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ASPECTS OF TRANS-BOUNDARY SNOW LEOPARD CONSERVATION IN CENTRAL ASIA

REPORT OF THE FFI/CMS WORKSHOP BISHKEK, KYRGYZSTAN 1st – 2nd DECEMBER 2014

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Fauna & Flora International (FFI) is a UK-based charity and has been active on biodiversity conservation in Central Asia since 1996, including work on National Biodiversity Strategies and Action Plans, protected area management planning and support, training, survey and monitoring, sustainable livelihoods, species and site conservation and capacity building. FFI has collaborated closely with range state governments and local partners to address snow leopard conservation across the region. www.fauna-flora.org

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Cover photo: Wakhan Range, Tajikistan-Afghanistan border. Photo: David Mallon
Rear cover photo: Snow leopard in Sarychat-Eertash State Nature Reserve. Photo: SLT/Snow Leopard Foundation Kyrgyzstan
Workshop photos: Maksim Kulikov/FFI

1. Introduction

1.1. Background

Snow Leopards are apex predators that live at naturally low densities and occupy large home ranges. Single sites, including most Protected Areas (PAs), are rarely large enough to harbour viable populations. Conservation strategies at landscape scales are therefore needed to ensure the long-term persistence of snow leopards and their prey (Snow Leopard Network 2014). In mountain regions, where national boundaries commonly run along ridges, landscapes frequently have a transboundary character. It has been estimated that up to a third of the snow leopard's known or potential range is located less than 50-100 km from the international borders of the 12 range countries (Snow Leopard Network 2014).

All major snow leopard conservation initiatives during the past 15 years have underlined the need for or recommended increased transboundary-scale or – level collaboration. These include the Snow Leopard Survival Summit held in Seattle in 2002, the Rangewide Priority Setting Exercise for Snow Leopards in Beijing 2008, and the Snow Leopard Survival Strategy (McCarthy & Chapron 2003, Snow Leopard Network 2014).

The Global Snow Leopard & Ecosystem Protection Program (GSLEP) was initiated by the President of the Kyrgyz Republic and developed in collaboration with the World Bank/Global Tiger Initiative and other partners. GSLEP developed a global framework for government-led conservation of Snow Leopards and their habitat. The foundation of the process is a set of 12 National Snow Leopard and Ecosystem Priorities (NSLEP) (World Bank 2013). One of the GSLEP's Core Principles of Snow Leopard Conservation is '*Ensuring landscape-level transboundary conservation*' (Snow Leopard Working Secretariat 2013: page 12).

The FFI/CMS technical workshop "Aspects of Transboundary Snow Leopard Conservation in Central Asia" was developed to advance landscape level and transboundary conservation of snow leopards and their prey in the four countries of Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan). The workshop, which was financed through the CMS Small Grants Programme and organised by FFI, took place in the wider context of three important, related initiatives that took place in 2013-2014, all of which also recommended increased transboundary work in the region:

1. The CMS Central Asian Mammals Initiative (CAMI) covers 14 countries and 15 species, including Snow Leopard and Argali. A CAMI Programme of Work and Resolution were developed at a multi-stakeholder workshop in September 2014 and these documents were approved at the 11th CMS Conference of the Parties in November 2014 (CMS 2014).

2. A revised and updated version of the Snow Leopard Survival Strategy (SLSS) was published in October 2014 by the Snow Leopard Network (SLN), an international network encompassing organizations and individuals engaged in Snow Leopard conservation worldwide (SLN 2014).

3. A Single Species Action Plan for the Argali, one of the Snow Leopard's prey species, was produced by CMS and published in October 2014 (Mallon et al. 2014).

1.2. The Workshop

The workshop took place at the Asia Mountains-2 Hotel, Bishkek, on 1-2 December 2014. It was attended by 23 participants (list in Appendix 1) and was facilitated by David Mallon. The workshop was opened formally by Elmira Kachibekova, representing the Kyrgyz State Agency on Environmental Protection and Forestry. The workshop consisted of the following sessions (detailed agenda in Appendix 2):

- Opening/introductions
- Status of Snow Leopards and prey in the four countries (presentations and discussion)

- Recent and current transboundary projects in the region and community conservancies (presentations and discussion)
- Identifying landscapes (4 working groups)
- Methodology: presentations and discussion
- Data sharing and storage and Camera trapping (2 working groups).

Camera-trapped snow leopard family, Sary-Chat-Eertash Reserve. Photo: Snow Leopard Trust/Snow Leopard Foundation-Kyrgyzstan

2. Regional status

2.1. Kazakhstan

Snow leopard range is restricted to southern and eastern Kazakhstan. Current numbers are estimated at 110-130, of which over 80% are found in the North Tien Shan and Zhongar Alatau ranges. The species is listed in the National Red Data Book in category 3 (out of 5) as a "rare" species (range and numbers declining) but it should be moved into the higher category 2. Protected areas containing snow leopard are listed in Table 1.

Snow Leopard prey species include: Siberian ibex *Capra sibirica*, argali *Ovis ammon*, wild boar *Sus scrofa*, roe deer *Capreolus pygargus*, red deer *Cervus elaphus*, grey marmot *Marmota baibacina*, long-tailed marmot *M. caudata*, Menzbier's marmot *M. menzbieri*, tolai hare *Lepus tolai*, mountain hare *L. timidus*, Himalayan snowcock *Tetraogallus himalayensis* and other gamebirds. All these species are subject to hunting except argali and Menzbier's marmot, which are included in the national Red Data Book. In most mountain regions, populations of hunted species are quite high, but are not correlated everywhere with numbers of snow leopards.

Projects

- *Snow Leopard in Kazakhstan, population status, conservation measures and restoration 2012-2014*. Funded by the Ministry of Education and Science and implemented by the Institute of Zoology of the Academy of Sciences.
- *Study of the Snow Leopard population in the Republic of Kazakhstan with aim of developing conservation measures (2014)*. Funded by the Forestry and Hunting Committee of the Ministry of Agriculture and implemented by the Association for Conservation of Biodiversity of Kazakhstan (ACBK), the Institute Zoology, and Snow Leopard Foundation.
- *Raising the potential of SPAs with participation of local communities in conservation of Snow Leopard and habitat in East Kazakhstan oblast*. Funded by the GEF Small Grants Program and running from October 2013 for 1.5 years; implemented by the Snow Leopard Foundation.
- *Baseline research on clarifying population size and distribution and status of prey in three pilot protected areas In West Tien Shan, North Tien Shan and Zhongar Alatau, 2014-2015*. Supported by USAID and implemented by ACBK.
- *Conservation of Biodiversity in the Northern Tien Shan* (section 3.2. below).
- *Modelling Snow Leopard habitat in response to climate change*. Funded by SLN Small Grants Programme and implemented by Kazakh National University, Almaty State Nature Reserve, and University of Cumbria.

Table1. Protected area in Kazakhstan containing Snow Leopards

Site*	IUCN category	Area (km^2)
Aksu-Zhabagly SNR and WHS	1a	750
Almaty SNR / sanctuary	1b / IV	733 / 7240
Altyn Emel SNNP	II	4596
Ile-Alatau SNNP	II / V	1644
Zhongar Alatau SNNP	?	3560
Katon-Karagay SNNP	?	6434
Kolsai Koldery SNNP	II / V	1610
Markakol SNR	1a	750
Sairam-Ugam SNNP	?	1500
Zapadno-Altai SNR	1a	561

* SNR = State Nature Reserve; SNNP = State National Natural Park; WHS = World Heritage Site

2.2. Kyrgyzstan

The total area of suitable habitat is estimated at 54,000 km^2. Various population estimates have been made at different times (Table 2). Snow Leopard has been included in the national Red Data Book in 1985 and in the second edition in 2007 in the highest category, as Critically Endangered. A National Strategy and Action Plan for Conservation of the Snow Leopard has been developed covering 2013-2023. In 2013, the fine for killing or illegal capture of a snow leopard was raised to 500,000 som (USD 8,700). Protected areas containing snow leopard are listed in Table 3.

Table 2. Snow leopard population estimates in Kyrgyzstan

Estimates	Date	Source
600-700	1980	E. Koshkarev
250-300	2005	NABU
150-250	2007	Red Data Book
150-500	2013	WWF

Prey numbers estimated by the State Agency on Environmental Protection and Forestry are: Siberian Ibex – 50,000-55,000; Argali - 16,000-20,000; Marmots (3 species - *Marmota baibacina*, *M. caudata*, *M. menzbieri*) - 358,000. There are an estimated 1.5 million large livestock (cattle, horses) and 5 million small livestock (sheep and goats) in the country. Satellite collaring of argali has been carried out by the Institute of Biology and Soil Science.

Projects

Research, monitoring, camera trapping, training, capacity building, awareness, community livelihoods and management planning have been conducted by the Institute of Biology, SLC/SLF, FFI, GIZ, NABU, Panthera, and WWF.

Table 3. Protected area in Kyrgyzstan containing Snow Leopards

Site	IUCN category	Area (km^2)
Ala Archa State National Park (SNP)	II	194
Besh-Aral State Nature Reserve (SNR)	Ia	632
Chon-Kemin SNP	II	1236
Karakol SNP	II	160
Kara-Bura SNP	?	114
Kara-Shoro SNP	II	1220
Karatal-Japyryk SNR	1a	364
Khan Tengri SNP	?	3257
Kulun-Ata SNR	?	277
Naryn SNR	Ia /IV	183 / 400
Padysha-Ata SNR	1a	305
Sarychat-Eertash SNR	1a / IV	720 / 1341
Sary-Chelek Biosphere Reserve	1a	232
Jety-Oguz Sanctuary (*Zakaznik*)	IV	300
Kengsu Sanctuary (*Zakaznik*)	?	?
Tyup Sanctuary (*Zakaznik*)	IV	150

2.3 Tajikistan

Suitable range for the snow leopard covers an estimated 85,700 km^2, a large part of the country, in the Pamir and Pamir-Alai systems. Total numbers have been estimated at 200-220. Snow leopard is listed in the national Red Data Book as a rare and declining species. Protected areas containing snow leopards are listed in Table 4.

Table 4. Protected Areas in Tajikistan and estimated numbers of Snow Leopards

Protected Area	Area (km^2)	No. of Snow Leopards
Romit State Reserve (SR)[1]	161	7-12
Dashtidjum SR	197	15-18
Zorkul SR	877	5-6
Tajik National Park	26,112	140
Shirkent Historical-Natural Park	31	2
Sarykhosor Natural Park	38	2
Dashtidjum Sanctuary[2]	501	6-7
Muzkul Sanctuary	669	8
TOTAL	**28,586**	**185-195**

[1]zapovednik, [2]zakaznik

There are also several trophy hunting management areas and five community conservancies. Most hunting concessions are in the eastern Pamir and offer argali and ibex hunts. The Murgab hunting concession in the South Alichur range adjoins Zorkul State Nature Reserve to the north and harbours good populations of argali. Community conservancies are a relatively recent development. Five have been established so far, managed by local NGOs and with the participation of former hunters (Table 5). The presence of snow leopards has been confirmed in all except Muhofiz (where they may occur).

Table 5. Community conservancies in Tajikistan

NGO	Conservancy	District	Area (km^2)
Burgut	Alichur	Murgab	927
Muhofiz	Hozratisho	Shuroabad	283
Parcham	Ravmeddra	Rushan	493
Yoquti Darshay	Darshadarya	Ishkashim	43
Yuz Palang	Zong	Ishkashim	270

Projects

In 2006, SLT and WCS conducted 32 transects covering a total distance of 22,126 km and confirming the presence of snow leopards at several sites. Research, camera trapping, training, capacity building, community work and management planning have been carried out by the Institute of Biology and Parasitology and the Pamir Biological institute in the National Academy of Sciences, GIZ, FFI, Panthera, SLC and WCS.

Recent camera-trapping at sites across Tajikistan has produced the following estimates: Western Pshart range -38 snow leopards; Vakhan Range – 4; Darvaz Range – 6; Rushan Range – 6; Shakhdara range – 6; Gissar range – 4.

Table 6. Estimates of prey numbers in Tajikistan

Species	Numbers					
	1960	1983	2001	2009	2012	2014
Siberian ibex (*Capra sibirica*)	72,000	41,000	17,000	-	-	
Markhor (*Capra falconeri*)	1,000	400	130	-	1,018	1,300
Argali (*Ovis ammon*)	70,000	25,000	3,500–10,000	23,711	-	-

2.4. Uzbekistan

Snow Leopard range covers about 10,000 km^2, divided into two parts: the West Tien Shan (Chatkal, Pskem and Ugam ranges) and Pamir-Alai system (Hissar, Turkestan and Zeravshan ranges). Surveys in the Kuramin Range found no evidence of snow leopard presence. Numbers have been estimated at 30-50 in the National Strategy and Action Plan in 2004 and 80-120 by Gosbiokontrol in 2014, representing between 1% and 2.5-3% of the world population. Numbers fluctuate by season with transboundary migrations. More precise data are not available because for 10 years no targeted study has taken place. Available data are sporadic (verbal reports to Academy of Sciences), limited geographically to Chatkal and Gissar State Reserves; do not have a species-specific character inasmuch as they were collected during surveys of other species (Chatkal and Gissar State Reserves), and some areas have no information (Zaamin State Reserve, Dzhizakskaya *oblast*, Hissar range outside Gissar State Reserve and the basin of the Tupalang river, Surkhandarya oblast). Protected areas containing snow leopard are listed in Table 7.

A National Strategy and Action Plan was developed in 2004 covering the period up to 2010. The species is listed in the national Red Data Book in Category 1 (Critically Endangered). Priorities for 2014-2020 listed in the NSLEP are reducing conflicts, reducing threats to prey, developing incentives for local communities, strengthening programmes of research and monitoring, raising awareness, combatting illegal trade, and strengthening transboundary cooperation.

Projects

- *Inventory of red-listed species of flora and fauna in Tashkent and Surkhandarya oblasts, 2012-2013*. Implemented by the Institute of Genetic Resources of Plants and Animals of the Academy of Sciences. The project has compiled a full database of records of Snow Leopard from the Western Tien Shan between 1956 and 2014.
- *Camera trapping in Hissar State Reserve*. Supported by Panthera, WCS, WWF, and SLN Small Grants Programme. The project has confirmed the presence of Snow leopards, prey species and competitors. Reserve staff are able to operate camera traps independently, but need further training in data analysis.
- *Sustainable Use of Natural and Forest Resources in Key Biodiversity Sites Important for Snow Leopard*. A proposed GEF/UNDP project by the State Committee for Nature Protection. The project has three components: (1) Enhancing the network of SPAs; (2) Sustainable use of pastures; (3) Increasing the capacity of government agencies, scientific researchers and NGOs to implement the GSLEP programme.

Table 7. Protected Areas in Uzbekistan containing Snow Leopards

Site	IUCN Category	Area
Chatkal Biosphere Reserve	1a	357
Ugam-Chatkal National Park	II	5,746
Hissar Biosphere Reserve	1a	810
Zaamin State Reserve	1a	268
Zaamin National Park	II	240

2.5. Regional population size

Adding together the recent population figures in the four countries above produces an estimate of 490-970 snow leopards in Central Asia. Details of how all these figures were calculated are not available. They are generally based on 'expert opinion' and use different assumptions. It is therefore difficult to make comparisons between countries and between different time periods. Great care is also needed when extrapolating from individual studies and sites, since snow leopard density varies widely and can be expected to be higher inside protected areas than outside them.

3. Transboundary and Landscape Initiatives

3.1. Recent Initiatives

Biodiversity Conservation in the Altai-Sayan Ecoregion

This project was funded by UNDP-GEF from 2007-2012 to enhance cooperation. Snow leopard and Argali were among the focal species. An Altai-Sayan Ecoregion Conservation Strategy has been produced (WWF 2012).

GEF West Tien Shan Project 2005-2009

The project aimed to increase cooperation between five protected areas in three countries. Objectives included strengthening capacity, supporting regional cooperation, and enhancing income generation. Ranger teams were trained and equipped, maps of threatened species were produced and an atlas of biodiversity produced in Russian and English.

Pamir-Alai Transboundary Conservation Area Project (PATCA)

This project was funded by the EU/TACIS in 2007-2008 to examine the option of creating a transboundary PA between Kyrgyzstan and Tajikistan. A biological database was assembled.

Pamir Conservation Area

A Pamir International Protected Area has been proposed by the Wildlife Conservation Society in the Eastern Pamir (Schaller 2005; WCS 2007), covering several protected areas in Afghanistan, China, Pakistan and Tajikistan and coinciding largely with the distribution of Marco Polo sheep *Ovis ammon polii*.

Tien Shan Ecosystem Development Project (TSEDEP)

Also funded by GEF, and operating in 2008-2009 to support management of protected areas and sustainable development in Kazakhstan and Kyrgyzstan.

3.2. Current Initiatives

GSLEP 20 x 2020 Landscapes

One of the aims of the programme is to identify and secure 20 landscapes across snow leopard range by the year 2020. In fact 23 national scale landscapes were identified at a workshop held at Issyk Kul in June 2014. These were defined as containing at least 100 breeding age snow leopards, supporting adequate prey populations and having functional connectivity to other snow leopard landscapes, some of which cross international boundaries (Snow Leopard Working Secretariat 2013).

Improving the effectiveness, coverage and management of Specially Protected Areas in the mountains of the Central Tien Shan. June 2013-July 2017

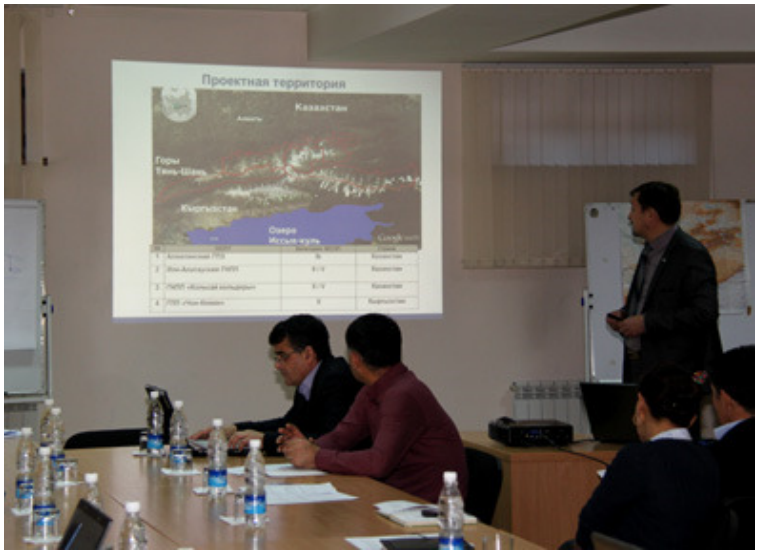
Funded by GEF, UNDP, USAID, Issyk Kul Biosphere Reserve, Republican Fund for Environmental Protection and Forestry Development, and WWF, with a total budget of USD 5,916,666. It is

implemented by the Kyrgyz State Agency on Environmental Protection and Forestry, Academy of Sciences of the Kyrgyz Republic, Government of Kyrgyzstan, Issyk Kul oblast regional administration, Ak-Su Regional State Administration, local authorities, non-commercial organizations, FFI, NABU, SLT, and WWF.

Component 1: Improve the conservation of threatened species by extending the area, and increasing the effectiveness, of specially protected areas (SPAs) in the mountains of the Central Tien Shan.
Component 2: Increase the inter-connectedness, sustainability and effectiveness of SPAs in the Central Tien Shan through regulating land-use in wildlife corridors and adjoining territories.

Among the main directions are: (i) establish the Khan Tengri State Nature Park (3257 km^2), which will increase protection of snow leopard range in the Central Tien Shan from 20% to 48% and the national Protected Area Network from 6% to 7%; (ii) Establish wildlife corridors (2663 km^2) connecting KTSNP to Sarychat-Eertash State Nature Reserve; (iii) Enhance the legal framework governing management of SPAs and corridors taking account of the interests of existing land-users; (iv) Provide technical and financial support to local communities for development of biodiversity-friendly activities.

Conservation of Biodiversity in the Transboundary Region of the North Tien Shan, 2013-2016
Funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) with a budget of 825,900 euros. Implemented by the Nature and Biodiversity Conservation Union, Germany (NABU), the Kyrgyz branch of NABU, Rural Development Fund, Ak Terek Foundation (in Kyrgyzstan) and Association for the Conservation of Biodiversity in Kazakhstan (ACBK) and 'Green Salvation' ecological society (in Kazakhstan).



The aim is to create an integrated system of management of SPAs in the North Tien Shan in Kazakhstan and Kyrgyzstan, taking account of the interests of the local population. Activities include: Assistance in the development and improvement of governance mechanisms; Development of a sustainable pasture management system (for Kyrgyzstan); Promotion of ecotourism and community based tourism in the border region; and management planning.

Altai Transboundary Biosphere Reserve
In September 2011 the governments of the Russian Federation and the Republic of Kazakhstan signed an intergovernmental agreement on the establishment of the "Altai" bilateral transboundary reserve on the basis of Katon-Karagay State National Natural Park in Kazakhstan and Katunskiy Biosphere Reserve in Russia, with a view to applying for nomination as a UNESCO transboundary biosphere reserve.

4. Transboundary landscapes

4.1. Connectivity

There was agreement during the meeting that snow leopard habitat in Central Asia is essentially continuous, apart from a few natural and human barriers, so demarcating boundaries of any kind within most of the range in the region can be a rather arbitrary process.

The wide and intensively developed Fergana Valley separates the Western Tien Shan and western end of the Hissar-Alai ranges, preventing direct movement of Snow Leopard and prey between them. The Alai Valley is a deep, though narrower valley, that may also hinder direct movement north-south between the Hissar-Alai and Pamir ranges.

It is not known whether the middle reaches of the Pyandj (Amu-Darya) river, which does not freeze in winter or fall to a low level in summer, also present a barrier to movement (the upper sections of the river in the eastern Pamir do freeze in winter thus allowing animals to cross). It is also unknown whether the Zeravshan river valley between the Turkestan and Zeravshan ranges is a barrier to movement of snow leopards and prey.

Human barriers consist of border fences and minefields. An inner border fence 350 km long was erected between Tajikistan and China during the Soviet era, but in places the posts have been cut for firewood so there is no longer a complete barrier (Schaller and Kang 2008). A new fence is reportedly under construction on the Chinese side of the border. Fences also exist along parts of the Tajikistan-Afghanistan and Uzbekistan-Tajikistan borders. So far, such fences extend along a relatively small part of Snow Leopard range, so this threat remains localized in the region, although it could quickly become more serious if more fences are constructed. Minefields are situated in a few places along the Uzbekistan-Tajikistan border.

Sarykol Range, Tajikistan-China border. Photo: A. Saidov

As most mountain ranges in the region run in a west-east or south-west to north-east direction, ridges that run north-south form potentially important connections. For example, the Fergana Range in Kyrgyzstan between the western Tien Shan and Hissar Range, and the Sarykol Range along the border between Tajikistan and China.

Information on snow leopard status is lacking from several parts of its regional distribution, such as the western part of Kyrgyz Range (Kazakhstan and Kyrgyzstan), the Turkestan Range (Kyrgyzstan and Tajikistan) and Ketmen range (Kazakhstan and China).

4.2. Transboundary landscapes

A transboundary landscape was defined as a coherent ecological and biogeographical territory crossing national boundaries, containing one or more protected areas and under different management and land uses, but still inter-connected, and which as a whole thus benefits the conservation of snow leopards and prey at a wide scale.

Eight priority transboundary landscapes were identified (Figure 1). Their boundaries were aligned wherever possible with GSLEP 20 x 2020 landscapes in the region, with the priority here being placed on the transboundary dimension. Shapefiles are available on request.

1. Altai (Kazakhstan, Russia, China, Mongolia)
Based on the proposed Altai Transboundary Biosphere Reserve which consists of Katon-Karagay State National Natural Park in Kazakhstan (6435 km^2) and adjoining Katunsky State Reserve in the Altai Republic, Russia (1516 km^2). Three more protected areas (Belukha, Argut, Shavlinskiy) lie north and north-east of Katunsky SR and adjoining Katon-Karagay SNNP are Ukok reserve in Russia and the Kanas Lake Reserve (2500 km^2) in Xinjiang, China. In Kazakhstan, Markakol SNR (750 km^2) adjoins to the south and West Altai SNR (561 km^2) lies farther to the north-west on the border with Russia but possibly outside the main area of snow leopard range in this region. The whole area connects to the wider Altai-Sayan Ecoregion.

2. Zhongar Alatau (Kazakhstan, China)
In Kazakhstan, covers the western part of the range and its southern spurs, including the Altyn Emel ridge, which adjoins Altyn Emel SNNP (4596 km^2) to the south-east. The eastern half of the range lies in China, up to Sayram Lake. The Zhongar Alatau State Nature Reserve (3560 km^2) protects most of the Kazakh sector of the range. There are hunting concessions to the east and west of this reserve and adjoining Altyn-Emel SNNP. The Kazakh sector of this range was identified as a GSLEP 20 x 2020.

Zhongar Alatau
Photo: Alex Grachev

3. North Tien Shan (Kazakhstan, Kyrgyzstan)
Consists of the Transili Alatau and Kungei Alatau ranges lying along the border between Kazakhstan and Kyrgyzstan. On the Kazakh side are three contiguous PAs: Ile Alatau NP (1,644 km^2), Almaty SNR (733 km^2) and sanctuary (7240 km^2), and Kolsai Koldery SNNP (1610 km^2). Chon Kemin SNP (1236 km^2) is on the Kyrgyzstan side. The Kungei Alatau extends south-east to Kengsu sanctuary (zakaznik) in Kyrgyzstan, which represents a potential corridor through to the Central Tien Shan landscape. Most of the landscape described is covered by the *Conservation of Biodiversity in the Transboundary Region of the North Tien Shan Project* (section 3.2 above). The Kazakh sector of this range was identified as a GSLEP 20 x 2020.

4. Central Tien Shan (Kyrgyzstan, China)
Encompasses the area from Sarychat-Eertash SNR (1341 km^2) to the new Khan Tengri SNP (3257 km^2) on the eastern borders with China where it adjoins Tuomuerfeng (Tomur) Nature Reserve (2376 km^2) and Kazakhstan. It also includes Karakol SNP (160 km^2), and the Dzhety-Oguz (300 km^2) and Tyup (150 km^2) sanctuaries, and the area between, most of which is occupied by hunting concessions. Also included is Jangart, lying between the southern side of Sarychat-Eertash to the border. The landscape also potentially extends westwards to 4a Naryn SNR (183 km^2) and sanctuary (400 km^2), with which it is connected by more hunting concessions. The GEF/UNDP Central Tien Shan Project is planning to establish wildlife corridors covering 2663 km^2 between SCEZ and KTNP (section 3.2). Most of the Kyrgyz sector and Tomur Reserve in China are included in the GSLEP 20 x 2020.

Sarychat-Eertsah Reserve. Photo: D. Mallon

5. West Tien Shan (Kazakhstan, Kyrgyzstan, Uzbekistan)
The western end of the Tien Shan system consists of the Chatkal, Karzhantau, Ugam and Pskem ranges and contains a cluster of protected areas: Chatkal Biosphere Reserve (357 km^2, in two parts) and Ugam-Chatkal NP (5746 km^2) in Uzbekistan; Aksu-Zhabagly SNR (750 km^2) and Sairam-Ugam SNNP (1500 km^2) in Kazakhstan; Besh Aral SNR (632 km^2), Sary Chelek Biosphere Reserve (232 km^2), and Padysha-Ata SNR (305 km^2) in Kyrgyzstan. This region has good connectivity and is a well-recognized biogeographical unit. Most of it was covered by the former GEF project (section 3.1).

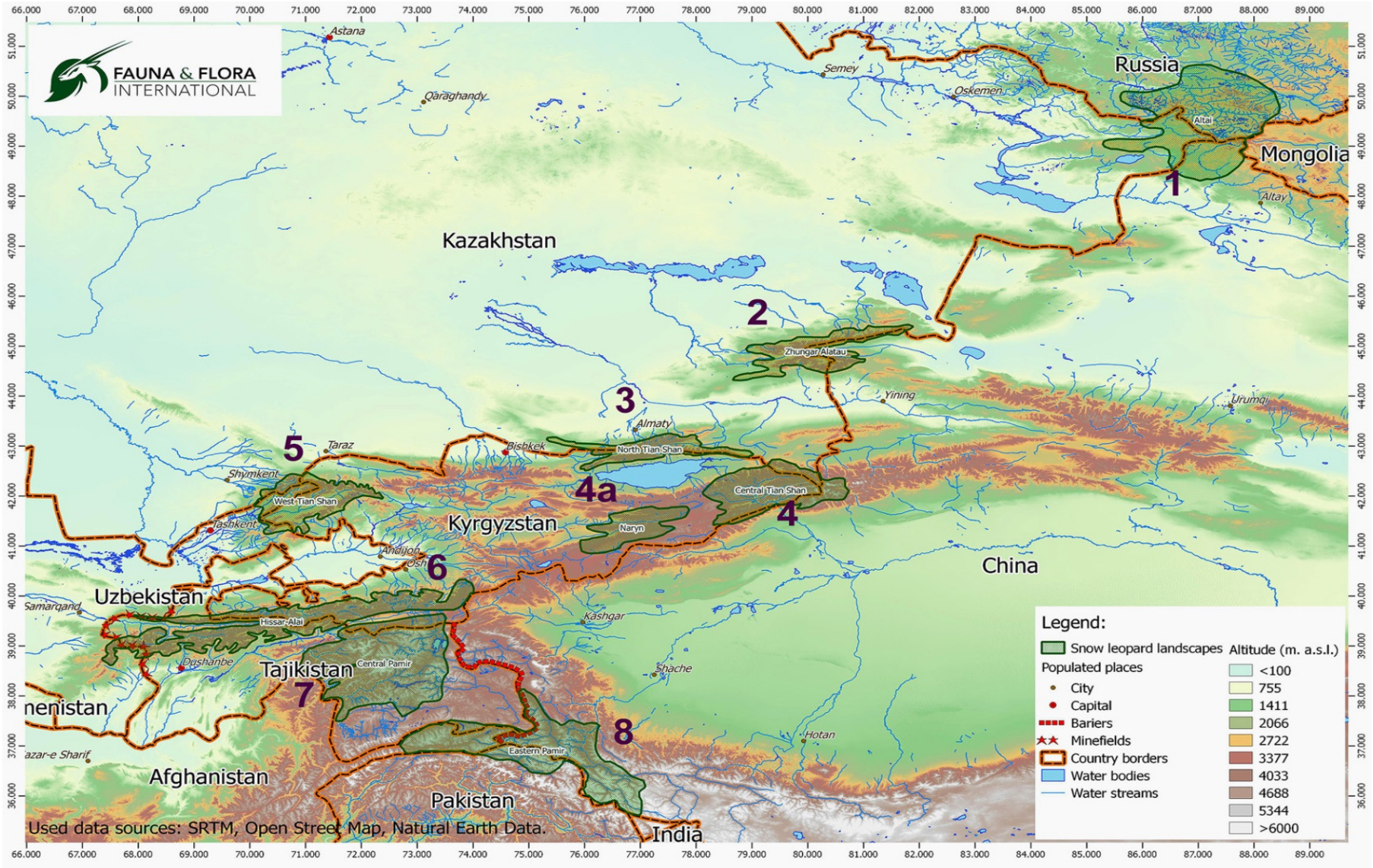


Figure 1. Transboundary landscapes identified at the workshop. 1. Altai. 2. Zhongar Alatau. 3. North Tien Shan. 4. Central Tien Shan. 4a. Naryn. 5. West Tien Shan. 6. Hissar-Alai. 7. Central Pamir. 8. Eastern Pamir.

6. Hissar-Alai (Kyrgyzstan, Uzbekistan, Tajikistan)
Consists of the Hissar, Turkestan and Zeravshan ranges that extend for approximately 500 km east to west and separated by the Alai Valley from the main Pamir system. Protected Area coverage is limited to Hissar SNR (810km^2), Zaamin SNR (248 km^2) and Zaamin NP (241 km^2) in Uzbekistan and Kulun-Ata State Reserve (277 km^2) in Kyrgyzstan. Most of this area is one of the GSLEP 20 x 2020.

Hissar Range.
Photo Ye. Protas

7. Central Pamir (Tajikistan, Kyrgyzstan)
Consists of the main block of the Pamir mountains north to the Trans-Alai Alatau range on the border between Tajikistan and Kyrgyzstan. The northern limit is the Alai Valley. Most of the landscape lies within Tajik National Park (26,112 km^2), which was inscribed on the World Heritage list in 2013. A transboundary reserve (Tajikistan-Kyrgyzstan) is under consideration in the Trans-Alai Alatau. Most of this area is one of the GSLEP 20 x 2020.

8. Eastern Pamir (Tajikistan, Afghanistan, China, Pakistan)
Covers the South Alichur, Wakhan and Sarykol ranges in Tajikistan, the Afghan and Chinese Pamir and a small area of Pakistan. Includes Zorkul SNR (877 km^2), Murgab hunting management area (2000 km^2), and Vakhan hunting management area in Tajikistan; Wakhan NP (11,457 km^2) in Afghanistan, which itself covers Big Pamir Wildlife Reserve (577 km²) and Teggermansu Wildlife Reserve (248 km²); Taxkorgan NR (15,863 km^2) in China, and Khunjerab NP (2269 km^2) and Kilik-Mintaka Game Reserve (650 km^2) in Pakistan. The landscape thus described is broadly the same as the Pamir International Conservation Area (Schaller 2005, WCS 2007), coincides with the distribution of the Marco Polo sheep *Ovis ammon polii* and encompasses GSLEP landscapes in Afghanistan, China, and Tajikistan.

Zorkul, Eastern Pamir. Photo: A. Saidov

5. Methodology and Data Recording

5.1. Introduction

Data and methodological issues have been discussed at previous regional forums, such as the regional workshop held in 2006 to foster cooperation on snow leopard conservation between the four countries (FFI 2007). Asia-Irbis was a regional initiative covering the four countries in Central Asia. Its priority activities included establishing a regional database of snow leopards and prey and developing a regional conservation strategy, but lack of funding hindered progress on these and other activities and it is currently inactive. There is wide agreement in principle that collaboration on standardising methods of data collection and recording is desirable, and that widespread use of the Russian language in the region would facilitate this.

5.2. Survey and census

The SLIMS methodology has been widely used to record field signs of snow leopard and prey. Researchers in all four countries have been trained in its use and have accumulated considerable experience. SLIMS remains useful for presence-absence surveys, but it has been shown to be ineffective for estimating population density or abundance. Knowledge of snow leopard field signs is also important when siting camera traps.

Several methods are used to count mountain ungulates but methodological problems make it difficult to calculate statistically accurate population estimates. A manual in Russian has been produced in Kyrgyzstan by GIZ, the Institute of Biology and Soil Science, and advice from IUCN Caprinae Specialist Group. This uses standard field recording forms and has now also been used in Tajikistan. A manual on using GPS has also been produced by the Institute of Biology and Soil Science.

5.3. Camera trapping

Substantial advances in camera trap technology have taken place during the last 10 years. As a result, this technique is widely used in all countries of the region and many excellent images of snow leopards, prey and other predators have been produced.

Camera traps are used for basic presence-absence surveys and in more systematic studies to estimate occupancy and population density, by using variations in spot patterns to identify individual animals. Remote video cameras have also been used.

Four types of camera are used in the region: Bushnell, Covert, Panthera, Reconyx. Each of these has different characteristics, such as cost, battery length, quality of sensor, performance in cold conditions, and focal length. The advantages and disadvantages of each type of equipment vary according to the circumstances in which it will be used. A number of points are common to all:

- High-quality batteries (nickel-cadmium or lithium) are recommended
- Correct placement of cameras is important (e.g. at cliffs and on ridges where snow leopards leave field signs)
- Appropriate intervals between photos should be set, to maximise battery life
- Camera sites should be relatively accessible for retrieving images and replacing batteries
- Video recording produces striking images but shortens battery life and occupies more space on storage cards
- To study whole populations and make estimates of density, setting cameras in a systematic grid is required
- A minimum number of cameras is needed to cover a large area, calculated according to mean home range size
- Individual cameras should be numbered, marked, and the data from each stored separately
- Store all data obtained in a table, listing camera number, date, time, species etc.

5.4. Data collection and storage

There is no regional database for recording snow leopards and prey species and at present, countries and institutions each use their own system. ACBK has developed a biodiversity database and has offered to make this available for use for snow leopards in the region.

Issues to be resolved in establishing a regional database:

- Use of different or incompatible methods of data collection
- Mechanism for access and use
- Verifying the accuracy of information
- Rights to access and use of information
- Misuse of data for illegal purposes (e.g. by poachers)
- Timing of revision and updates

To set up, the following are recommended

- Agree a host organization
- Set up a coordinating committee or steering group
- Establish an MOU between major organizations
- Agree the data fields to be recorded
- Introduce standardized methodologies and data recording formats
- Russian as the primary language
- Establish a system of access rights for different users
  - Tiers of access (public, restricted access and by payment)
- Obtain funding
  - State agencies, Universities, research institutes, NGOs

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Appendix 1. List of Participants

Kazakhstan
Yuriy Grachev (Institute of Zoology)
Oleg Lukanovskiy (Association for Conservation of Biodiversity of Kazakhstan)

Kyrgyzstan
Azat Alamanov (WWF)
Tolkunbek Asykulov (NABU-Kyrgyzstan)
Askar Davletbakov (Institute of Biology and Pedology, National Academy of Sciences)
Elmira Kachibekova (State Agency on Environmental Protection and Forestry)
Evgeniy Grechko (GSLEP Working Secretariat)
Lira Joldubaeva (GIZ)
Ainura Jusupbayeva (GSLEP Working Secretariat)
Sergei Kulagin (Kyrgyz Society of Wildlife Conservation,)
Mukhtar Musaev (Director, Sarychat-Eertash State Nature Reserve)
Nazgul Turdumatova (UNDP project)
Alexander Vereshagin (Science Director, Sarychat-Eertash State Nature Reserve)
Kubanych Zhumabai uulu (Snow Leopard Trust / Snow Leopard Foundation)

Tajikistan
Munavvar Alidodov (Panthera)
Ubayd Gulamadshoev (FFI-Tajikistan)
Nuzar Oshurmamadov (Panthera)
Abdusattor Saidov (Director, Institute of Zoology and Parasitology, Academy of Sciences)

Uzbekistan
Elena Bykova (Institute of Genetic Resources and Animal Husbandry)
Alexander Esipov (Deputy Director, Chatkal State Nature Reserve, and Institute of Genetic Resources and Animal Husbandry)

Other
Jarkyn Samanchina (FFI-Kyrgyzstan)
Maksim Kulikov (FFI-Kyrgyzstan)
Liesje Birchenough (FFI)
David Mallon (IUCN Species Conservation Planning Subcommittee, (then) Chair, Snow Leopard Network)

Appendix 2. Workshop Programme

Day 1

09.00-09.15: Opening

Formal opening (Elmira Kachibekova, State Agency on Environmental Protection and Forestry)

Introductions

Workshop aims and objectives; background context –GSLEP and CAMI (David Mallon)

Presentations:

"Transboundary aspects of snow leopard conservation" (David Mallon)

"FFI in Central Asia" (Liesje Birchenough)

09.45–11.00: Status of snow leopards

Presentations:

Kazakhstan - "Status of current projects of snow leopard conservation, status of snow leopard and its prey species population, transboundary/landscape initiatives" (Yuriy Grachev)

Kyrgyzstan - "Current projects of snow leopard conservation, status of snow leopard and its prey species population, transboundary/landscape initiatives" (Kubanych Jumabai uulu)

Tajikistan - "Conservation of snow leopard (*Panthera uncia*) in Tajikistan" (Abdusattor Saidov)

Uzbekistan - "Snow leopard population status in Uzbekistan, current and planned projects" (Alexander Esipov)

Questions and discussion

Tea/coffee 11.00-11.20

11.20-13.00: Transboundary initiatives and community conservation

Presentations:

"UNDP/GEF project "Improving the coverage and management effectiveness of PAs in the Central Tian Shan Mountains" (Nazgul Turdumatova)

"Biodiversity conservation in transboundary region of North Tian-Shan" (Tolkunbek Asykulov)

"Model creation of ecological network in Central Tian-Shan – WWF project" (Azat Alamanov)

"Community conservation of snow leopard in Tajikistan" (Munavvar Alidodov)

"Study of migration routes of wild ungulates (as snow leopard prey species) with satellite collars" (Askar Davletbakov on behalf of Kaiberen)

Questions and discussion

13.00-14.00: Lunch

14.00-16.00: Transboundary and other landscapes (1)

Defining landscapes and corridors (examples and discussion)

Working groups (1 per country): List protected areas, PA clusters, identify key transboundary landscapes

16.00–16.20: Tea/Coffee

16.20–18.00: Transboundary (2)

Working groups: Finalise landscape maps; threats, barriers, opportunities

Report back and plenary discussion

Day 2
09.00-11.00: Methodology and data (1)

Presentations:
"Monitoring of mountain ungulates in conditions of Kyrgyzstan" (Askar Davletbakov)
"Ecological-faunal approach to the issue of snow leopard conservation" (Alexander Vereshagin)

Discussion: methodology, extrapolation, emerging technologies

Group discussions: 1. Camera-trapping; 2. Data storage and data sharing.

Tea/coffee 11.00-11.20

11.20-13.00: Methodology and data (2)
Report back and discussion (camera trapping and data issues)

13.00-14.00: Lunch

14.00-16.00: Key issues
Role of mining and trophy hunting concessions
Illegal trade and cross-border poaching
Enhancing cooperation

16.00–16.20: Tea/Coffee

16.20-17.30: Conclusions
Summary and next steps

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