of the Kyrgyz Republic № 54 of June 16, 1999, “On Ecological Expertise”
- Law of the Kyrgyz Republic № 26 of June 27, 1996, “On Quarantine of Plants”
- Law of the Kyrgyz Republic № 59 of June 17, 1999, “On Fauna”
- Forest Code of the Kyrgyz Republic № 66 of July 8, 1999
- Provision on the Biosphere Territory “Yssyk-Kel” (approved by the Degree of the Government of the Kyrgyz Republic № 40 of January 24, 2000)
- Regulation on the state control of environmental protection, rational use of natural resources and provision of ecological security of the Kyrgyz Republic (approved by the Decree № 295 of the Government of the Kyrgyz Republic of May 25, 2000)
- Law of the Kyrgyz Republic of June 20, 2001, “On Protection and Use of Flora”
- RED DATA BOOK of Kyrgyz Republic. – Bishkek. Kyrgyzstan; 2nd edition. 2007.
- Provision on protection of fish resources and their environment in fishing water bodies of the Kyrgyz Republic (approved by the Decree of the Government of the Kyrgyz Republic № 161 of April 22, 2008)
- Law of the Kyrgyz Republic № 200 of August 11, 2008 “On the rates of fees for use of nature objects of fauna and flora in Kyrgyz Republic”
- Conception of sustainable development of ecology-economical system “Issyk-Kul” for the period till 2020 (approved by the Decree of the President of the Kyrgyz Republic № 98 of February 10, 2009)
- Law of the Kyrgyz Republic № 18 of May 3, 2011 “On Specially Protected Natural Territories”
- National Strategy of conservation of snow leopard in the Kyrgyz Republic for 2013-2023 (approved by the Decree of the Government of the Kyrgyz Republic № 732 of October 19, 2012)
- Decree of the Government of the Kyrgyz Republic № 48 of February 1, 2013 “On approval of new boundaries of Sarychat-Eertash state nature reserve”
- Provision on organization of [the] “Sarychat-Eertash State Nature Reserve” № ППЮ0005560 of April 25, 2013”

1.6 Process of Management Plan Development

This management plan was originally compiled over a 20-month period between October 2005 and May 2007 by the staff of the Reserve, facilitated by Fauna & Flora International (FFI) and a national NGO. Technical input was provided by a number of national specialists, FFI and the International Snow Leopard Trust (ISLT) now known as Snow Leopard Trust (SLT). The Plan was updated in 2013 by the staff of the Reserve with the assistance of FFI.

1.7 Procedures for modifying the Management Plan

The Reserve's Management Plan should be flexible enough to accommodate changes in the scientific data available and in the behaviour or impacts of stakeholders. It is therefore not a fixed document, but a statement of proposals based on the conditions that existed at the time of writing. The main purpose, goal and objectives of the protected area (as written in the plan) are unlikely to change during the plan period and should continue to provide the purpose and a sense of direction for the Reserve for the next 10 to 20 years.

Any changes in the Reserve's 'condition' should be accommodated through revisions to the table of activities. The inclusion of new or amended activities will allow the Reserve staff to be flexible – to respond to changes – whilst retaining the overall purpose for which the Reserve was created. To this end, the activities detailed in the activity plan table should be reviewed annually by the Reserve staff. At each review, any changes in Reserve 'condition' should be considered and minor amendments and the re-prioritisation of activities undertaken to ensure that planned activities address management needs.



The full management plan should be comprehensively reviewed every five years, including a re-analysis of the main issues (as presented in the introductions to each theme). Any significant new data should be included in the plan. At this time, the prescribed activities may need to be partially or completely re-written. Activities within the monitoring chapter will allow the degree to which the management plan has been implemented, what has worked and what has not, to be assessed, and for any other lessons to be learned. The results of this assessment will inform any revisions that need to be made to the plan in the future. Unless there has been a change to the status/designation of the Reserve, the Goal should only be reviewed every 20-years and the objectives every 10-years.

1.8 Procedures for approving the Management Plan

Currently there is no legally determined process for approving the Plan. A wide range of stakeholders were consulted on the draft Plan when it was prepared in 2007. This later version of the Plan has been provided to a number of stakeholders including the State Agency on Environment Protection and Forestry, who were also engaged in a Plan revision workshop held in 2013. The final version of the Plan is to be submitted to the Director of the State Agency on Environment Protection and Forestry for his/her formal approval. After which the Plan will become operational.

1.9 Description of the Reserve

Location and boundaries

The Reserve was established by decree of the Government of the Kyrgyz Republic № 76 of March 10, 1995. In creating the Reserve, a regime of a specially protected natural area (SPNA) was established on this territory. This requires the full discontinuance of economic activity on the territory (including cattle grazing, construction of buildings, roads, etc.).

The Reserve is situated at the meeting-point of the Inner and Central Tian-Shan in the tributary valley of the Sary-Jaz River and constitutes an area typical of the high altitude pasture (syrt) zone. The total territory of the Reserve is 149,117.9 hectares, of which 128,869 hectares are assigned as core zone, 16,778 hectares as buffer zone and 3,471 hectares as protected zone. Zonation is approved by the order of the State Agency on Environment Protection and Forestry under the Government of the Kyrgyz Republic № 01-92/102 of April 26, 2013. The Reserve is situated between the altitudes of 2,000 to 5,500 meters above sea level. This territory is characterized by vertical zonation.



Map 1.1 Location of the Sarychat-Eertash Reserve

The boundaries of the Reserve were approved under the Decree № 48 of the Government of the Kyrgyz Republic, dated February 1, 2013 and entitled “On approval of new boundaries of Sarychat-Eertash state nature reserve”. This decree is the legally defining document for the Reserve’s boundaries.

Description of the Reserve’s borders.

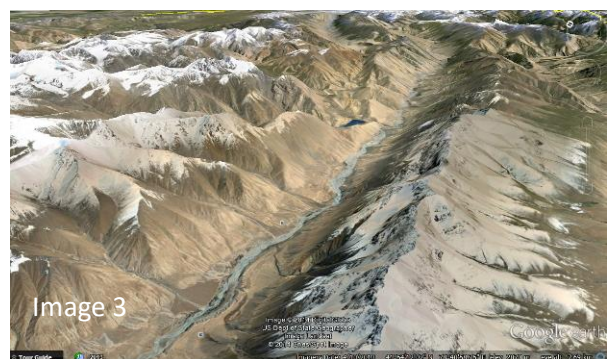
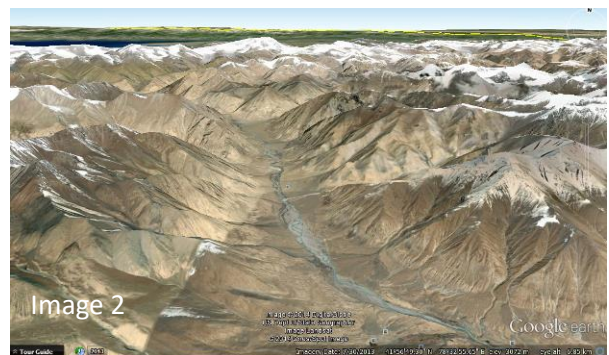
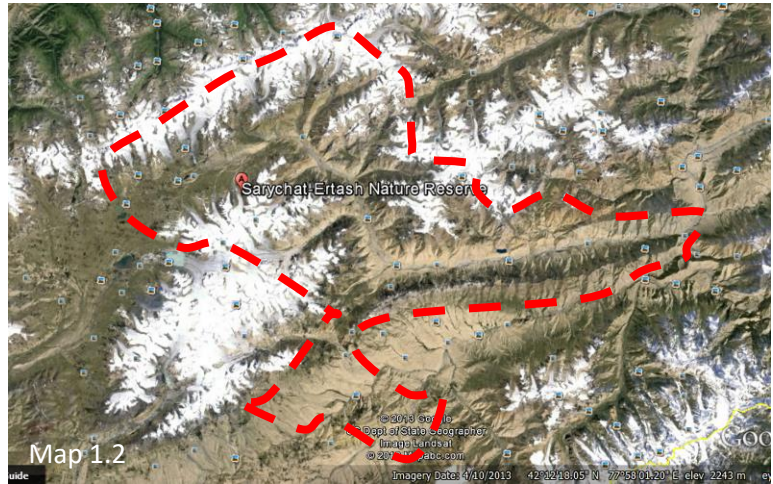
The northern border of the core zone starts at the Terskei Ala-Too mountain range, 1km eastward of the Jukuchak pass (4,049 m above sea level), in the area of the upper reaches of the Sary-Chat River, and runs through the Terskei Ala-Too eastward until the administrative border with Ak-Suu Rayon.

The eastern border runs along the administrative border dividing Jety-Oguz and Ak-Suu Rayons in a south-easterly direction. From the Koiluu pass (4,303 m above sea level) it runs down to the Sary-Jaz river in the area of its right tributary, turns westwards along the Ak-Shyirak ridge, then southwards to the conjunction of Koyonduu and Cholok-Kapchygai rivers, then running south-west along the river to the water’s edge (3,065.2 m above sea level). Then the reserve’s border runs northwards to the conjunction of Ak-Tash and Bordu rivers, and then to the source of the Bordu River, turns north-east till the southern border of the reserve, till the source of Kurgak-Tepchi river. Then the reserve’s border runs westwards, reaches Petrov’s glacier, runs along its eastern edge till the altitudinal point of 4,901 m above the sea level, then the reserves border runs 4,600 m westwards, along a straight line, to the altitudinal point of 4,561 m above the sea level and then to the source of Sarychat River.

The western border runs in the north-western direction along the watershed of the Sarychat and Arabel Rivers (3614 m above sea level) and ends at the original starting point.

Relief

With reference to map 1.2 opposite and images 1, 2 and 3 below – at between 2,200m and 5,000m above sea level, relief is characterized by high mountain ranges with intervening valleys and basins. The mountain ranges are alpine, with steep slopes and snow caps and glaciers occurring along their crests. The southern slopes of the Terskey Ala-Too range, which forms the Reserve’s northern border, descend to the remote (syrt) plains of the main Sarychat river valley.



The valley sides generally slope 7 to 10 degrees and are covered with moraine deposits from the Kolpakovsky and other minor glaciers. Lower down, erosion has shaped these to form an undulating landscape of hills and ridges. On lower less steep slopes, the moraine is covered by vegetative growth with many boulders being blanketed with lichens.

The main valley (yellow dash on map 1.2) is formed by the Sarychat River, which is one of the main rivers of the Central Tian-Shan. It originates in the eastern third of the Terskei Ala-Too mountain range and is oriented from the south-west to the north-east. The river valley (image 1 looking west) is framed by the Ak-Shyirak mountain range to the south and the Terskei Ala-Too mountain range to the north. The river then abruptly changes direction and, now under the name of the Eertash, turns to the south-west and cuts a valley for itself between the eastern extremity of the Ak-Shyirak mountain range and the western extremity of the Koiluu mountain range (Image 2). It then flows from the west to the east under the name of Uch-Kul and into the Sary-Jaz River (image 3). The larger tributaries of the Sary-Chat River include (on the west) the Boroko, the western and eastern Bordu and western Koiluu tributaries. On the east side can be found the Chon-Sarytor, the Oroi-Suu, the Aigyr-Bulak, the Jaman-Suu and the Eshek-Art tributaries. There are also many small lakes which are evidence of the recent covering of the territory by water from glaciers.

Climate

The climate of the Reserve is very harsh and sharply continental. The average annual temperature equals 7.5° below zero. The average monthly temperature in January is (minus) - 21.5° and in June + 4.2°. The annual comparative humidity is 52%, reaching 64% in January and dropping to 48% in July. Annual precipitation is 295 mm with 164 mm falling between June and August. The number of days per year with snow cover fluctuates between 200 and 210 days in the upper high-altitude zones.

Geology

The newest geological structures of the Central Tian-Shan result from a history of tectonic movement, which is reflected in the development of modern physiographic complexes. Rocks of very different genesis, age and composition, from pre-Cambrian crystalline slates to modern loose fragmental quaternary formations, are found on the territory of the Central Tian-Shan. The pivotal feature of the geological structure of the territory is that its northern outlying districts (to the north of the "Main Structural Line" of the Tian-Shan) are composed of predominantly pre-Cambrian and Lower Paleozoic sedimentary rocks, notable for a significant degree of metamorphism, as well as volcanic rocks - granites and granites-diorites. The structure of the southern part of the Central Tian-Shan is predominated by the Middle Paleozoic deposits with rocks from the pre-Cambrian and the Lower Paleozoic being almost absent. Neozoic continental deposits can be found mainly within the bounds of inter-montane depressions.

Glaciers, Permanent Snow and Snowfields

The Ak-Shyirak and the Terskei Ala-Too mountain ranges represent large centers of glaciation of the region. They are characterized by various types of glacial formations.

The Terskei is characterized by flat peak and valley glaciers. One of the largest valley glaciers is the Kolpakovsky glacier, which, according to the latest data, is 10 km long and up to 1.1 km wide at its widest point. The glacier covers approximately 30.4 square km. The glacier nose (terminus) is situated at 3,660 m. As with other glaciers in the



Terskei the Kolakovsky glacier is in retreat. Other glaciers situated at the upper reaches of the Boroko and the Bordu Rivers are smaller in size than the Kolpakovsky glacier.

In addition to valley glaciers, hanging glaciers and individual snowfields are peculiar to Ak-Shyirak. The glaciers of the southern slope of the Terskei and the northern slope of the Ak-Shyirak give rise to many rivers, which collectively create one of the tributaries of the Sary-Jaz River – the Sary-Chat River.

Landscape elements

Elevation, seclusion, and variations in height, relief and climatic peculiarities have created a diversity of elementary landscapes in the Sary-Chat River basin. Relief is the key factor determining the borders of the various landscape types, with five key high altitude zones being distinguishable, including more than 30 elementary landscapes.



The Reserve's High Altitude Grasslands (Syrts) have a character reminiscent of the Arctic tundra. Here, one can find a combination of high altitude polygonal, tundra, badland and underdeveloped rocky soils. There are also many peaty and meadow-marshy soils. Permafrost is observed at a shallow depth. By their mechanical composition the soils are semi-loamy with a high concentration of rock fragments and detritus.

Flora

The vegetation of the Reserve has evolved under the influence of extreme factors including the sharply continental, cold and dry climate, elevation, intensity of solar radiation, open wide flat areas dominated by wind with no snow cover in winter time. This has led to a prevalence of bushy and blanket cover type plants, with a dominance of high altitude, mono-dominant wormwood deserts and shallow *Festuca* steppes. Based on baseline surveys and historical data, 298 species of flora have been identified; this number is expected to increase significantly once baseline surveys have been completed in all parts of the Reserve.



Grassland communities include *Artemisia (Artemisia rhodantha)* with herbs (*Ptilagrostis subsessiliflora*, *Festuca sulcata*, *Andrsace sericea*, *Oxytropys macrocarpa*, *Dracocephalum paulsena*). The formation of *Festuca kryloviana* with *Ptilagrostis purpurea* and *Ptilagrostis subsessiliflora*, *Poa litvinova*, and *Kobresia humilis*. Kobresia communities consist of *Cobresia capiliformis*, *Saussurea leucophylla*, *Oxytropys macrocarpa*, *Carex stenocarpa*, and *Cobresia humilis*. The formation of *Dryadanthe tetrandra* forms cushions between which sedges, *Calamagrostis tianschanica*, *Saussurea leucophylla*, and others species grow.

Vertical zones

The Reserve is situated mainly in the Sarychat River basin. It represents a model of a high altitude ecosystem. High altitude ecosystems can be zoned into 5 vertical belts, as is the case in the wider Central Tien Shan range. However, the Reserve is characterized by 4 belts, including more than 30 elementary vegetation communities (see box below). The sub-alpine zone is not represented.

<p style="text-align: center;">Semi-Desert belt - (2300 – 3400 m)</p> <ul style="list-style-type: none"> • Wormwood deserts with <i>Artemisia rhodantha</i> • Wormwood deserts with <i>Artemisia rutifolia</i> • Saussurea deserts with <i>Saussurea leucophylla</i> • Saltwort desert with <i>Salsola passerina</i> 	<p style="text-align: center;">Steppe belt - (2800 – 3900 m)</p> <ul style="list-style-type: none"> • Fescue steppes with <i>Festuca sulcata</i> • Fescue steppes with <i>Festuca kryloviana</i> • Feathergrass (<i>Ptilagrostis</i>) steppes with <i>Stipa subsessiliflora</i> • Feathergrass steppes with <i>Stipa caucasica</i> • Meadow oat grass steppes with <i>Arenochloa (Arenastrum) desertorum</i> • Wheatgrass steppes with <i>Elymus dasystachis</i> • Barley steppes with <i>Hordeum turkestanicum</i>
<p style="text-align: center;">Alpine belt - (3100 – 4100 m)</p> <ul style="list-style-type: none"> • Fescue meadow-steppes (<i>Festuca tianschanica</i>) • Feathergrass (<i>Ptilagrostis</i>) meadow-steppes with <i>Stipa (Ptilagrostis) mongolica</i> • Kobresia meadow-steppes with <i>Kobresia humilis</i> • Meadows: <ul style="list-style-type: none"> ○ Kobresia meadows with <i>Kobresia capilliformis</i> ○ Sedge meadows with <i>Carex melanocephala</i> ○ Bluegrass meadows with <i>Poa alpina</i> ○ Floodplain sedge meadows with different types of sedges – <i>Carex</i> spp. ○ Floodplain meadows with <i>Festuca orientalis</i> ○ Floodplain meadows with bush grass – <i>Calamagrostis epigeios</i> ○ Floodplain meadows with Batalin's couchgrass – <i>Elytrigia batalinii</i> 	<p style="text-align: center;">Nival belt - (3750 - 5000 m)</p> <p>Rocks covered with cructose lichen. Lithophilous mosses found in places.</p>

Wetland communities are in all altitudinal zones and include:

- **Marshes:** Sedge marshes with various types of sedges – *Carex* (*C. melanatha*, *C. pseudofoetida*, *C. orbicularis* and others)
- **Subshrubs:** Brushwoods of *Comarum salesovianum* (*Potentilla salesoviana*) and German tamarisk – *Myricaria alopecuroides*
- **Shrubs:** Flood-plain combined bushes with willows – (*Salix alatarica*, *S. caprea*), sea buckthorn – (*Hippophae rhamnoides*) and Pea shrub with *Caragana jubata*

Birch forests along alluvial fans, floodplain terraces and temporary waterways are found in the lower reaches of the Uch-Kul River. There are rare spruce forests on the right bank in this area.

Fauna

From the zoogeographic point of view, the Reserve is part of the Palaearctic Realm and is included in the Southern-Palaearctic sub-area of the Mountainous Asian Province. It represents the Sary-Jaz sector of the high altitude zoogeographic district of the same name in the Central Tian-Shan region.

26 species of mammals occur on the territory of the Reserve and the presence of 6 other species is possible (a total of 31 species). These belong to 5 orders, 11 families and 18 genera including: Snow Leopard (*Panthera uncia*), Manul (*Otocolobus manul*), Wolf (*Canis lupus*), Fox (*Vulpes vulpes*), Brown Bear (*Ursus arctos*), Stone Marten (*Martes foina*), Mountain Weasel (*Mustela altaica*), Weasel (*Mustela nivalis*), Ermine (*Mustela erminea*), Polecat (*Mustela eversmanni*), Ibex (*Capra ibex (sibirica)*), Argali (*Ovis ammon*), Grey Marmot (*Marmota baibacina*), Wild boar (*Sus scrofa*), Tian-Shan Vole (*Sicista tianschanica*), Grey Hamster (*Cricetulus migratorius*), Silver Field-vole (*Alticola argentatus (roylei)*), Kyrgyz Field-vole (*Microtus kirgisorum*), Narrow-headed Field-vole (*Microtus gregalis*), Hare (*Lepus capensis*), Royle's Pika (*Ochotona roylei*) and others. Five Kyrgyz Red Data Book mammal species are recorded: Snow Leopard, Brown Bear, Manul, Stone Marten and Argali.



Bats

Bats (Chiroptera) have not been studied, although at least 2 different species have been observed.

Fish

Fish have been partly studied and include the Tian-Shan Scaly Osman (*Diptychus gymnogaster* Kessler) and the Tibetan Loach (*Nemachilus stoliczkai* Stein-dachner).



Amphibians and Reptiles

Only one species of amphibian, the Green Toad (*Bufo viridis*) is found in the Reserve. Kokshaal lizard (*Eremias kakshaaliensis*) is also found on the border of the Reserve in the Jangart area.

Invertebrates

Known Red Data Book species include the Swallowtail (*Papilio machaon*) and the Tian-Shan Apollo (*Parnassius tianshanicus*). Butterflies are widespread and some interesting high-altitude communities have been identified. Butterflies are a priority for survey and monitoring as they are excellent ecological and environmental indicators and many endemic species and subspecies have been identified in the mountains of Central Asia. Further study of other invertebrate taxa is also a future priority.

Molluscs

Molluscs have not been studied and are of great interest as Central Asia contains many restricted-range endemics.

Aquatic invertebrates

Aquatic invertebrates have also not been studied and are of interest as indicators of water pollution (rivers, lakes).

Birds

There are 92 species of birds recorded in the Reserve including 31 permanent resident species and 61 temporary resident and breeding species. Raptors include Golden Eagle (*Aquila chrysaetos*), Bearded Vulture (*Gypaetus barbatus*), Himalayan Griffon (*Gyps himalayensis*), Eurasian Griffon (*Gyps fulvus*), Cinereous Vulture (*Aegypius monachus*) and Saker Falcon (*Falco cherrug*). Galliforms include Himalayan Snowcock (*Tetraogallus himalayensis*), Chukar (*Alectoris chukar*) and Daurian partridge (*Perdix dauuricae*). Ruddy Shelduck (*Tadorna ferruginea*) and Lesser Sand Plover (*Charadrius mongolus*) can be found at mountain lakes. Passerine birds include the Red-billed Chough (*Pyrrhocorax pyrrhocorax*), Yellow-billed Chough (*Pyrrhocorax graculus*), Horned Lark (*Eremophila alpestris*), Brandt's Mountain Finch (*Leucosticte brandti*), Plain Mountain Finch (*Leucosticte nemoricola*) and Wallcreeper (*Tichodroma muraria*) amongst other species. There are 8 recorded Kyrgyz Red Data Book bird species: Golden Eagle (*Aquila chrysaetos*), Bearded Vulture (*Gypaetus barbatus*), Himalayan Vulture (*Gyps himalayensis*) Eurasian Griffon (*Gyps fulvus*), Cinereous Vulture (*Aegypius monachus*), Saker Falcon (*Falco cherrug*), Eurasian Eagle-owl (*Bubo bubo*) and Ibisbill (*Ibidorhyncha struthersii*).

Local Communities

There are no resident communities within the Reserve. The nearest town is Karakol located on the south shore of Lake Issyk-Kul some 300 km away from the Reserve's northern border. The Reserve's headquarters is located in Barskoon village, also on the south shore of Lake Issyk-Kul and some 220km from the Reserve's northern border.

The nearest village is Ak-Shyirak situated some 18 km eastward of Koyenduu on the southern border of the Reserve. The village residents include a number of the Reserve's rangers and their families and a local population of approximately 30-40 people.

Engilchek village is located to the east of the Reserve along the Uch-Kul River (the place of confluence with the Sary-Jaz River). Engilchek is some 145km from Karakol town.



To the west, the border of the Reserve adjoins the territory of the Kumtor gold mine. The mine is located some 160 km from Karakol town and 80 km from the Reserve's headquarters.

Sacred Sites

Cultural sites

There are many burial sites on the territory of the Reserve. These consist of ruined mazars and graveyards from various historical periods and belonging to various ethnic groups. Tashtar-Ata, a place of local people's worship, is located in the buffer zone of the Reserve, some 12 km from Koenduu. Kalmyk burial grounds and historical kumbezts also attract the interest of visitors. Rock

paintings such as the petroglyphs portraying animals and hunting scenes found at Saimaluu-Tash are known and visited by Kyrgyz visitors.

Natural sites

The destructive-constructive actions of Mountain Rivers and moving glaciers create numerous glacial lakes such as Bash-Kel, Achy-Kel and Kyzyl and natural springs such as those at Eshek-Art, Koiluu, Koenduu and Uch-Kel all of which are worshipped and considered sacred. The presence of a number of sacred places and mazars on the land adjacent the Reserve, and efforts to foster caring attitudes towards them, provides an opportunity for the Reserve to raise awareness and to conduct education activities amongst the local population and visitors.

Infrastructure: Buildings, Roads, Bridges, Power/telephone Lines and Communications

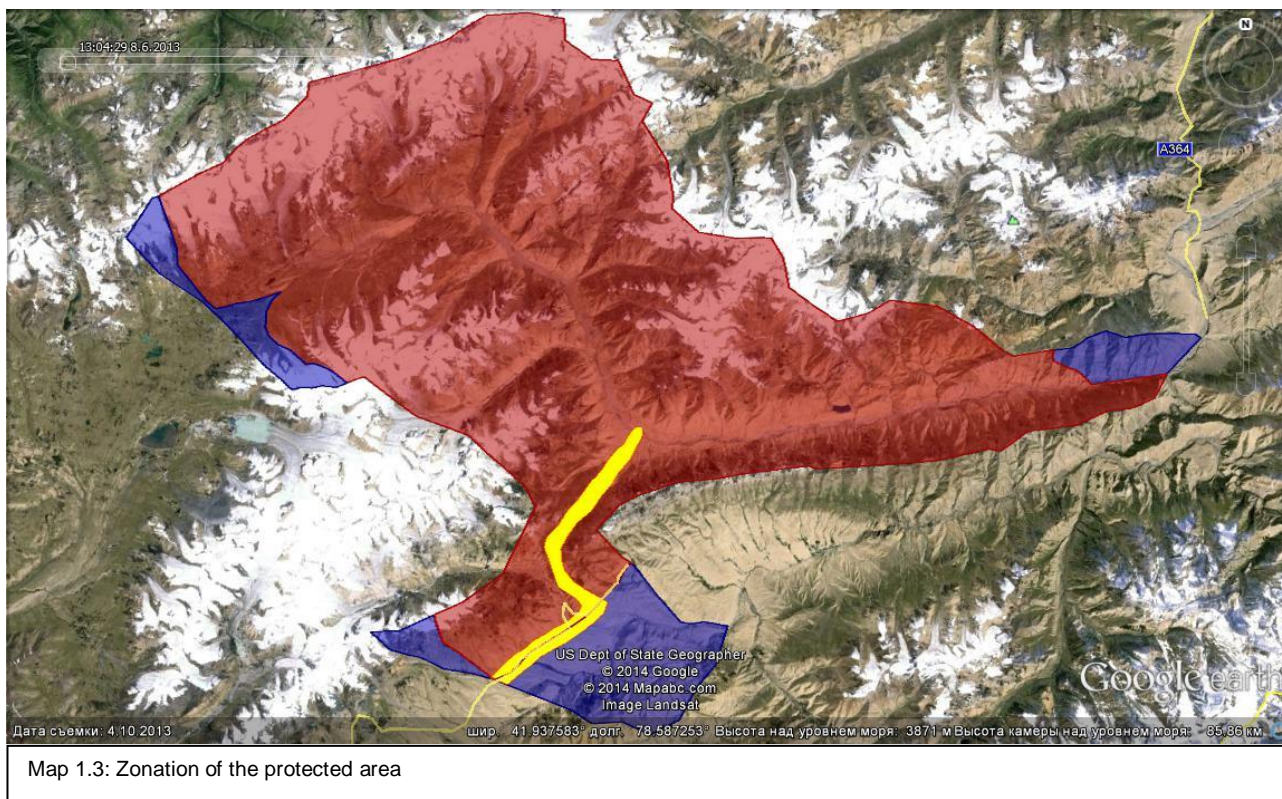
There are seven rangers' posts (5 former shepherds' houses and 2 cabins) on the territory of the Reserve. The road leading to the Reserve is an earth road leading from Barskoon village through the Barskoon gorge to the Suek pass (4000 m). The road then goes onto to Karasai valley and then becomes a mountain road leading to Ak-Shyirak.

Electricity, telephone line and communication means are absent in the Reserve and between the rangers' houses. A telephone is available in Ak-Shyirak and Engilchek villages. The Reserve team also has radios stationed at Ak-shirak and Barscoon and two mobile units operating between the two.



2. Zonation

A review of the Reserve's boundaries was completed by the Government and formalised in the Governmental decree № 48 of February 1, 2013 "On approval of new boundaries of Sarychat-Eertash state nature reserve". As a result of the review, the Reserve area was increased to 149,117.9 hectares. With reference to map 1.3 below – the protected area is divided into 3 zones: Core Zone – 128,868.9 hectares (86.42% of territory marked red); Buffer Zone – 16,778 hectares (11.25% - blue); and Protected Zone – 3,471 hectares (2.33% - yellow).



According to the Law of the Kyrgyz Republic № 18 of May 3, 2011 "On Specially Protected Natural Territories", edited July 25, 2012 № 132, the following restrictions apply to zones within reserves:

Core Zone (main zone of the Reserve)

Article 15 Regime of use of a core zone within a state nature reserve

1. Any kind of economic and other human activity is forbidden in the core zone, with exception of activities aimed at:
 - Conservation of natural systems in their natural condition, restoration and prevention of changes of natural systems and their components as a result of a human impact;
 - Maintenance of conditions required to control fire and sanitary safety;
 - Conducting ecological monitoring;
 - Conducting scientific work;
 - Implementing controls determined by the state for example to control disease outbreaks.
2. Citizens of the Republic are only allowed on the territory of the state nature reserve with the permission of the relevant authorities, which is acquired through the procedures set by the Government of Kyrgyz Republic.

Buffer Zone

Article 16 Regime of use of a buffer zone within a state nature reserve

To prevent negative impacts on biological and landscape diversity within a buffer zone, the following activities are forbidden:

- The creation of new settlements;
- Hunting and the creation of hunting concessions and placement of hunting camps;
- Construction, placement and use of infrastructure / facilities;
- Exploration and extraction of mineral resources;
- Any type of tree cutting apart from selective sanitary cuttings agreed with scientific institutions;
- Introduction (acclimatization) of new species of plants and animals;
- Actions changing the hydrological regime of the core zone and any other activities capable of negatively impacting on the ecosystem in general;
- Economic and other activities that threaten the state of nature systems and objects.

Management Zone

Article 17 Regime of use of a protection zone within a state nature reserve

1. Basic types of economic activity, which do not deteriorate the condition of natural systems and resources, are allowed.

2. The following activities are forbidden:

- Collection of herbs, fruits, berries and flowers and plants, which are threatened and listed in the Red Data Book of Kyrgyz Republic;
- Hunting and trapping of animals, destruction of nests, holes, and other shelters and dwellings of wild animals, and also collection of eggs of birds and reptiles;
- Introduction / acclimatization of wild animals;
- Other types of activities that would deteriorate the natural, scientific, cultural and esthetic values of the state nature reserve.

3. The "Provision on organization of [the] "Sarychat-Eertash State Nature Reserve" № ГПЮ0005560 of April 25, 2013" provides further detail on the restrictions applying to each zone with state nature reserves as follows:

3.1. Functional zoning of the territory of the state nature reserve is implemented by segregation of the following zones: core zone (main zone); buffer zone; protection zone.

3.2. It is forbidden on the entire area of the state nature reserve to interrupt the natural flow of natural systems, complexes and processes in any way that will result in a decrease of natural, scientific, cultural and esthetic values including:

- actions changing the hydrological regime of the state nature reserve;
- construction of buildings, facilities, roads, pipelines, power lines and other communications and objects, not related to the activity of the reserve;
- geological surveys and extraction of mineral resources;
- disturbance of soil cover, destruction of mineral outcrops and exposure of rocks;
- all types of forest use, the taking of hay, collection of herbs and other plants, flowers, seeds, cattle grazing and other types of use of vegetation;
- fishing, hunting and catching of animals and the destruction and disturbance of their habitats;
- introduction (acclimatization) of new animals and plant species;
- collection of samples with exception to materials required for scientific and research activities in the state reserve;
- use of chemicals to control pests, plant and animal diseases with exception to cases presenting a particular danger to populations of fauna and flora and human health;
- movement and transport of livestock outside of roads and waterways designated for general use;

- transport of timber by floating on water bodies;
 - noise and other acoustic impacts of an unnatural origin.
- 3.3. Citizens, including foreign citizens, who are not a part of the reserve staff team (e.g. people from other scientific research institutions, mass media and cinema) are only allowed on the area of the state reserve with the permission of the General Directorate and with the agreement of the Agency in the prescribed manner, for the purpose of:
- Conducting scientific research according to the reserve's work plan;
 - Filming of scientific material;
 - Presenting the natural, historical systems/complexes and objects and activities of the state reserve.
- 3.4. to 3.6 of the provision repeats the legal definitions of use in the core, buffer and protection zones as detailed in the Law of the Kyrgyz Republic № 18 of May 3, 2011 "On Specially Protected Natural Territories" and as described above.
- 3.7 Based on scientific and technical council recommendations, by proposal of the General Directorate, upon agreement with the scientific institution and with permission of the Protected Areas Agency, the following measures related to the conservation of natural systems and complexes, scientific research, biotechnical conservation and restoration and the raising of ecological awareness are allowed including:
- restoration of areas in the state reserve where natural complexes have been damaged by human activity or natural disasters or restoration of areas adjacent to the reserve, which have been prevented from reaching a natural state due to economic activity,
 - measures on the conservation of threatened species of plants and animals;
 - conducting of fire and sanitary security measures (sanitary cuttings in plantations, suffering from pests and natural disasters, regulating animal populations to maintain 'natural' population levels within the natural complex);
 - catching animals for tagging and distribution;
 - catching and shooting animals for collection of scientific materials (only in the protection zone of the state reserve);
 - building of a laboratory, living and economic constructions, roads, bridges, banners and panels, which are necessary for the reserve to fulfill its main tasks;
 - survey and mapping of forestry and hunting, geodesic and topographic features;
 - ecological, scientific and awareness raising tourism in the buffer and protection zone.
- 3.8 Fees must be paid to visit the reserve and for other proposed services. The fees will be paid into a special account and will be spent in accordance with the reserve's approved budget.

3. Evaluation of the activities and situation of the Reserve

The Reserve has a well-motivated and capable staff. However, the lack of operational budget and resources and equipment limits activity. The lack of budget results in the Reserve being understaffed and provides no scope for improving the knowledge and skills of existing staff through training. The Reserve has been able to retain the majority of staff over the previous 5 years, having lost only one ranger due to reduced income.



A project led by FFI and funded by the European Bank for Reconstruction and Development (EBRD), the International Finance Corporation (IFC) and Kumtor Gold Company (KGC), between 2005 and 2008 improved staff skills, facilitated community outreach and provided resources to the Reserve team. The project also conducted baseline surveys on flora, mammals, insects and aquatic invertebrates in 2007/8. The project also produced a Reserve management plan and biodiversity monitoring and anti-poaching strategies. Although not formerly approved the management plan has since been used to guide management. However, implementation of the Plan activities hasn't been possible due to insufficient funding. The biodiversity monitoring strategy has also not been implemented due to lack of funding. The anti-poaching strategy has been followed as closely as possible by rangers while undertaking patrolling. No external training has been provided to the Reserve team since this project ended in 2008. In addition, there has been little scope for following up on community outreach activities and for improving awareness-raising and education activities started under this project.

Since 2011 a USAID funded project, implemented by WWF, has provided equipment to the Reserve team including border signs, field uniforms, camera traps, camera, camcorder and binoculars. The project also supported annual surveys in 2011, 2012 and 2013 for snow leopards and prey species using the international standard SLIMS approach. This work was undertaken by a senior scientist from the Severtsov Institute of Ecology and Evolution. This project also provided 20 yaks as part of a programme to build a sustainable source of income for the Reserve. The Yaks are subsidised by and remain the property of WWF, with the produce from the Yaks being used to generate income for the Reserve. This scheme is anticipated to be rolled out to other reserves in Kyrgyzstan.

Baseline surveys undertaken in 2007/08 were followed up with botanical and zoological surveys in 2013, funded by FFI and completed by a team of national specialists. These surveys sought to fill gaps in survey information related to various habitats and taxa including invertebrates and micromammalia. In 2013 KGC funded a review and update of the Sarychat-Eertash Management Plan; this Plan being the resulting document. KGC have also committed further funding support to implement the activities within the Plan over the coming 5 years.

In addition to the above activities, the Reserve has also become the focus for a number of other conservation groups and researchers. Snow leopard surveys were conducted by the French organization Panther, who conducted camera trap surveys in August 2013. French and Belgian researchers also conducted a series of ornithological expeditions in summer 2013. Shinshu University in Japan also, over the last two years, conducted satellite monitoring of wildlife and vegetation surveys. The University plans to extend this research to include the radio collaring of argali, ibex, bear, wolf and snow leopard. The University also provided 4 camera-traps to the Reserve in the summer 2013. In late 2013, UNDP were also in the process of providing resources and equipment to the Reserve.

All of the above survey data now needs to be consolidated and added to the Reserve's database. Any gaps in baseline and / or monitoring data should be addressed, as a priority, by future research activities undertaken by Reserve or collaborating researchers.

Data on the distribution and number of species such as argali, ibex and snow leopard and the ecological corridors these species use within the reserve are available. The main ecosystems have also been identified. However, the surveys conducted in 2013, on floristic composition within the main ecosystems that lie within the Reserve are not yet finished. There is also a lack of information on species composition, migration routes and ecological corridors linked with adjacent territories. For this reason, the Reserve's revised Management Plan includes research activities aimed at filling gaps in data and providing information necessary to inform and ensure the successful work of the Reserve in future.

To facilitate all of the above it is necessary to develop a Reserve wide GIS mapping and scientific data storing and processing system. The Reserve team has a large stock of scientific data, collected from regular field patrols by rangers, but they are not digitalized, stored and analysed properly, due to a lack of software and staff capacity.

Unlawful hunting of mountain ungulates also allegedly occurs where hunting concessions overlap the reserve's southern and western buffer zone. These impacts are compounded by the ongoing practice of poisoning marmots as part of an anti-plague campaign. The Reserve needs to maintain a high field presence to manage these issues. However, they lack the resources to do so.

Climate change is considered to be both a current and future threat to the Reserve. It is imperative that baseline surveys are completed and a biodiversity monitoring strategy be put in place to allow the team to understand and monitor changes taking place, and to ensure the adaptation of Reserve management to enable biodiversity to cope with the impacts of a changing climate. Other threats include overgrazing in the buffer zone and adjacent areas; a lack of scientific work due to reduced state budget, and; a possible loss of security on the Reserve's north-west flank once the Kumtor mine has closed. There are also concerns that future economic considerations will outweigh conservation priorities as mining companies have shown interest in the region and could recommence explorations at any time.

9.1.1.1.1.1.1 Hunting

It is clear from the laws and provision related to the zonation and management of the Reserve that hunting is not allowed on the Reserve territory. With healthy and increasing populations of key species, which include Argali and Ibex, areas adjacent to the Reserve have become a focus for hunting activities by private hunting groups. In this respect the Reserve territory provides a resource (wild animals) that benefit organisations and individuals outside of the Reserve. There are currently 7 hunting concessions located to the east, south and west of the Reserve, the north being inaccessible. These hunting concessions target large ungulates, which are hunted primarily by foreigners and rich nationals. The hunting of wild species in principle is not an issue but every effort should be made to ensure that hunting:

- does not encroach on the Reserve territory
- is based on sustainable hunting principles
 - o for example hunting quotas should be based on the best available scientific data and at levels that ensure that the long term viability of the target species, both within the Reserve and wider 'non-protected' landscape, is not threatened
- provides tangible benefits to the Reserve and the conservation of its species and habitats
- provides tangible benefits to local communities living closest to the Reserve

To support these conditions the Reserve Administration will seek to improve the demarcation of the Reserve's border where it abuts hunting concessions. It will also raise awareness of hunting

concessionaires on the purposes and values of the Reserve and the restrictions placed on hunting on the Reserve territory.

Sustainable hunting and community based hunting approaches in other parts of the world are clearly demonstrating that hunting relies on well managed species populations and can be compatible with the conservation of species and ecosystems, provide financial support to protected areas and opportunities for local communities to improve their livelihoods. The Reserve Administration recognises that there are increasing calls for more sustainable and / or community based hunting approaches within Kyrgyzstan and is supportive of such approaches.

9.1.1.1.1.1.2 Tourism

The Reserve is strictly protected (86.42% core zone) and set aside to protect biodiversity and the entire high mountain ecosystem as a whole. Human visitation is strictly controlled to ensure the protection of biodiversity and limit the impacts of humans on natural systems. The Reserve buffer zones are of low value for tourism visitations. Given the need for infrastructure development to access the Reserve and the great sensitivity of its ecosystems and species, tourism is considered to be incompatible with the primary management objective of the Reserve and is therefore not allowed within the core zone, and will not be encouraged in other zones on the Reserve territory.

4. The Reserve's management strategy

The mountains of Central Asia contain a rich and diverse flora and fauna and the importance of the area has been recognized by a number of international designations including as a Global 200 Ecoregion, a Centre of plant diversity and a global biodiversity hotspot. Nationally the Reserve lies within the Issyk-Kul Biosphere Reserve and is designated as a strictly protected area in its own right.

The focus for the work of the Reserve is conditioned by the aims stated in legislation, the position of the Reserve as a part of the World Network of Biosphere Reserves (UNESCO) and the National Strategy and Action Plan on Biological and Landscape Diversity Conservation of the Kyrgyz Republic. These highlight the international, national and regional importance of the Reserve territory and the great importance of the conservation of the area and its biodiversity.

The Goal of the Reserve should therefore meet the requirements of national legislation and the expectations of the international community in respect to protecting the Reserve. The Goal needs to summarize the scope of work of the Reserve and inspire the Reserve team and others to achieve it.

While developing the **Goal** questions regarding the use of terms such as **biodiversity**, **landscapes**, **ecosystem**, **complex of species**, were raised. This is because each document relating to the Reserve (e.g. national and international laws, the management plan, etc.) uses each of these words in a different way.

To clarify in this Management Plan, the Goal refers to the word “**ecosystem**” because it has broader meaning than just “**biodiversity**”. Specifically, conducting experiments on all major directions and

objectives can provide specific examples of the state of the **ecosystem** as a whole because the Reserve is a scientific laboratory with its staff of researchers and rangers.

5. The Goal of the Reserve and Overview of Objectives

The Goal of the Reserve is:

To study and preserve the unique high altitude ecosystem of the Central Tien Shan, on a possibly expanded Reserve territory, seeking also to support the conservation of associated cultural heritage and engage local communities and other stakeholders in nature conservation activities.



The Goal should be seen as the long term target the Reserve team wishes to achieve over the next 15 to 20 years. To achieve the Goal the team has selected 6 themes, which reflect the main areas of activity for the reserve in the coming period. They are:

- 5.1 Biodiversity Conservation
- 5.2 Scientific Research and Information Technology
- 5.3 Local Communities and Improving Conditions in High Altitude Rural Areas
- 5.4 Public Relations and Education
- 5.5 Administration and Organisational Management
- 5.6 Monitoring the Plan

The following chapters present the detailed strategies to be implemented under each theme to address the threats to the Reserve. Each chapter introduces the theme and describes:

- The key threats related to the theme;

- The objective/s targeted to address the threats within the theme together with a measurable indicator, which enables progress towards achieving the objective to be tested;
- The primary subject areas (areas of work) and the activities (the detailed work) to be delivered to achieve each objective, and;
- Timetable indicating when each activity is planned to be implemented.

Overview of Objectives

A total of 8 objectives have been identified to be achieved over the next 5 years. These are presented in more detail in the following chapters and are summarized here:

<p>Theme 5.1. Biodiversity Conservation</p> <p>Objective 1.1: To gather and collate essential data on habitats and ecosystems by 2015 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of activities to maintain and/or restore the Reserve’s ecosystems to a favourable condition.</p> <p>Objective 1.2: To gather and collate essential data on key animal and plant species by 2018 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of management activities to maintain and/or restore the Reserve’s species populations to a favourable condition.</p>
<p>Theme 5.2. Scientific Research and Information Technology</p> <p>Objective 2.1: To develop and deliver a broad programme of scientific research (supported by computer technology) that measures the condition and trends in the state of the ecosystem, habitats and species and informs effective biodiversity management in the Reserve and adjacent areas.</p>
<p>Theme 5.3. Local Communities and Improving Conditions in High Altitude Rural Areas</p> <p>Objective 3.1: To increase the participation of local communities in nature conservation activities.</p>
<p>Theme 5.4. Public Relations and Education</p> <p>Objective 4.1: To raise awareness of the threats to the Reserve in order to increase public appreciation and engender public support for its protection and management.</p>
<p>Theme 5.5. Administration and Organizational Management</p> <p>Objective 5.1: To ensure that management and administration maximises efficiency and ensures the Reserve has all of the resources necessary to implement all (100%) of the priority 1 projects, 80% of priority 2 and 60% of priority 3 management plan activities.</p> <p>Objective 5.2: Expansion of the Reserve’s territory with the aim of the conservation of rare and threatened species of fauna and flora due to human caused activities.</p>
<p>Theme 5.6. Monitoring the Plan</p> <p>Objective 6.1: To monitor and collect/document the results of management activities and the achievement of management objectives.</p>

9.2 5.1 Biodiversity Conservation

Biodiversity conservation is the main theme within the management plan. This is the main focus of the Reserve's activities and provides the framework for all work conducted by the Reserve in the other 5 thematic areas identified within this plan.

9.2.1.1.1.1.1 Biological Diversity

A number of regionally and globally threatened species are found in the Reserve such as: Snow Leopard (*Panthera uncia*), Argali (*Ovis ammon*), Manul (*Otocolobus manul*), Saker Falcon (*Falco cherrug*) and Cinereous Vulture (*Aegypius monachus*). There are also a number of other species of conservation interest listed in the Kyrgyz Red Data Book: Brown bear (*Ursus arctos*), Stone marten (*Martes foina*), Bearded Vulture (*Gypaetus barbatus*), Himalayan Vulture (*Gyps himalayensis*), Golden Eagle (*Aquila chrysaetos*), Eurasian Griffon (*Gyps fulvus*), Eurasian Eagle-Owl (*Bubo bubo*), Ibisbill (*Ibidorhyncha struthersii*). Additional species of interest include: Himalayan Snowcock (*Tetraogallus himalayensis*), Tian Shan Apollo (*Parnassius tianshanicus*) and Swallowtail (*Papilio machaon*). This emphasizes the necessity of actions to conserve the territory, its habitats and species. As knowledge on the diversity of taxa such as invertebrates, bats and rodents on the Reserve is incomplete, it is necessary to conduct preliminary (literature) taxonomic inventories and baseline surveys in the Reserve.

Threats to Biodiversity

The following threats are noted:

- Poaching of snow leopard, argali, ibex, marmot and other animals.
- Lack of resources for study and conservation of biodiversity.
- Global climatic changes.
- Mining explorations – anticipated threat in future.
- Impact of the closure of the Kumtor Gold Mine on security.
- Overgrazing in the buffer zone and on borders with adjoining territory – threat in the future.
- Increase in the number of hunting agencies along the border with the Reserve.

Based on the requirements of conserving the territory, its habitat and species, and taking into account current and anticipated threats, the following objectives and activities have been identified:

<u>Objective</u>	<u>Indicator of success</u>
<p>Objective 1.1: To gather and collate essential data on habitats and ecosystems by 2015 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of activities to maintain and/or restore the Reserve's ecosystems to a favourable condition</p>	<p>Indicator: Completion of baseline surveys. State of the Reserve report produced in 2018. Monitoring indicates ecosystems have not deteriorated from baseline.</p>

Subject Area 1: Survey of Habitats

The 4 vertical ecological belts with the Reserve are the main starting point for study of the whole ecosystem. This work has been started but has not been completed. All high altitude belts need to be covered by surveys (transects, monitoring plots for plants and animals, track surveys, etc.)

because only together will they enable a full understanding and description of the character and appearance of the Reserve to be obtained.

Activity 1: Complete the identification and survey of the 4 vertical zones

Partner organizations: National Academy of Sciences of the Kyrgyz Republic, State Agency for Environmental Protection and Forestry, higher education institutions on nature conservation, Biosphere Reserve Territory “Issyk-Kul”

Priority Level – 1

Activity 2: Complete the identification and prioritization of vegetation communities

Partner organizations: National Academy of Sciences of the Kyrgyz Republic, State Agency for Environmental Protection and Forestry, higher education institutions on nature conservation, Biosphere Reserve Territory “Issyk-Kul”

Priority Level – 1

Activity 3: Complete the survey of priority vegetation communities

Partner organizations: National Academy of Sciences of the Kyrgyz Republic, State Agency for Environmental Protection and Forestry, higher education institutions on nature conservation, Biosphere Reserve Territory “Issyk-Kul”

Priority Level – 1

Activity 4: Conduct baseline surveys to identify the state of pastures in buffer areas

Partner organizations: National Academy of Science of the Kyrgyz Republic, agencies, higher education institutions

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	1 st /2 nd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Identification and survey of 4 vertical zones	X	X										
2. Identification of vegetation communities	X	X										
3. Conduct priority vegetation communities’ surveys	X	X										
4. Conduct baseline surveys for identification of the state of pastures in buffer areas	X	X	X	X	X	X	X	X	X	X	X	X

Subject Area 2: Provision of Security and Management of Habitats

The staff of the Security Department of the Reserve include: a Head of Security, 2 Senior Rangers and 14 Rangers. Their main task is the conservation of the entire natural complex in its natural state. The Security Department works according to an approved annual work plan. There are 14 management sectors in the Reserve. The 3 main sectors cover access points to the Reserve. Each of these has 2 rangers appointed to control access.

On a monthly basis, rangers conduct patrols and survey fauna and flora in each sector. The organization of 7 day patrolling in the 3 main sectors is planned every month. However, due to lack of funding patrols are not always conducted on time. This work is carried out in accordance with established routes and survey methodologies. Rangers are trained in the suppression of illegal activity and conduct this work in accordance with prescribed protocols and legislation. All rangers have been trained in the field on arresting lawbreakers, the use of GPS, maps, binoculars and compass and provision of first aid.

Activity 1: Control and prevention of access to the core zone with the aim of conserving the ecosystem

Partner organizations: National Academy of Science of the Kyrgyz Republic, agencies, higher education institutions

Priority Level – 1

Activity 2: Conducting anti-poaching patrolling with intensified patrolling in spring and autumn seasons

Partner organizations: agencies, programmes, communities

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	constantly											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Control access to the core zone with the aim of conserving the ecosystem	X	X	X	X	X	X	X	X	X	X	X	X
2. Conduct anti-poaching patrolling with increased intensity in spring and autumn seasons	X	X	X	X	X	X	X	X	X	X	X	X

Subject Area 3: Monitoring the State of the Ecosystems

Biodiversity Monitoring Strategy

A baseline survey was conducted in summer 2013. This should fill any gaps in data required for the monitoring strategy. The strategy covers all aspects of biodiversity of the Reserve, including representative data and communities, and those considered rare or threatened. The recording of climatic data will be built into the monitoring programme as soon as is feasible. The main attention is directed towards monitoring a suite of habitats, vegetation communities and species that are relatively well-known and representative of the high-altitude biota of SCEZ:

- Snow leopards
- Mountain ungulates (argali and ibex)
- Marmots
- Large raptors
- Himalayan snowcock
- Threatened species of flora (e.g. *Berberis kashgarica*)

- Birds identified as indicators of main habitat types (high altitude zone; cliffs/screes; wetlands; birch forest; shrubs)

Two invertebrate groups – butterflies and molluscs – and lichens are also included in the monitoring strategy. The start and timing of monitoring is dependent on the availability of baseline data and production of monitoring identification materials. Rare and threatened plant species such as *Berberis kashgarica* can have small-scale monitoring schemes designed for them at known locations where they occur. The following steps are essential in implementing the monitoring strategy

- Completion of the baseline survey.
- Extend SLIMS transects to all appropriate parts of the Reserve.
- Produce identification guides to main groups.
- Refine analysis of rangers' patrol data.
- Develop a large raptor monitoring scheme.
- Trial transects on Eshek-Art Pass, Koyonduu valley.

Habitat or Ecosystem Monitoring

The monitoring strategy is based on the monitoring programme used in the West Tien Shan. This involves running a 3-5 km transects through each of three major habitat types: high-altitude slopes, middle-elevation slopes and riverine woodland. This will be repeated in the 3 principal sectors of the Reserve, giving a total of 9 transects to monitor ecosystem condition. These transects would be ridden on horseback, with a list of selected indicator species to be identified. The Reserve contains enough riverine woodland in the lower course of Uch-Kul to provide transects of sufficient length, and the riverine woodland can be combined with shrub habitats along streams to make this viable. A more detailed scheme with smaller plots to monitor critical species and communities will be used for vegetation. Ideally this will include climate and soil data.

The Reserve is characterized by island (mosaic) and belt distribution of bushes and trees along the main riverbed of the Sarychat River, starting from the left tributary of the Bordu River, as well as in gorges and dry riverbeds of side tributaries. Birch and willow groves are distributed in the lower course of the Uch-Kul. Transects that incorporate both these aspects (i.e. longer-distance habitat condition monitoring and smaller plots targeted at priority species or communities) will be designed. However, further identification of critical and representative habitats and vegetation communities is required before they can be included in the monitoring strategy and this activity should be a research and survey priority.

Activity 1: Data collection from automated equipment with the aim of tracking state of climate in different parts of the Reserve

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions)

Priority Level – 1

Activity 2: Conducting surveys of habitats and different taxa of plants and animals each season

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 1

Activity 3: Establishing a 3-5 km transect in each of the three types of habitats

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”, SLT, FFI)

Priority Level – 2

Summary and timetable of activities:

ACTIVITY	1 st – 4 th year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Data collection from automated equipment with the aim of tracking state of climate in different parts of the Reserve	X	X	X	X	X	X	X	X	X	X	X	X
2. Conducting surveys of habitats and different taxa of plants and animals each season		X			X			X			X	
3. Establishing a 3-5 km transect in each of the three types of habitats										X	X	X

<u>Objective</u>	<u>Indicator of success</u>
<p>Objective 1.2: To gather and collate essential data on key animal and plant species by 2018 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of management activities to maintain and/or restore the Reserve’s species populations to a favourable condition.</p>	<p>Indicator: Completion of a baseline surveys. State of the Reserve report produced in 2018. Monitoring indicates species have not deteriorated from baseline.</p>

Subject Area 1: Survey of Flora and Fauna Populations

Activity 1: Conduct a series of expeditions to produce and keep up to date the inventory of flora and fauna of the Reserve (4 expeditions per year over two year period)

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”, SLT, FFI)

Priority Level – 1

Activity 2: Data analysis and development of lists of key species based on the results of expedition work for further monitoring activities

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions)

Priority Level – 2

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Conduct a series of expeditions to produce inventory of flora and fauna of the Reserve (4 expeditions per year over two year period)	X									X	X	X
2. Data analysis and development of lists of key species based on the results of expedition work for further monitoring activities				X	X							

Subject Area 2: Monitoring of Species and Indicator Species

Snow leopards are already monitored through the SLIMS process. As one of the two top predators in the Reserve, they have a ‘keystone’ effect in that a viable population reflects in part a healthy high-altitude ecosystem. Expansion of SLIMS monitoring into new areas is planned and will greatly increase its value.

Prey species are also monitored as part of the SLIMS process. Ibex, Argali, Marmots and Snowcock are also recorded throughout the Reserve by the rangers on a regular basis. With some refinement of the current system and more detailed analysis this could fulfill an important role in the monitoring strategy.

Large birds of prey can be monitored in part by calculating the encounter rate over distance traveled or number of patrol-days. A supplementary method is to monitor known nest sites twice annually for presence of breeding pairs, and breeding success, depending on the accessibility of such sites. Training in raptor identification is needed to ensure correct identification of target species.

Monitoring of species will be carried out on transects, experimental plots and others based on the species and generally accepted methods stated above. Key species of animals and plants have not all been identified. It is necessary to agree on this with specialists.

Activity 1: Conduct expeditions to survey snow leopard on a seasonal basis (4 times per year) based on SLIMS methodology

(Partner organizations: International Universities and NGOs)

Priority Level – 1

Activity 2: Conduct dedicated research of prey species of snow leopard on a monthly basis and continuously through ranger patrolling (argali, ibex, marmot) based on SLIMS methodology.

(Partner organizations: FFI)

Priority Level – 1

Activity 3: Develop monitoring system of key species based on the inventory data

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions)

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	1 st – 4 th year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Conduct expeditions to survey snow leopards on a seasonal basis (4 times per year) based on SLIMS methodology		X			X			X			X	
2. Conduct research of prey species of snow leopard on a monthly basis and continuously (argali, ibex, marmot) based on SLIMS methodology	X	X	X	X	X	X	X	X	X	X	X	X
3. Develop monitoring system of key species based on the inventory data				X	X							

5.2 Scientific Research and Information Technology

The Scientific Department of the Reserve consists of 5 people. Scientific research work is directed towards the study of the high altitude ecosystem of the Central Tien Shan with the current main focus being the study of snow leopards and its prey species. This work started in 2002. The second research direction is the study of avifauna including the determination of species composition (92 species) and their distribution on the Reserve territory. The Scientific Department cooperates with a number of higher education institutions, the National Academy of Science, International NGOs and many leading Kyrgyz and international specialists.

All scientific research should, by necessity, be conducted to international standards and based on computer technologies (GPS, digital photo and video equipment, computer, electronic map, satellite communication and satellite monitoring). All processed information should be stored in an electronic database and contacts with partners should be maintained through the internet and website.

Overall, the Scientific Department is facing the following problems:

1. Lack of programmes in many necessary research areas.
2. Lack of resources to conduct research and field work.
3. Lack of appropriately qualified specialists.

<u>Objective</u>	<u>Indicator of success</u>
Objective 2.1: To develop and deliver a broad programme of scientific research (supported by computer technology) that measures the condition and trends in the state of the ecosystem, habitats and species and informs effective biodiversity management in the Reserve and adjacent areas.	The number of programmes available. Presence of technology.

Subject Area 1: Biodiversity Research
Current Recording and Data Collection

Data of various kinds are collected by science section staff and the rangers. The science section has responsibility for conducting research and surveys. Rangers record observations while carrying out their regular patrols. Activities of all staff are greatly hampered by chronic lack of funding and equipment. Data is collated to some extent at Reserve HQ but currently only snow leopard records are entered onto the computer (as an MS Word file). The Reserve does not possess any computer database software.

Science Section

The science section personnel have been trained by SLT in the use of SLIMS snow leopard transects. A number of regular transects are monitored and there are plans to expand the number to intensify coverage and extend it to other parts of the Reserve. Recording of prey numbers is an integral part of SLIMS monitoring. The science section has also established 5 fenced plots in the buffer zone near Koyonduu to calculate biomass and assess the effects of grazing on different vegetation types. This activity falls under the heading of research rather than monitoring.

Rangers

Rangers patrol each sector once a month. They are equipped with a hand-drawn plan of the sector, copied from 1:100,000 maps and a recording sheet with a list of wildlife, numbered 1-23. This includes all the larger and medium-sized mammals, birds of prey, game birds and pigeons. Ibex and argali are subdivided into males, females and young. The approximate site of each observation and number of animals are entered on the map and the recording sheet, with additional details entered into a patrol diary. The data are collated at Reserve HQ by species and by sector. This recording system was devised by the Reserve staff and has subsequently been adopted by the forest authority nationwide. It is well-designed, simple and robust, and produces a lot of valuable information. The division of the Reserve into management sectors provides a sound basis for current and future recording and habitat mapping. The cartographic grid on the map originals allows locations where taxa were recorded to be plotted with relative accuracy and these can be later plotted on GIS.

Taking into consideration the complex socio-economic conditions of Kyrgyzstan at the present time, we should be more flexible about the issue of attracting highly qualified specialists to work in the Reserve because it requires significant financial means. Thus, we should restructure the work of both scientific and security departments. The collection of field material and monitoring surveys could be successfully done by rangers and scientific staff themselves after receiving their education and training in the skills required to deliver these activities. Furthermore, rangers are responsible for observing both biotic and abiotic nature with observations being added to Reserve's dataset and data-base. For this reason, all staff members should be trained in basic computer use and coordinated to input data in support of scientific work and the implementation of the management plan. Highly qualified specialists will be used to consult on and process field material.

Activity 1: Develop a programme for the survey of numbers and distribution of key species (Golden Eagle, falcon, bear and Manul)

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory "Issyk-Kul")

Priority Level – 1

Activity 2: Continue work on evaluation of livestock grazing impact on various types of vegetation on fenced plots (2 times per year continuously)

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory "Issyk-Kul")

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Develop a programme for survey of numbers and distribution of key species (Golden Eagle, falcon, bear and Manul)									X	X		
2. Continue work on evaluation of cattle grazing impact on various types of vegetation on fenced plots (2 times per year continuously)		X								X		

Subject Area 2: Survey on Abiotic Factors

The uniqueness of the high altitude ecosystem of the Central Tien Shan is due to a combination of abiotic factors. Rising up to an altitude of 5,000m the glacial massif Ak-Shyrak has the harshest climatic conditions in this region. The massif is the start of 3 river systems and influences the economic activity of the population of this region, as well as all ecological zones situated below.

Key abiotic factors of this region are relief, climate, glaciers, water network (lakes and rivers) and soils. The glaciers influence the water system and local climatic conditions. These together with relief (altitude, exposition of slopes) determine the landscape forms and biodiversity to be found. The Reserve's programme of research must include survey and research work on:

- Ecosystems, landscapes and relief
- Climate (including the automated station)
- Glaciers (including the automated station)
- Water resources (rivers and lakes)
- Soils

Activity 1: Further develop and establish new research programmes on:

- Climate
- Glaciers survey
- Water resources survey (rivers and lakes)
- Soil and relief (data for monitoring activities)

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions)

Priority Level – 2

Summary and timetable of activities:

ACTIVITY	3 ^d /4 th year											
	A	S	O	N	D	J	F	M	A	M	J	J
a) Programme of climate survey								X	X			
b) Programme of glaciers survey	X	X	X	X				X	X	X	X	X
c) Programme of water resources survey (rivers and lakes)								X	X			
d) Programme of soil and relief survey for collection of basis data for further monitoring activities								X	X			

Subject Areas 3: Data Management

The Reserve team plans, in addition to collecting data on flora and fauna, to collect data on abiotic factors on the territory of the Reserve. The data collected will be recorded on a data base that will also be used for monitoring activities. The database will be made available to other scientific research and nature conservation institutions. Thus, it is necessary to develop and apply the following programmes:

1. Programme of collection, processing and storing of information on biodiversity
2. Programme of collection, processing and storing of information on abiotic factors

Activity 1: Purchase statistics and GIS software for collecting, analyzing and storing data information on biodiversity and abiotic factors and provide training in their use.

(Partner organizations: National Academy of Science of the Kyrgyz Republic, higher education institutions, Biosphere Reserve Territory "Issyk-Kul")

Priority Level – 2

ACTIVITY	1 st /2 nd year											
	A	S	O	N	D	J	F	M	A	M	J	J

1. Purchase statistics and GIS software for collecting, analyzing and storing data information on biodiversity and abiotic factors and provide training				X	X							
---	--	--	--	---	---	--	--	--	--	--	--	--

5.3 Local Communities and Improving Conditions in High Altitude Rural Areas

The conservation of the Reserve is directly linked to the socio-economic / living conditions of local populations in rural areas. At present, over 60% of the rural population in Kyrgyzstan lives below the poverty line. Lack of employment and opportunity to maintain even a basic standard of living, combined with a reduction in literacy levels in rural areas, and has led to the overexploitation of natural resources, e.g. poaching, cutting of trees and shrubbery with increased negative impacts on wildlife.

In the past the conservation of the Reserve has placed restrictions on the economic use of land, pastures and wildlife products by local residents. Whilst many restrictions need to stay in place, the promotion of the appropriate sustainable use of natural resources could bring benefits both to the Reserve and the local residents.

“Without a normal natural environment, problems facing society will multiply. Without sustainability of the socio-economic environment, none of the achievements in the field of nature conservation will be long-term and lasting”.

Population

There are two inhabited localities in the immediate proximity of the Reserve: Ak-Shyirak and Engilchek. There are 40 families residing in Ak-Shyirak village, including the Reserve staff, shepherds and other local residents. There is a school in the village. There are 23-24 families in Engilchek and several thousand people work at the Kumtor mine. The border patrol camps located near the Reserve are situated in Kara-Sai, Ak-Shyirak and Engilchek.

There are also 7 hunting agencies adjoining and surrounding the Reserve. These private hunting agencies have security service staff on site on a year round basis, as well as guides during a hunt, besides foreign clients-hunters (August – October and March). Security service staff of local hunting agencies are hired from Karakol town and rayons located near the lake for seasonal work.

Threat Assessment

Current threats to biodiversity related to communities and other local stakeholders are: poaching of snow leopards and mountain ungulates; ‘unlawful hunting’ of mountain ungulates by local people; poaching of marmots; and poisoning of marmots. Future threats are considered to be: cessation of mining operations at Kumtor; future mining exploration; overgrazing in the buffer zone; and unregulated tourism.

At present foreign hunting concessions situated adjacent the Reserve present a threat to the Reserve. These hunting concessions do not make any contribution to the protection and/or development of the Reserve, although ungulates found on the territory of the Reserve are the object of hunting. Hunting concessions have violated the Reserve’s protected territory and the Reserve authorities’ suggestion of closing down or moving hunting concessions to a safe distance from the Reserve’s borders have received no reaction from higher authorities.

Stakeholder Identification

A detailed stakeholder analysis was undertaken in 2005 and 2006 through participatory meetings with a range of local stakeholders. This analysis has been reviewed and remains relevant today. Stakeholders are individuals or groups who are impacted by, or impact on, the key species/groups,

and conservation actions aimed at these species/groups; or have a special interest in the Snow Leopard and its major prey species (Argali, Ibex and Marmot) and supporting habitats. Ten broad groups of people who potentially cause threats to key species/groups, the *impacting stakeholders*, were identified (Table 1). Individuals or groups, who can help mitigate or reduce the impacts of the *impacting stakeholders*, were identified as *mitigating stakeholders* (Table 2).

Local residents of Ak-Shyirak, Engilchek and Karakolka villages, as well as the Naryn Region were identified as the key stakeholders and have taken active part in the development of the management plan through participation in the seminar for stakeholders (August 2005) and the seminar for representatives of local communities (September 2006). Their opinions and advice proved very useful in the development of the goal and objectives of the management plan, in particular, for the writing of the section on local communities.

Table 1: Impacting stakeholders in the SCEZ identified by workshop participants

Code	Name	When?
1	Local people - Ak-Shiyrak	Year-round
2	Local people – Engilchek	Year-round
3	Outsiders - Shepherds	June-Oct
4	Outsiders – hunting agencies (staff)	June-Oct
5	Outsiders – hunting agencies (clients)	June-Oct
6	Outsiders - Kyrgyzstan (illegal hunters)	June-Oct
7	Outsiders - Kyrgyzstan (legal hunters)	June-Oct
8	Local border patrol (national security)	Year-round
9	Higher officials (local and national)	June-Oct
10	Reserve staff	Year-round

Table 2: Mitigating stakeholders in the SCEZ identified by workshop participants

Code	Name	Who can they directly influence? *
1	Village councils	1,2,8
2	Village elders	1,2,8

3	Future village leaders	1,2,8
4	Local people – participants in SLE programme	1,2,8,10
5	Border Patrol, Chairman (Bishkek)	8,9
6	Border Patrol, Regional Commander (Kara Kol)	8,9
7	Border Patrol, Local commanders (4)	1,2,3,4,5,6,7,8,10
8	SAEPF**, Hunting Control, Director	4,5,7
9	SAEPF**, Service for Control of Protection of Wildlife and Plants, District level officers	1,2,3,4,5,6,7
10	SAEPF**, Regional Inspection for Hunting	4,5,7
11	SAEPF**, Forestry Fund, Director	?
12	Ecological Prosecutors Office	4,5,6,7
13	Owners of hunting agencies (7)	4,5
14	Sarychat Eertash Reserve, Director	1,2,3,10
15	Sarychat Eertash Reserve, Reserve staff	1,2,3,4,5,6,7
16	Local & International NGOs	1,2,7,9,10
17	Hunters & Fishers Society	7

* Indicates code for negative stakeholder individual or group (from Table 1).

** State Agency on Environment Protection and Forestry

Engaging local people to support the work of the Reserve

In order to provide for compliance with the regime of protection of the Reserve and to limit the hunting of ungulates beyond its borders, it is necessary, in addition to controlling access and enforcing laws, to persuade the local people living close to the Reserve of the value of the Reserve and its conservation. The Reserve therefore aims to engage with local communities directly, through joint activities under



objective 3.1, and indirectly through education and awareness-raising activities through objective 4.1. Village councils, elders and future leaders can influence local people. The village council consists of a chairman, a secretary, a representative of the elders, along with a representative of the border patrol, local or district police. However, as unfortunately most members of the Ak-Shyirak and Engilchek councils live in Barskoon, and because local or district police are not present all the time, it is unlikely that village councils would be of much influence in stopping poaching.

Since 2002, the Reserve has worked on the programme of snow leopard conservation. Based on a joint initiative within the framework of this programme, local NGOs were established in Ak-Shyirak

and Engilchek villages to provide local residents, namely unemployed women, with jobs. They produce various products from felt, sell them and gain income that they use to provide for their families. In case of no poaching and negative impact on nature by local residents, local communities receive a bonus of 30% on top of total income sum gained from selling felt products.

Because of this work, there is a fundamental basis for snow leopard conservation in Ak-Shyirak village since people there no longer consider it important to have a snow leopard trophy. Women who are benefiting from the employment scheme influence their husbands (including rangers) and pressure them not to hunt. It is not possible to say whether there has been a decrease in hunting but there has been an interest in making anti-poaching activities work. Also, an important aspect of the community programme is that it has provided jobs to local people. When the Reserve started, it hired former poachers and shepherds as rangers. The salary is not great but it is a full-time job so there is an incentive not to poach. If people are busy with their jobs there is less time to poach.



Enilchek is more accessible from the outside e.g. via paved road from Karakol²⁹, so there is more movement of people in and out of the village during the year. For example, the area was known as a paradise for poachers even during Soviet times. The road there closes as early as October and opens again in May. Like Ak-Shyirak, village heads don't spend much time there, and there is only small number of people who stay the winter. It is the winter-time when snow leopards are more likely to be poached since this is when the fur is in its best condition. So it is possible that locals are poaching to supply orders from Karakol and beyond.

Rangers have made efforts to raise awareness in this village, and to get people to help anti-poaching efforts. Although some local hunters have agreed not to hunt, so far there has not been much interest in anti-poaching activities. Added to this, there is a hunting agency called Han-Tengri Tour which promotes hunting and likely provides jobs for locals. Reserve staff have collaborated with this organization to do scientific research (SLIMS) in 2001-2002. But local people should see clear benefits to maintain interest in conservation. At the same time if locals see that law enforcement is applied effectively and fairly to all groups, they are more likely to respect its application in their community.

<u>Objective</u>	<u>Indicator of success</u>
Objective 3.1: To increase the participation of local communities in nature conservation activities.	Indicator: The number of people engaged. The types of activities. Benefits to locals.

²⁹ The population of Karakol is estimated at 60-70,000 people.

In addition to its immediate functional responsibilities the Reserve team also conducts active work with local communities, border patrols and the mining enterprise “Kumtor Gold Company”. In summer time, on the shore of the lake Issyk-Kul, summer ecological camps are organized through the joint efforts of the Reserve’s staff and sponsors. The Reserve supports community work through the promotion of improvement of livelihoods of the population through organizing and supporting non-governmental organizations.

“Kumtor” also financially supports some of the conservation actions implemented by the Reserve. The location of the Reserve close to the border zone promotes cooperation with the border patrol service, which is manifested through joint training and patrolling. Many of the Reserve’s rangers are volunteer border guards. The Reserve plans to actively continue cooperation with the institutions listed below and engage them in nature conservation:

- Local aiyl okmotu (village governments)
- Mining companies - Kumtor, Engilchek, Togolok
- Frontier guards
- Hunting agencies
- NGOs
- Schools

Subject Area 1: Working with Local NGO and Community Organisations to Increase Local Participation in Nature Conservation Activities

Activity 1: Attraction of local community and border patrol representatives for joint patrolling

(Partner organizations: local communities, border patrol guards)

Priority Level – 2

Activity 2: Joint organization of social and cultural activities with local communities on nature conservation activities

(Partner organizations: local communities)

Priority Level – 2

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Attraction of local community and border patrol representatives for joint patrolling	X	X	X	X	X	X	X	X	X	X	X	X
2. Joint organization of social and cultural activities with local communities on nature conservation.	X	X	X	X	X				X	X	X	X

5.4 Public Relations and Education

Information about Environmental Conservation

As surveys and conversations with the population of the Issyk-Kul Oblast demonstrate the population is not well informed about the activities of the Reserve, its purpose and role in nature conservation. The level of ecological knowledge of the population is also extremely low. One of the most important objectives of the Reserve is to foster the support of the local population for and their collaboration in nature conservation activities. The Reserve has worked closely with a number of organizations, supported through the previous EBRD/IFC capacity building project and others, to raise the awareness of local people on the Reserve and biodiversity conservation. However, the Reserve lacks some of basic infrastructure it requires for conducting such work in the longer term. For example, the Reserve lacks literature and materials on working with local communities and has no information/education department that could carry out work with the population and visitors on a regular basis. Meetings can be held using community facilities but the Reserve lacks any space for meetings with the local population at its headquarters.

Education of local residents is carried out through conversations with the Reserve's staff. The formal system of ecological education as such is absent and dissemination of information through mass media is not developed in the region. For ecological education of the population and school children it is necessary to establish an ecological-educational department. This will help to improve contact with the population and the Reserve will secure support for its activities. Education of school children in Ak-Shyirak village is carried out during lessons on Natural History, Biology and Geography. There is a "Nature Corner" with posters, photographs and information about the Reserve in Barskoon village.

Harsh living conditions have led to the situation where the majority of the residents in the republic feel no necessity to obey laws to protect nature. For this reason, there is a need for continuous ecological-educational work to raise awareness of the Reserve and its values and the laws relating to its protection. To this end, we need to attract mass media from the oblast, the republic, the CIS countries and the world, to the produce programmes and materials to raise public awareness about the Reserve, its problems and needs. The efforts of the Reserve staff, some governmental structures, local government, mass media, entrepreneurial structures, NGOs and international organizations seeking to provide public support and practical assistance to the Reserve in this regard, should be coordinated.

<u>Objective</u>	<u>Indicator of success</u>
Objective 4.1: To raise awareness of the threats to the Reserve in order to increase public appreciation and engender public support for its protection and management.	Indicator: The number of people and organizations contacted/with whom positive relations were established. The

Subject Area 1: Educational programmes

A number of educational programmes implemented by the Reserve were oriented on secondary school students. Substantial attention in educational programmes was paid to habitats of rare and threatened species, mainly snow leopard.

The annual action “March of Parks and Reserves” starts with half-hour lectures about the work of the Reserve, other Reserves and national parks of Kyrgyzstan, environmental legislation, etc. The programme of annual summer ecological camps provides for daily classes on ecology, zoology and botany. In addition to the Reserve’s staff, secondary school teachers and higher education institution lecturers (Issyk-Kul State University) are attracted to teaching classes. The range of age categories for which educational programmes are oriented should be expanded.

The Reserve plans to:

- Conduct trainings and seminars with local residents.
- Work with the local population to provide education tailored to different ages and professional levels.
- Deliver a programme of education and awareness to “visitors” (guests, hunters, shepherds, tourists, representatives of state, rayon and republic level), who present a potential threat to the biodiversity.
- Collaborate with leading higher education institutions of the republic, CIS and abroad.
- Develop a programme to work with all categories of the population and community and attract them to joint patrolling of the protected and adjacent territories of the Reserve.

Activity 1: Develop a programme of trainings and seminars on the theme of the Reserve and its work.

(Partner organizations: State Agency for Environmental Protection and Forestry, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 2

Activity 2: Conduct seminars and trainings 2 times per year with the public.

(Partner organizations: State Agency for Environmental Protection and Forestry, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 2

Activity 3: Support the Biosphere Reserve to open a new staff unit on education and public relations.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 1

Activity 4: Development of a portfolio of education and information materials on the Reserve and nature conservation in general.

(Partner organizations: State Agency for Environmental Protection and Forestry, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 2

Activity 5: Continuous work to increase the level of awareness on environmental protection amongst local populations.

(Partner organizations: State Agency for Environmental Protection and Forestry, higher education institutions, Biosphere Reserve Territory “Issyk-Kul”, schools)

Priority Level – 1

Activity 6: Sign agreements with leading higher education institutions and conservation NGOs of the republic, CIS to:

- a. conduct scientific research activities
 - b. conduct educational programmes of nature conservation character
- (Partner organizations: higher education institutions)

Priority Level – 3

Summary and timetable of activities:

ACTIVITY	3 rd /4 th year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Develop a programme of trainings and seminars		X	X	X	X				X	X		
2. Conduct seminars and trainings 2 times per year with public			X							X		
3. Support the Biosphere Reserve to open new staff unit on education and public relations									X	X	X	
4. Development of a portfolio of education and information materials about Sarychat-Eertash State Nature Reserve and nature conservation in general			X	X	X							
5. Continuous work on increasing the level of awareness on environmental protection among local population	X	X	X	X	X	X	X	X	X	X	X	X
6. Sign agreements with leading higher education institutions and conservation NGOs of the republic, CIS to a) conduct scientific research activities; b) conduct educational programmes	X	X	X	X	X	X	X	X	X	X	X	X

Subject Area 2: Public relations and mass media

The main activities in this area are oriented towards building advocacy for nature conservation among local residents through discussions, lectures, trainings and seminars. Annually, the Reserve takes part in the international action “March of Parks and Reserves” during which games, quizzes and competitions are conducted in schools in villages neighboring the Reserve.

The very low level of awareness of local people is a main threat to the Reserve. Until recently residents of villages situated close to the Reserve were unaware of the Reserve’s existence. For broader coverage of the Reserve’s activities, publications about the Reserve’s work in mass media are needed (articles, video films, etc.) at local, regional and state level. Since 2003, the Sarychat-Eertash Reserve has conducted active work with the public at large. Articles in regional periodicals (“Ak-Kuu”, “Vesti Issyk-Kulya”) have been published on a regular basis. Articles in the republican newspaper “Slovo Kyrgyzstana” and scholarly papers of the Reserve’s staff have been published. A video film about the Reserve was shown on regional television.

The executive staff of the Reserve plan to give more attention to task of raising awareness about nature conservation amongst the population. Local communities, local government, schools and higher education institutions will be attracted to this work.

Activity 1: Update and refresh the environmental educational departments within museums and libraries in Ak-Shyirak, Engilchek and Barskoon villages about the Reserve.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”, international organizations)

Priority Level – 1

Activity 2: Continuously work with mass media and other organizations to raise the level of awareness and knowledge of nature conservation work.

(Partner organizations: mass media of oblast and republic level)

Priority Level – 1

Activity 3: Create a series of videos about the Sarychat-Eertash reserve (1 film per year over 5 year period).

(Partner organizations: mass media

Priority Level – 2

Activity 4: Organize a series of TV programmes about the nature of the Reserve (quarterly on a continuous basis).

(Partner organizations: TV of oblast and republic level, higher education institutions, National Academy of Science of the Kyrgyz Republic, FFI, SLT)

Priority Level – 2

Activity 5: Publish articles in scientific journals and newspapers at oblast and republic level (6 times per year).

(Partner organizations: newspapers of oblast and republic level, higher education institutions, National Academy of Science of the Kyrgyz Republic)

Priority Level – 2

Activity 6: Maintain an up to date website for the Reserve.

(Partner organizations: FFI)

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Update and refresh the environmental educational departments within museums and libraries in Ak-Shyirak, Engilchek and Barskoon villages about the Reserve.	X	X	X	X	X	X	X	X	X	X	X	X
2. Continuously work with mass media and other organizations to raise the level of awareness and knowledge of nature conservation work.	X	X	X	X	X	X	X	X	X	X	X	X
3. Create a series of videos about the Sarychat-Eertash corridor (1 film per year over 5 year period)				X	X							
4. Organize a series of TV programmes about the nature of the Reserve (quarterly on a continuous basis).	X			X			X			X		
5. Publish articles in scientific journals and newspapers at oblast and republic level (6 times per year)	X	X	X	X	X	X	X	X	X	X	X	X
6. Maintain an up-to-date website for the Reserve	X	X	X	X	X	X	X	X	X	X	X	X

5.5 Administration and Organizational Management

All budgets allocated to the Reserve are spent on payment of salaries. Staff salaries fail to reach even a subsistence level of wage. No infrastructure support work is conducted. There is insufficient office space available that corresponds to the volume of work to be undertaken. The Reserve's scientific research and biotechnical activities have not been financed for the past four years. The Reserve's only working vehicle is 7 years old and in need of repair. Two new ranger posts and further field equipment is required including field clothes, tents, sleeping bags and mats; research equipment including GPS units, cameras, binoculars, trap cameras, automatic meteorological stations and a computer with statistics and GIS software is also required. The administration faces the following issues:

- Lack of financing due to extremely difficult socio-economic situation in the Republic.
- Lack of interest in the Reserve at the local and state level, as well as public organizations.
- Lack of infrastructure including ranger bases with electricity.
- In the medium term the Reserve will need to identify a site and construct a new headquarters.

Organizational activities should be directed towards solving the following priority issues:

- Equipping the scientific team (facilities).
- Repairing old and equipping new ranger posts.
- Establishing an ecological-educational Centre and two branch Centres.
- Securing critical Headquarters infrastructure.
- Solving the problem of communications, illumination, heating and transportation (car, motorbike and horses).
- Implementing the management plan.

<u>Objective</u>	<u>Indicator of success</u>
<p>Objective 5.1: To ensure that management and administration of the organisation maximises efficiency and ensures the Reserve has all resources necessary to implement all (100%) of the priority 1 activities, 80% of priority 2 and 60% of priority 3 management plan activities</p>	<p>Indicator: 100% performance on priority 1 activities. 80% performance on priority 2 activities. 60% on priority 3 activities.</p>

Subject Area 1: Staff Management

The effective delivery of the management plan and the sustainability of the work results will directly depend on the motivation and interest of the staff in their work, the availability of good material-technical basis, as well as prospects for professional growth of each staff member. The Reserve's Executive believes that it is necessary to accomplish the following:

- Increase salaries up to an appropriate level.
- Fully computerize all activities of the Reserve
- Continuous appraisal of education and training needs and improve the qualifications of all staff.
- Attract highly qualified staff to the Reserve.
- Improve critical resources and infrastructure.

Activity 1: Retain current and if possible increase the staff number of the Reserve.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 1

Activity 2: Purchase necessary equipment over a 3 year period.

(Partner organizations: donor organizations)

Priority Level – 1

Activity 3: Purchase alternative sources of energy in the first 2 years: a) wind, and b) solar

(Partner organizations: donor organizations)

Priority Level – 2

Activity 4: Organize appropriate training for all staff of the Reserve in the first 3 years.

(Partner organizations: FFI, WWF, SLT and other international organizations)

Priority Level – 1

Activity 5: Conduct a feasibility study into the construction or purchase of an office for the Reserve and implement in the first 3 years.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 2

Activity 6: Repair old and establish new rangers’ posts in the first 2 years.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”)

Priority Level – 2

Activity 7: Establish and equip new scientific laboratory.

(Partner organizations: State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory “Issyk-Kul”, donor organizations)

Priority Level – 3

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Retain current and if possible increase the staff number of the Reserve.		X	X	X	X							
2. Purchase necessary equipment listed in Annex 1 in the first 3 years of the Plan	X	X	X	X	X	X	X	X	X	X	X	X
3. Purchase alternative sources of energy in the first 2 years: Wind and solar	X	X	X	X	X	X	X	X	X	X	X	X
4. Organize appropriate training for all staff over 3 year period			X			X			X			X
5. Conduct a feasibility study into the construction or purchase of an office for the Reserve in the first 3 year period and implement it	X	X	X	X	X	X	X	X	X	X	X	X
6. Repair of old and establish new rangers' posts over 2 year period										X	X	X
7. Establishment and equipment of a new scientific laboratory										X	X	X

Subject Area 2: Fundraising and sustainability

The main attention should be directed towards finding financial means (fundraising) for implementation of the activities under themes 5.1 to 5.6 in accordance with their priority.

The Reserve is a state institution. As such it is financed from the national budget and partially from the fund of the Biosphere Territory "Issyk-Kul". These funds are sufficient to pay minimum staff salaries and office rent only. Donor funding support needs to be attracted and retained with the aim of improving the quality and sustainability of the Reserve's work. In previous years, grants have been secured that have improved the Reserve's equipment and material base. Survey and planning work, enforcement, community outreach and education work also benefited and some training was provided to staff. However, funding has fallen far short of needs. Grants from donor organizations have proved irregular and have not been used to improve the working conditions of staff directly. Due to these reasons, the implementation of many necessary planned activities has been hampered and some activities have been unachievable. For more productive work, the Reserve needs further funding support and in the long-term a permanent and stable source of income.

In this regard, this management plan review has been facilitated by FFI through a project funded by KGC. This same project has also committed to funding a proportion of the Plan's implementation over its 5 year term. Currently, projects being delivered by UNDP and USAID/WWF aim to increase the Reserve's resource base. The USAID/WWF project also seeks to create a sustainable source of funding for the Reserve by promoting subsidiary farming as a source of income. These provides an excellent basis for delivering the Plan and the Reserve team will work hard with its partners and collaborators to secure the remaining funds and support required to fully achieve the Plan.

Activity 1: Continuous search for financial sources and relations with donor organizations

(Partner organizations: donor organizations)

Priority Level – 1

Activity 2: Development of joint projects with international nature conservation organizations on a continuous basis

(Partner organizations: donor organizations)

Priority Level – 1

Activity 3: Establishment of a farming economy under the Reserve in Ak-Shyirak village (over 2 year period)

(Partner organizations: donor organizations)

Priority Level – 1

Summary and timetable of activities:

ACTIVITY	2 nd /3 rd year											
	A	S	O	N	D	J	F	M	A	M	J	J
1. Continuous search for financial sources and relations with donor organizations	X	X	X	X	X	X	X	X	X	X	X	X
2. Development of joint projects with international nature conservation organizations on a continuous basis	X	X	X	X	X	X	X	X	X	X	X	X
3. Establishment of a farming economy under the Reserve over 2 year period	X	X	X	X	X	X	X	X	X	X	X	X

Objective**Indicator of success**

Objective 5.2: Expansion of the Reserve's territory with the aim of conservation of rare and threatened species of fauna and flora due to human caused activities.

Indicator: state of ecosystems.

Subject Area 1: Increase of the area of the Reserve

At present, the massive development of high altitude regions of the Tien Shan (development of animal husbandry, mining industry, and energy sector, mass and hunting tourism) is taking place. At the same time, many species of large animals (snow leopard, argali, and bear) require large natural habitats. However, due to development of mountainous territories, these animals' habitats are decreasing rapidly, and there are no functional and / or designated corridors left between them. The Reserve's boundaries have recently been reviewed. But it is still necessary to take measures to expand the territory of the Reserve further, in particular to including the Djangart region, which our research shows contains the highest signs of snow leopard in this region.

Activity 1: Study of the state of habitats of rare and threatened species of fauna and flora on adjacent territories

(Partner organizations: National Academy of Science of the Kyrgyz Republic, State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory "Issyk-Kul")

Priority Level – 1

Activity 2: Writing of a justification for increasing the territory of the Reserve as found to be necessary.

(Partner organizations: National Academy of Science of the Kyrgyz Republic, State Agency for Environmental Protection and Forestry, Biosphere Reserve Territory "Issyk-Kul")

Priority Level – 1

ACTIVITY	3 rd /4 th year												
	A	S	O	N	D	J	F	M	A	M	J	J	
1. Study of the state of habitats of rare and threatened species a) fauna b) flora		X				X		X			X		X
2. Writing of a justification for increasing the territory of the Reserve as found to be necessary.									X	X	X		

5.6. Monitoring

Management planning is a continuous and adaptive process. The Sarychat-Eertash Reserve protects a natural living landscape influenced by the human culture and activities around it. The condition of the ecosystems, habitats and species may change as a result of multiple natural and

human influences. Therefore, we cannot assume that management actions described in this plan, which were designed initially based on the situation in 2007/8 and reviewed in 2013, will achieve the outcomes we desire in 2018.

The Sarychat-Ertash Reserve administration needs to track and check progress and when we see a change, adapt our management. This process is called adaptive management.

Each management objective and activity has a designated indicator, which can be measured to assess if we are achieving the results we intended. Implementation of the monitoring actions below will ensure that we collect the necessary data and analyse it to be able to assess overall progress towards the achievement of the Plan's actions, objectives and overall goal.

<u>Objective</u>	<u>Indicator of success</u>
Objective 6.1: To monitor and collect/document the results of management activities and the achievement of management objectives.	Indicator: Monitoring activities conducted

Activities:

- M1 To establish the systems and infrastructure required to implement monitoring activities M2 through M18.
- M2 Ensure that all data gathered under monitoring actions M3 to M18 is reviewed and analysed annually to determine impacts / trends and condition, and corresponding management responses.
- M3 Ensure that research reports are completed on time and in a format determined by the administration for all research work undertaken by administration personnel or as a contractual obligation of partners.
- M4 Maintain a catalogue / library of printed materials related to the Park, including action plans, research and EIA reports, consultations, guidelines, interpretation and education materials, and media articles.
- M5 Ensure that rangers and scientific staff complete reports on their activities to control and monitor threatened species, habitats, natural resource use and cultural heritage.
- M6 Ensure all monitoring data is stored – preferably on a GIS database – within 2 months of being gathered.
- M7 Ensure that staff keeps a record (including copies of presentations, documents, etc.) of consultation meetings with other agencies, authorities, and resource users.
- M8 Ensure that staff keeps a record (including copies of presentations, documents, etc.) of consultation meetings / discussions to provide support to local communities and special interest groups.
- M9 Ensure that staff keeps a record (including copies of presentations, documents, etc.) of seminars and lessons provided to local communities, students and schools.
- M10 Maintain a reference GIS database of administrative borders and zones and the location of signs and boundary markers.
- M11 Ensure that the Administration obtains copies of all EIAs, plans, strategies and public consultation documents that will have an influence or impact on the SCEZ.
- M12 Review annual work plans to ensure all important activities from the management plan are included and hold copies of work-plans on file for at least 5 years so they can be reviewed with the management plan.

- M13 Evaluate the level of awareness and understanding of target groups before and after 25% of education and awareness programmes and activities.
- M14 For all externally funded projects, ensure that project inception, mid-term and end reports are produced and stored in the catalogue/library.
- M15 Ensure that all cultural heritage sites and monuments within the reserve are monitored every 3 years and visitor impact assessed.
- M16 Maintain an up-to-date list of personnel (including volunteers), their roles and responsibilities and training and support needs.
- M17 Keep an up-to-date record of finances / accounts.
- M18 Conduct assessments of staff skill levels prior to and post all training activities.
- M19 Make a full assessment of this plan's implementation in year 5 (2018). Feed the results into the planning process, aiming to have the follow-up management plan ready by 2019.

10 6. Five-year Work plan

No.	Activity	Duration	Priority	Est. Budget (\$)	Outputs / indicator	Progress
<p>Goal: To study and preserve the unique high altitude ecosystem of the Central Tien Shan, on a possibly expanded Reserve territory, seeking also to support the conservation of associated cultural heritage and engage local communities and other stakeholders in nature conservation activities.</p>						
<p>Theme 1: Biodiversity Conservation</p>						
<p>Objective 1.1: To gather and collate essential data on habitats and ecosystems by 2015 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of activities to maintain and/or restore the Reserve's ecosystems to a favourable condition. <i>Indicator:</i> Completion of a baseline surveys. State of the Reserve report produced in 2018. Monitoring indicates ecosystems have not deteriorated from baseline.</p>						
<p>Subject Area 1: Survey of Habitats</p>						
Activity 1	Complete the identification and survey of the 4 vertical zones.	Year 1	1	\$3000	Expedition and report on vertical zoning	Research conducted, report available
Activity 2	Complete the identification and prioritization of vegetation communities.	Year 1	1	\$3000	Expedition and survey reports.	Research conducted, report available
Activity 3	Complete the survey of priority vegetation communities.	Year 1	1	\$3000	Expedition and report	Partly done

Activity 4	Conduct baseline surveys to identify the state of pastures in buffer areas.	Continuous basis	1	\$3795	4 expeditions and a monitoring plot	
Subject Area 2: Provision of Security and Management of Habitats						
Activity 1	Control and prevention of access to the core zone with the aim of conserving the ecosystem.	Continuous basis	1	\$3750	3 ranger posts maintained and active	
Activity 2	Conducting anti poaching patrolling with intensified patrolling in spring and autumn seasons.	Continuous basis	1	\$3750	Monthly patrolling – permanent mobile group	Patrolling on vehicle along the main road was funded in 2014
Subject Area 3: Monitoring the State of the Ecosystems						
Activity 1	Data collection from automated equipment with the aim of tracking state of climate in different parts of the Reserve.	Continuous basis	1	\$2040	Monthly collection of data and reporting data on climatic conditions	
Activity 2	Conduct surveys of habitats and different taxa of plants and animals each season.	Continuous basis	1	\$2760	Expedition and survey reports.	Regularly conducted by the reserve staff
Activity 3	Establish a 3-5 km transect in each one of the three types of habitats.	Year 2	2	\$2760	Continuous monitoring; monitoring data	Conducted jointly with SLT, WWF according to SLIMS
Objective 1.2: To gather and collate essential data on key animal and plant species by 2018 and to use these as a baseline to determine the state of the Reserve and to inform the delivery of management activities to maintain and/or restore the Reserve's species populations to a favourable condition. <i>Indicator:</i> Completion of baseline surveys. State of the Reserve report produced in 2018. Monitoring indicates species have not deteriorated from baseline.						
Subject Area 1: Survey of Flora and Fauna Populations						

Activity 1	Conduct a series of expeditions to produce and keep up to date the inventory of flora and fauna of the Reserve (4 expeditions per year over two year period).	Years 1-2	1	\$3395	4 expeditions; list of species composition	1 expedition conducted, report available
Activity 2	Data analysis and development of lists of key species based on the results of expedition work for further monitoring activities.	Years 2-3	2	\$5020	Report based on collated and analysed data; list of key species for monitoring	A monitoring method manual on key species developed
Subject Area 2: Monitoring of Species and Indicator Species						
Activity 1:	Conduct expeditions to survey snow leopard on a seasonal basis (4 times per year) based on SLIMS methodology.	Continuous basis	1	\$4288	Seasonal expeditions; continuous monitoring	Conducted jointly with SLT according to SLIMS and by Panthera
Activity 2	Conduct dedicated research of prey species of snow leopard on a monthly basis and continuously through ranger patrolling (argali, ibex, marmot) based on SLIMS methodology	Continuous basis	1	\$4280	Seasonal expeditions; continuous monitoring	Conducted jointly with SLT according to SLIMS and by Panthera
Activity 3	Develop a monitoring system of key species based on the inventory data.	Year 2	1	\$2440	Developed programme	A monitoring scheme on plants and animals developed
Theme 2: Scientific Research and Information Technology						
Objective 2.1: To develop and deliver a broad programme of scientific research (supported by computer technology) that measures the condition and trends in the state of the ecosystem, habitats and species and informs effective biodiversity management in the Reserve and adjacent areas. <i>Indicator:</i> The number of programmes available. Presence of technology.						
Subject Area 1: Biodiversity Research						

Activity 1	Develop a programme for survey of numbers and distribution of key species.	Year 2	1	\$2260	Developed programme	
Activity 2	Continue work on evaluation of cattle grazing impact on various types of vegetation on fenced plots (2 times per year continuously).	Continuous basis	1	\$1226	2 expeditions per year	
Subject Area 2: Survey on Abiotic Factors						
Activity 1	Further develop and establish new research programmes on: a) Climate; b) Glaciers; c) Water resources (rivers and lakes); and d) Soil and relief (data for monitoring activities).	Years 2-3	2	\$1610	Developed and approved programmes	
Subject Areas 3: Data Management						
Activity 1	Purchase statistics and GIS software for collecting, analyzing and storing data information on biodiversity and abiotic factors and provide training in their use.	Year 2	2	\$2260	Electronic data storage and management software in place and being used	
Theme 3: Local Communities and Improving Conditions in High Altitude Rural Areas						
Objective 3.1: To increase the participation of local communities in nature conservation activities. <i>Indicator:</i> The number of people engaged. The types of activities. Benefits to locals.						
Subject Area 1: Working with Local NGOs and Community Organisations to Increase Local Participation in Nature Conservation Activities						
Activity 1	Attraction of local community and border patrol representatives for joint patrolling.	Continuous basis	2	\$2450	Establishing a group of community inspectors	A seminar on involvement conducted
Activity 2	Joint organization of social and cultural activities with local communities on nature conservation activities.	Continuous basis	2	\$1250	Plan of activities developed and implemented	Conservation lectures conducted in local schools

Theme 4: Public Relations and Education						
Objective 4.1: To raise awareness of the threats to the Reserve in order to increase public appreciation and engender public support for its protection and management. <i>Indicator:</i> The number of people and organizations contacted and positive relations established. The types of activities and programmes.						
Subject Area 1: Educational programmes						
Activity 1	Develop a programme of trainings and seminars on the theme of the Reserve and its work	Year 2	2	\$2130	Materials produced for 6 trainings and 4 seminars	A programme is being developed
Activity 2	Conduct seminars and trainings 2 times per year with the public.	Continuous basis	2	\$5680	Trainings/seminars conducted	Conservation lectures conducted in local schools
Activity 3	Support Biosphere Reserve to open new staff unit on education and public relations.	Year 2	1	\$0	Staff hired and working	
Activity 4	Development a portfolio of education and information materials on the Reserve and nature conservation in general.	Continuous basis	2	\$1125	Publishing brochures-manuals	Leaflets and posters were developed in Russian and Kyrgyz, printed and handed over to the management of the reserve. A film about the reserve created.
Activity 5	Continuous work on increasing the level of awareness on environmental protection amongst the local population.	Continuous basis	1	\$1705	Number of publications, meetings, etc.	Conservation lectures conducted in local schools
Activity 6	Signing agreements with leading higher education institutions and conservation NGOs of the republic, CIS for: a) conducting scientific research activities, and; b) conducting educational programmes of nature conservation character	Years 1-2	3	\$695	Agreements signed and activities conducted.	An agreement signed with the Issyk-Kul State University

Subject Area 2: Public relations and mass media						
Activity 1	Update and refresh the environmental educational departments within museums and libraries in Ak-Shyirak, Engilchek and Barskoon villages about the Reserve.	Years 2-3	1	\$4610	3 museums/libraries equipped and open.	Books for school libraries of Barskoon, Ak-Shyirak and Inilchek were purchased and handed over
Activity 2	Continuously work with the mass media and other organizations to raise the level of awareness and knowledge about nature conservation work.	Continuous basis	1	\$1655	Published articles media – 2 times per yr	A popular scientific book Sarychat-Eertash was published
Activity 3	Create a series of videos about the Sarychat-Eertash reserve (1 film per year over 5 year period).	Continuous basis	2	\$5700	Producing at least 1 video film per year	1 good film about the reserve created to the 20 th anniversary
Activity 4	Organize a series of TV programmes about the nature of the Reserve (quarterly on a continuous basis).	Continuous basis	2	\$1655	Quarterly TV programmes	
Activity 5	Publish articles in scientific journals and newspapers at oblast and republic level (6 times per year).	Continuous basis	2	\$400	Published articles	Articles about the reserve are quarterly published in Ak-Kuu journal
Activity 6	Maintain an up to date website for the Reserve	Continuous basis	1	2500	Website is up to date	Web-site developed and regularly updated by the reserve staff
Theme 5: Administration and Organisational Management						

Objective 5.1: To ensure that management and administration of the organisation maximises efficiency and ensures the Reserve has all resources necessary to implement all of the priority 1 activities, 80% of priority 2 and 60% of priority 3 Management Plan activities. *Indicator:* 100% performance on priority 1 activities. 80% performance on priority 2 activities. 60% on priority 3 activities.

Subject Area 1: Staff management

Activity 1	Retain current and if possible increase the staff number of the Reserve.	Continuous basis	1	\$0	Staff retained and hired (for laboratory)	Rifs are being conducted
Activity 2	Purchase necessary equipment listed in Section 8 over 3 year period.	Years 1-3	1	\$107,250	Equipment/resources purchased	The list of purchased equipment is attached
Activity 3	Purchase alternative sources of energy over 2 year period: a) wind, and b) solar.	Years 2-3	2	\$13600	2 x wind turbines and 2 x photovoltaic cells	2 wind power generators purchased and installed by WWF
Activity 4	Organize appropriate training for all staff of the Reserve in the first 3 years.	Years 1-3	1	\$7025	6 trainings conducted	A training conducted for rangers
Activity 5	Conduct a feasibility study into the construction or purchase of an office for the Reserve over 3 year period and implement if possible.	Years 1-3	2	\$36000	Office purchased/secured	A new office provided by the Agency in Barskoon village
Activity 6	Repair of old and setting of new rangers' posts over 2 year period.	Years 1-3	2	\$11250	6 stations repaired and 1 new established	
Activity 7	Establishment and equipment of a new scientific laboratory.	Years 1-2	3	\$17000	Laboratory established and equipped	

Subject Area 2: Fundraising and sustainability						
Activity 1	Continuous search for financial sources and relations with donor organizations.	Continuous basis	1	\$1620	Relations with other groups established. Projects underway.	
Activity 2	Development of joint projects with international nature conservation organizations on a continuous basis.	Continuous basis	1	\$1620		WWF, Panthera, ISLT, FFI
Activity 3	Establishment of a farming economy under the Reserve in Ak-Shyirak village.	Years 1-4	1	\$0		A farm created by WWF but not handed over to the reserve yet
Objective 5.2: Expansion of the Reserve's territory with the aim of conservation of rare and threatened species of fauna and flora due to human caused activities. <i>Indicator:</i> state of ecosystems.						
Subject Area 1: Increase of the area of the Reserve						
Activity 1	Study of the state of habitats of rare and threatened species of fauna and flora on adjacent territories	Continuous basis	1	\$2440	Expedition reports	
Activity 2	Writing of a justification for increasing the territory of the Reserve as found to be necessary.	Year 3	1	\$700	Justification for expansion to Jangart submitted.	
Theme 6: Monitoring the implementation of the Plan						
Objective 6.1: To monitor and collect/document the results of management activities and the achievement of management objectives. <i>Indicator:</i> Monitoring activities conducted.						

Activity 1	To implement activity M1 to establish the systems and infrastructure required to implement monitoring activities M2 through M18.	Year 1	1	\$1000	Annual monitoring report and minutes of monitoring meetings	
Activity 2	To implement monitoring activity M2 by hold annual monitoring meetings to assess progress and to produce an annual montiroing report.	Continuous basis	1	0		
Activity 3	To implement monitoring activities M3 through M18 in order to gather the data required to assess progress in implementing the Plan.	Continuous basis	1	0		
Activity 4	Make a full assessment of this plan's implementation in Year 5 (2018). Feed the results into the planning process, aiming to have the follow-up management plan ready by 2019.	Year 5	1	\$2000	Five year monitoring report and minutes of monitoring meetings	

7. Summary of budget requirements 2016 to 2018

7.1 Budget tables

Activity	Priority	Total cost	Breakdown of annual costs				
			1 st /2 nd	2 nd /3 rd	3 rd /4 th	4 th /5 th	5 th /6 th
Objective 1.1: To gather and collate essential data on habitats and ecosystems...							
Subject Area 1: Habitat surveys							
Activity 1	1	3000	3000	0	0	0	0
Activity 2	1	3000	3000	0	0	0	0
Activity 3	1	3000	3000	0	0	0	0
Activity 4	1	3795	735	720	750	780	810
		12795	9735	720	750	780	810
Subject Area 2: Habitat Management							
Activity 1	1	3750	690	720	750	780	810
Activity 2	1	3750	690	720	750	780	810
		7500	1380	1440	1500	1560	1620
Subject Area 3: Monitoring the Ecosystem							
Activity 1	1	2040	375	390	410	425	440
Activity 2	1	2760	510	530	550	575	595
Activity 3	2	2760	510	530	550	575	595
		7560	1395	1450	1510	1575	1630
Objective total		27855	12510	3610	3760	3915	4060

Objective 1.2: To gather and collate essential data on key animal and plant species ...							
Subject Area 1: Species survey							
Activity 1	1	3395	0	1640	1755	0	0
Activity 2	2	5020	940	980	1020	1020	1060
		8415	940	2620	2775	1020	1060
Subject Area 2: Species monitoring							
Activity 1	1	4288	790	820	858	890	930
Activity 2	1	4280	790	820	855	890	925
Activity 3	1	2440	450	470	490	505	525
		11008	2030	2110	2203	2285	2380
Objective total		19423	2970	4730	4978	3305	3440
Objective 2.1: To develop and deliver a broad programme of scientific research ...							
Subject Area 1: Biodiversity Research							
Activity 1	1	2260	1130	1130	0	0	0
Activity 2	1	1226	226	235	245	255	265
		3486	1356	1365	245	255	265
Subject Area 2: Survey Abiotic factors							
Activity 1	2	1610	0	790	820	0	0
		1610	0	790	820	0	0
Subject Area 3: Data management							
Activity 1	2	2260	0	2260	0	0	0
		2260	0	2260	0	0	0

Objective total		7356	1356	4415	1065	255	265
Objective 3.1: To increase the participation of local communities ...							
Subject Area 1: Working with local NGOs and communities							
Activity 1	2	2450	450	470	490	510	530
Activity 2	2	1250	230	240	250	260	270
		3700	680	710	740	770	800
Objective total		3700	680	710	740	770	800
Objective 4.1: To raise awareness of the threats to the Reserve ...							
Subject Area 1: Educational Programmes							
Activity 1	2	2130	680	710	740	0	0
Activity 2	2	5680	1050	1090	1135	1180	1225
Activity 3	1	0	0	0	0	0	0
Activity 4	2	1125	0	0	360	375	390
Activity 5	1	1705	315	325	340	355	370
Activity 6	3	695	340	355	0	0	0
		11335	2385	2480	2575	1910	1985
Subject Area 2: Public relations and media							
Activity 1	1	4610	0	0	2260	2350	0
Activity 2	1	1655	225	335	350	365	380

Activity 3	2	5700	1050	1095	1140	1185	1230
Activity 4	2	1655	225	335	350	365	380
Activity 5	2	400	70	75	80	85	90
Activity 6	1	2500	1500	250	250	250	250
		16520	3070	2090	4430	4600	2330
Objective total		27855	5455	4570	7005	6520	4315
Objective 5.1: To ensure that the management and administration ...							
Subject Area 1: Staff Management							
Activity 1	1	0	0	0	0	0	0
Activity 2	1	107250	51850	31400	5900	15350	2750
Activity 3	2	13600	0	6800	6800	0	0
Activity 4	1	7025	2250	2340	2435	0	0
Activity 5	2	36000	0	0	2000	34000	0
Activity 6	2	11250	3600	3750	3900	0	0
Activity 7	3	17000	0	2000	15000	0	0
		192125	57700	46290	36035	49350	2750
Subject Area 2: Fundraising and sustainability							
Activity 1	1	1620	300	310	325	335	350
Activity 2	1	1620	300	310	325	335	350
Activity 3	1	0	0	0	0	0	0
		3240	600	620	650	670	700
Objective total		195365	58300	46910	36685	50020	3450

Objective 5.2: Expansion of the Reserve territory ...							
Subject Area 1: Increase the area of the reserve							
Activity 1	1	2440	450	470	485	510	525
Activity 2	1	700	130	135	140	145	150
		3140	580	605	625	655	675
Objective total		3140	580	605	625	655	675
Objective 6.1: Monitoring ...							
Activity 1	1	1000	1000	0	0	0	0
Activity 2	1	0	0	0	0	0	0
Activity 3	1	0	0	0	0	0	0
Activity 4	1	2000	0	0	0	0	2000
		3000	1000	0	0	0	2000
Objective total		3000	1000	0	0	0	2000

Overall budget 287,694 82,851 65,550 54,858 65,430 19005

7.2 Summary of budget figures

The total anticipated budget – excluding basic staff salaries and office costs – is \$287,694 for the 5 year period of the management plan. These costs are broken down into annual figures in the table above. The total budgets required to deliver priority activities are detailed in table 2 below. The total budgets required to deliver each objective are detailed in table 3 below.

Table 2: Summary of budget per activity priority level:

	Total	1st/2nd	2nd/3rd	3rd/4th	4th/5th	5th/6th
Priority 1 activities	177,109	73706	44070	20223	25875	13235
Priority 2 activities	92890	8805	19125	19635	39555	5770
Priority 3 activities	17695	340	2355	15000	0	0
Overall budget total	<i>287,694</i>	<i>82851</i>	<i>65,550</i>	<i>54,858</i>	<i>65,430</i>	<i>19,005</i>

Table 3 : Summary of budget per objective:

	Total	1st/2nd	2nd/3rd	3rd/4th	4th/5th	5th/6th
Objective 1.1	27855	12510	3610	3760	3915	4060
Objective 1.2	19423	2970	4730	4978	3305	3440
Objective 2.1	7356	1356	4415	1065	255	265
Objective 3.1	3700	680	710	740	770	800
Objective 4.1	27855	5455	4570	7005	6520	4315
Objective 5.1	195365	58300	46910	36685	50020	3450
Objective 5.2	3140	580	605	625	655	675
Objective 6.1	3000	1000	0	0	0	2000
Overall budget total	<i>287,694</i>	<i>82,851</i>	<i>65,550</i>	<i>54,858</i>	<i>65,430</i>	<i>19,005</i>

8. Annex 1: Equipment list

Anticipated list of the equipment needed for Sarychat-Eertash state reserve – 2013 - 2018

Equipment	Approximate price of the equipment					Total
	1 st year	2 nd year	3 rd year	4 th year	5 th year	
PC	1000					1000
Database programme	2000	2000				4000
Binoculars			1000	1100		2100
Telescopes with tripods			300	300		600
GPS	600	500	500			1600
Radiophones			400	400		800
Dictaphones					500	500
Digital cameras	2500				1000	3500
Camcorder with a tripod		2500				2500
Thermometers	300					300
Anemometer	150					150
Meteo-stations		500	500	500		1500
Trap cameras			2500	2500		5000
Jeep	45000					45000
Horses		15000		7500		22500
Saddles		1000		1000		2000
Horseshoes	200	200	200	200	200	1000
Uniform (winter/summer)		6500				6500
Tents		500				500
Sleeping bags		1000		1000		2000
Carry mats		250		250		500

Rucksacks			500		500	1000
Field stoves		250				250
Torches	100					100
New ranger posts						0
First aid kit		400		400		800
Fax					250	250
Xerox					300	300
Laptop		600				600
Printer		200				200
Scanner				200		200
Total	51850	31400	5900	15350	2750	107250

Kumtor Gold Company

Report on Development of a Biomonitoring Quality Assurance and Quality Control (QA/QC) Protocol

**David Mallon
December 2017**

Introduction

The aim of biomonitoring is to track changes in the status of biodiversity over time. Monitoring targets can include species (e.g. presence, population size, population trends), habitats (vegetation communities, extent of cover), environmental factors (climate, soil, water chemistry), or the impact of threats. The results of monitoring are used to inform decisions on conservation actions and implement or adjust management measures accordingly.

Monitoring programs require a clear statement of the aims, identification of key targets, an appropriate methodology and application of procedures to allow valid comparisons to be made. These procedures include standardized monitoring routes and/or sampling sites, similar timing and duration from year to year, data collection protocols, and reporting procedures. These general principles apply to all targets of monitoring.

The purpose of a formal Quality Control Protocol is to operationalize these basic principles in a site-specific context.

Kumtor (KGC) Biomonitoring

The KGC biomonitoring program currently covers four groups: plants, birds, mammals, hydrobiology (aquatic invertebrates). Monitoring is carried out by experts from the Institute of Biology and Pedology of the Kyrgyz Academy of Sciences. Thirteen monitoring visits have been undertaken so far (summary below).

A review of the monitoring program by external consultants recommended introduction of an overall monitoring framework: it is in response that this protocol has been developed. A second recommendation by the consultants, that botanical monitoring should resume in 2017, has been carried out.

Botany

A botanical survey took place in 1993 and the results were included in the EIS. Two subsequent botanical monitoring visits have been conducted, in 2013, 2017. The methods employed are a combination of line transects and fixed plots (quadrats). Plant species were identified in the field or collected as herbarium samples and identified subsequently in the laboratory.

The 2013 survey of the Kumtor mine site and adjoining areas was based on transects. A total of 208 species of plants were listed, as recorded on the 1993 and 2013 surveys. Kyrgyz Red Data Book and endemic species are identified. Note that the Conclusions (1-4) are presented twice, with slightly different information. However, some important information is not provided, notably details of the routes followed, distance covered, and dates of survey and there is no accompanying map.

In 2017, monitoring covered the mine site (using routes and quadrats) and the Barskoon Valley (quadrats only). 100 m² quadrats were established at 5 sites in Barskoon Valley, and 9 at the mine site. A second aim was to investigate the impact of dust on vegetation in Barskoon and the impact of the mine on rare and endemic species. A map showing the quadrat sites and their GPS coordinates are included, as are tables of species recorded in each one, referring to different vegetation communities. The introduction mentions six quadrats at each site and it is not completely clear from the text if the tables

are a composite of the six quadrats or a selected quadrat, or whether sites were chosen as representative of a particular vegetation community.

Hydrobiology

Four survey visits took place in 2012, 2013, 2014, 2015, covering sampling in static water bodies and rivers, as well as analyses of the impact of slurry discharge and possible pollution by cyanide. The aim of each monitoring visit is clearly stated, as are the methods and equipment used. The results, conclusions and recommendations are also clear, but no maps or GPS locations of sampling sites are provided. As the water bodies visited have names and/or numbers, it can be assumed that coordinates are available. Note that a slightly different version of the 2013 report is included along with bird and mammal data in the report entitled '*CN Wildlife survey NAS KR 2013*'.

Birds and Mammals

There are seven reports, covering line transects at the mine site and adjoining area and specific visits to the Tailings Management Facility and other water bodies. Species are identified visually, indirectly through field signs and on one occasion by camera traps. Two reports (March 2015 and August 2016) consist only of lists of species observed at a few sites, with no other details of the aim, methods or other supporting information. The remaining reports contain detailed information and tables, although some tables are not very clearly captioned; for example, in 2016 the dates for three visits are all listed as October, when it appears they should in fact refer to September, October, November.

Conclusions

1. The scientists conducting the monitoring have considerable experience in the region and are well-qualified to conduct the monitoring.
2. The methodologies used are a combination of direct observations and indirect evidence through field signs made along line transects and at fixed sampling points (water bodies, vegetation quadrats). Species are mostly identified in the field, but some specimens are collected and identified later in the laboratory. Species are identified through individual experience and by reference to standard textbooks. The methodologies applied for each target group are fully appropriate.
4. For each focal monitoring group, species lists have been compiled, numbers recorded where relevant, and key species (endemics and those listed in the Kyrgyz Red Data Book) highlighted.
5. The same scientists are also engaged in monitoring in Sarychat-Ertash Reserve (SCER). Comparison with their monitoring reports on SCER shows commonality of approach and methods between the SCER and Kumtor sites, providing useful consistency.
6. The procedures followed appear to conform with the basic principles of monitoring listed above.
7. However, the reports vary greatly in format and content between the target groups, leading to an overall appearance of inconsistency.

8. Some reports lack items of necessary information while in others important details are present but not clearly highlighted, specifically:

- The aim of the monitoring is stated in most (though not all) reports but in some cases the aim is included within in an introductory paragraph along with other information.
- In several reports there is no map showing the routes followed or sampling sites and/or GPS locations are not listed: this information is assumed to have been recorded and should be included in each report for clarity and to ensure repeatability.
- Some reports list the scientist's CV and publications – these details are not needed in annual reports.
- Some reports include a section on biogeography or zoogeography. This background information is already contained in the KGC Biodiversity Strategy and is not needed not needed in monitoring reports.

Proposed QA/QC Monitoring Protocol

While the essential components of monitoring have been performed to date, there is scope for introducing greater rigor and consistency into the process, and the way it is reported, in order to demonstrate to government agencies and others that the monitoring procedures conform to international good practice. The key requirement is standardization of all aspects of the KGC biomonitoring program:

1. Identify the targets of KGC monitoring (currently botany, hydrobiology, birds, mammals, effects of cyanide, use of Tailings Management Facility, others).
2. State the overall aim of monitoring for each target group.
3. Specify the frequency and seasonality of the monitoring effort per target group (in conjunction with the scientists).
4. Formulate an alternative plan to cover adverse weather or unavailability.
5. Continue to align procedures and methodology as far as possible with monitoring in SCER.
6. Implement standardized data storage procedures (see below).
7. Implement a standardized file naming system (see below).
8. Ensure that each report contains all the necessary information in clearly named and separate sections (including full details of dates and duration of the monitoring trip, routes or sites visited, GPS locations, map, lists of species / communities recorded, other findings). Include information on the background to the site or zoogeography only if it is relevant to a specific monitoring visit.
9. In many cases, the same information will be repeated from visit to visit. E.g. fixed transect routes, regular sampling sites such as the Tailings Management Facility, GPS locations. However, this

information should still be presented in full each time to ensure the report can be read and understood as a stand-alone document. Some of this information (e.g. lists of GPS locations) can be included as an Appendix.

10. Introduce a standardized format for all monitoring reports (see below) and use this format and headings as the basis for planning and conducting all monitoring visits.

Recommended Monitoring and Report Format

File name:

- A standard system for all monitoring reports, indicating the subject and purpose (e.g. Report_Kumtor_Vetebrates_2017_annual_monitoring
Report_Kumtor_hydrobiology_2017_cyanide_impact_study)

Title:

- Include subject, year, purpose

Author(s):

- Name(s) only and affiliation (no need for personal information or qualifications)

Aim:

- A clear statement of the aim or aims of the monitoring visit

Methods:

- Date(s) of the visit and duration
- Routes / transects / sites visited (e.g. TMF, water bodies, vegetation quadrats).
- GPS locations of all sites visited and start/end points of transect routes (can list as an appendix)
- Brief description of routes and/or sites (habitat type, elevation, still/running water, etc)
- Map showing the routes/sites visited (using the same, standard base map for the KGC site and adjoining areas)
- Methodology used
- Data recording (e.g. notebooks or standard data entry forms, as used in SCER)
- Weather: a short description of conditions (e.g. frozen water bodies, snow cover, precipitation, visibility).

Results:

- Summary of the findings
- Full details of the findings
- Species lists
- Tables (Ensure table caption contains date and fully describe the contents: i.e. 'Table 1: Bird species recorded in August 2016'. Not just 'Table 1'.
- Highlight indicator species (and record locations on GPS)

Conclusions:

- Notable findings
- New species, especially indicators

- Signs of increase or decrease
- Impact of threats
- Other as appropriate

Recommendations:

- As appropriate, depending on results

Photos:

- As appropriate

References:

- As appropriate

Appendices:

- As appropriate

Data storage

- Maintain updated lists of GPS coordinates for all monitoring transects (start and finish) and sampling sites
- Maintain lists of species in each group recorded at the mine site and adjoining areas, highlighting any endemic and Kyrgyz Red Data Book species
- Update species lists as and when new species are recorded and amend the file name to include the date of revision
- Record species data on excel spreadsheets with separate columns for GPS coordinates. This format can be directly transferred into GIS mapping programs and also allows basic statistics to be performed on the data where appropriate.
- Incorporate new data into the KGC Biodiversity Strategy at appropriate intervals and amend the version number and file name/date.
- Amend any KGC operating instructions in light of new information, as appropriate

**David Mallon
December 2017.**