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SNOW LEOPARD

Karakorum Pamir Landscape

Management Plan

KARAKORAM-PAMIR LANDSCAPE

MANAGEMENT PLAN

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This management plan contributes towards first goal of the Global Snow Leopard and Ecosystem Protection Program (GSLEP) (The promotion of landscape-level approach for snow leopard conservation), by achieving strategic planning for one of the model landscapes (The Karakoram-Pamir Landscape) identified under the GSLEP. The development of the plan is supported by Whitley Award, conferred upon Dr. Muhammad Ali Nawaz in 2016, by the Whitley Fund for Nature (WFN). Landscape Mapping for Biodiversity Conservation, Water Resources Management, and Climate Adaptation was supported by the USAID.

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Snow Leopard Foundation

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1. FOUNDATION FOR DEVELOPING MANAGEMENT PLAN FOR THE KARAKORAM PAMIR LANDSCAPE CONTEXT

1.1 CONTEXT

The endangered snow leopards thrive in the mountains of twelve range countries of south and central Asia including Pakistan and are a culturally, ecologically, and economically important symbol of healthy high-mountain ecosystems and the communities living there, yet these cats are under threat of extinction across its entire range expanding 1.8 million square kilometer area (Snow Leopard Working Secretariat, 2013a). In 2012, the Government of the Kyrgyz Republic, led by President Almazbek Atambaev, inspiring from Global Tiger Initiative's Global Tiger Recovery Program (GTRP), began spearheading an initiative that would comprehensively address high-mountain environmental issues using the conservation of the charismatic and endangered snow leopard as a flagship. At President Atambaev's request, the Global Tiger Initiative's Secretariat at the World Bank, in technical partnership with the Snow Leopard Trust, offered its support and advice to guide the process of developing a Global Snow Leopard and Ecosystem Protection Program (GSLEP) with the participation of the 12 snow leopard range countries (Snow Leopard Working Secretariat, 2013a).

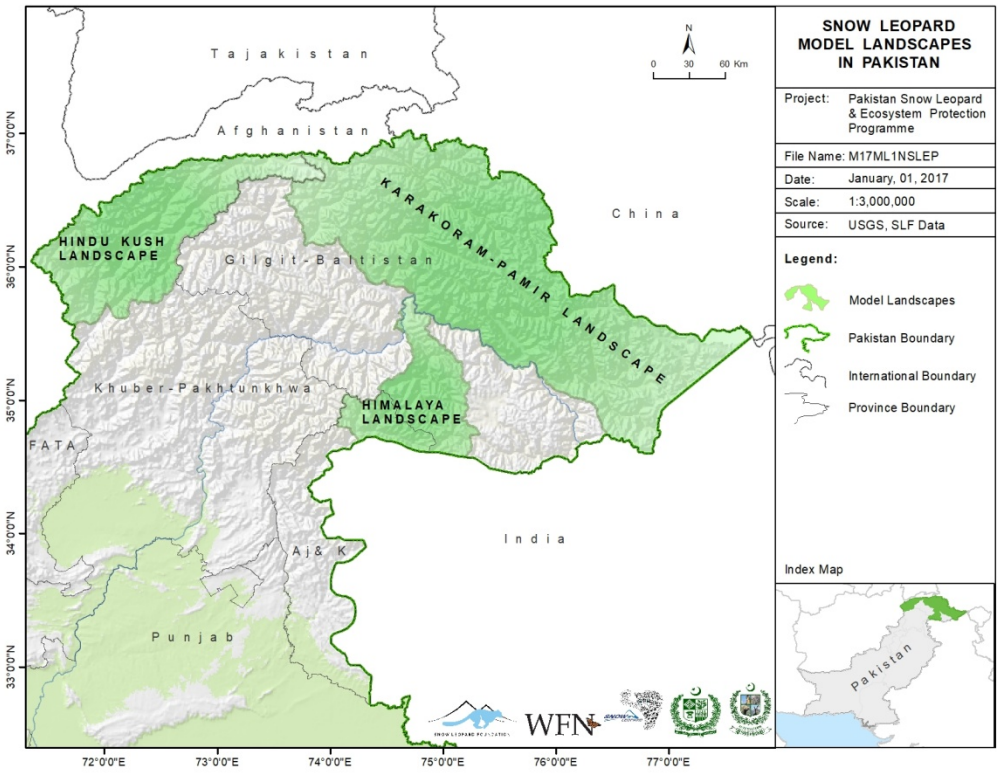
This was followed by the development of National Snow Leopard Ecosystem Protection Priorities (NSLEPs) by the 12 range countries which provided foundation for the GSLEP. The Government of the Kyrgyz Republic hosted leaders in the governments of the snow leopard range countries at the first International Forum on Snow Leopard Conservation in Bishkek in October 2013 which resulted the endorsement of GSLEP. The famous Bishkek Declaration states, "The snow leopard range countries agree, with support from interested organizations, to work together to identify and secure at least 20 snow leopard landscapes across the cat's range by 2020 or, in shorthand – Secure 20 by 2020." Furthermore, secure snow leopard landscapes were defined as those that contain at least 100 breeding-age snow leopards conserved with the involvement of local communities, support adequate and secure prey populations, and have functional connectivity to other snow leopard landscapes, some of which cross international boundaries.

Pakistan addressed the GSLEP's goal of "Secure 20 by 2020" by identifying three landscapes, one each in Hindu Kush, Himalaya and Karakoram-Pamir, mountain ranges respectively. The landscapes were identified based on the extensive scientific data on snow leopards, their natural prey base and conflict with humans collected by SLF team during the past 10 years (Fig. 1-1). This information also set the foundation for the development of NSLEP, Pakistan developed by SLF and endorsed by the Government of Pakistan and GSLEP Secretariat

The NSLEP including the selection of snow leopard model landscapes was finalized through wider consultations nationally, particularly with stakeholders in the three snow leopard range provinces/territories (Gilgit-Baltistan, Khyber-Pakhtunkhwa, Azad Jammu and Kashmir). Summary of consultations is provided in Table 1-1, and glimpse of discussions in Figure 1-2. The NSLEP set the following six goals for 2014-2020.

- The promotion of landscape-level approach for snow leopard conservation
- The initiation of participatory conservation to enhance tolerance and build support for snow leopards
- The enhancement of scientific knowledge on snow leopards, prey base and habitat

Figure 1-1 Snow Leopard Model Landscapes in Pakistan



- The expansion and improvement of the management of the PA network in Pakistan
- Institutional strengthening and capacity building
- Trans-boundary conservation actions

This management plan contributes towards first goal of the GSLEP/NSLEP (The promotion of landscape-level approach for snow leopard conservation), by achieving strategic planning for one of the model landscapes (The Karakoram-Pamir Landscape) identified under the GSLEP.

1.2 THE KARAKORAM-PAMIR LANDSCAPE

The Karakoram-Pamir Landscape falls in the Gilgit-Baltistan (GB) province of Pakistan. Occupying an extraordinary varied and attractive landscape of 72,496 square kilometers, GB becomes the meeting point of world's four famous mountain ranges including the Himalaya, Karakoram, Pamir and Hindu Kush. Bordering with China, India and Afghanistan, it ranges from Hindukush to the Karakorum in the North-East with the Western Himalaya in the South and the Pamirs in the extreme North. Formerly known as Northern Area, the GB was given the right of self-governance through Gilgit-Baltistan Empowerment and Self Governance Order 2009 which among others resulted establishment of the elected legislative assembly with powers matching to other four provincial assemblies in the country. Administratively, the GB province is divided into three divisions and ten districts with population reaching to 1.3million (P&D GB, 2013). Although the total population of the GB is relatively small (with population density of 18 individuals/square kilometer), it is socio-ecologically, linguistically and ethnically diverse, reflecting the region's legacy of cultural change, migration and conquest over thousands of years.

Gilgit-Baltistan holds twelve out of thirty top peaks of the world with elevations above 7,500m including the second (K2- 8,611m) and third (Nanga Parbat- 8,125m) highest peaks and also harbors the largest glaciers outside the polar region (Zain, 2010) and thus serves as a vital

catchment for the Indus River, upon which a majority of Pakistan's irrigated agriculture and hydroelectricity depends. Climatic conditions vary widely in the GB, ranging from the monsoon-influenced moist temperate zone in the western Himalaya, to the arid and semi-arid cold desert in the northern Karakoram, Hindu Kush and Pamirs. Both temperature and precipitation vary temporally and spatially. Temperature is high (~40C°) in summer and low (~10C°) in winter and precipitation ranges from 200-500mm with aspect and altitude (GoP and IUCN, 2003).

The land cover of GB is dominated and featured by mountains with large glaciers, lakes and rivers with constitute 66.3% of the total area followed by forests (7.7%), rangelands (22.4%) and cultivable (2.3%), respectively (IUCN 2015). The wide variety of climatic conditions in the GB, coupled with the extreme variations in altitude and aspect, has led to an equally wide array of vegetation and ecological zones that support a rich faunal diversity, including an estimated 54 species of mammals, 230 species of birds, 23 species of reptiles and 6 species of amphibians (IUCN, 2015). Flagship fauna of the region include, snow leopard, brown bear, wolf, Himalayan lynx, Marco Polo sheep, Ladakh urial, blue sheep, musk deer, flare horned markhor and ibex. The region encompasses 60% range and population of snow leopard in the country (Hussain 2003).

Agro-pastoralism forms major source of livelihood of the mountain communities in the region and dependence on natural resources is increasing with the increase in human population overtime. For instance, the livestock numbers, especially the sheep and goats have increased substantially, from 1.02 million in 2000 to 1.71 million in 2010, with annual growth rate of 3.3% (GB, P&D 2013). Realizing the situation, the GB Government in collaboration with nongovernmental organizations and local communities initiated establishment of protected areas as one of the conservation measures and augmented the initiative with sustainable harvesting of biodiversity and other conservation and education measures with the passage of time. So far, 5 National Parks (NPs), 6 Game Reserves (GRs), and 2 Wildlife Sanctuaries (WSs) and 27 Community Managed Conservation Areas (CMCAs) covering ~50% of GB's total area have been established and notified (Parks and Wildlife Department, 2014). However, most of these protected areas are confined to smaller landscapes and focus on the species of economic values like wild ungulates and management prescriptions doesn't cover species with lager home ranges such as snow leopards. Thus, conservation and management of endangered species like snow leopards and associated ecosystem call for management measures at larger landscape level.

1.3 REVIEW OF THE EXISTING PROTECTED AREAS AND MANAGEMENT PLANNING HISTORY IN KARAKORAM PAMIR LANDSCAPE

The Karakoram-Pamir Landscape covers an area of 38,245 km² and falls in the Karakoram and Pamir Mountain Ranges of GB. This landscape represents 48% of the total snow leopard range in the country and includes three high altitude National Parks including Central Karakoram National Park (CKNP), Khunjerab National Park (KNP), Qurambar National Park (QNP) and their buffer zones. Most of the buffer zone valleys are designated as Community Managed Conservation Areas (CMCAs) mainly to conserve wild ungulates with the promotion of trophy hunting program. Besides, the Karakoram Pamir Landscape also encompasses valleys of Hunza and Gojal known as Gojal Conservancy established under the Mountain Areas Conservancy Project (MACP) of IUCN, Pakistan. This landscape thus, spreads across 7 out of the 10 districts of GB, including Skardu, Ghanche, Shighar, Gilgit, Hunza, Nagar and Ghizer, respectively.

Among the national parks, KNP constitutes the first ever protected area established in the GB region. KNP was notified as a national park on April 29, 1975 primarily to protect the Marco Polo sheep (Ovis ammon polii) and possibly, a remnant population of the rare Tibetan wild ass (Equus hemonius kiang) proposed by American wildlife biologist George, B. Schaller in 1974. Spread across 2,300km² area of Khunjerab and Shimshal watersheds, the KNP wasn't able to achieve its

objectives due to the increasing conflicts between park management and local communities until late 1980s (Knudsen, 1999). In 1988, the government of Pakistan and IUCN decided to revisit the park resources and management loopholes by engaging a Norwegian wildlife biologis, Per Wegge, who surveyed the park and come up with management solutions. Expansion of the park area to 6,000km² and change the original IUCN protected area category "category II" to "category VIII" of the park and use land-use zoning as management tool to dilute the resource use conflict with locals were some of the recommendations; he made (Wegge, 1988, 1992). In 1989, the National Council for Conservation of Wildlife (NCCW), convened a workshop in Gilgit to draft the framework of a new management plan for the KNP in line with the recommendations of Wegge, which was attended by national and international experts (Knudsen, 1999). The situation prevailed until 1991, when the government requested, Mr. Ashiq Ahmad Khan, an eminent conservationist, to interact with the communities to defuse the tension and deadlock. The efforts of Ashiq Ahmad Khan finally resulted dilution of the conflict and signing of agreement between the communities and government in 1992. In 1996, WWF developed and presented the revised management plan of KNP drafted by Ashiq Ahmad Khan. The total operating costs for activities planned under the five-year management plan amount to a staggering Rs. 57 million (WWF, 1996). In 2006, the buffer zones connecting to Shimshal and KVO were notified as CMCAs and KNP boundary was re-delineated in 2009 to 4,455km² by excluding the overlapping area (with CMCAs) of 1,089km² (WWF, 2009). In spite of, all these rigorous affords, the bifurcation of the core, buffer and CMCAs zones of KNP still need to be answered.

The Central Karakoram National Park (CKNP) was officially notified as National Park in 1993. The CKNP is Pakistan's largest Protected Area, covering over 10,000km² and encompassing the world's largest glacier outside of the Polar Regions.

The notion of establishing CKNP as national park emerged when the KNP took long to be considered for "World Heritage Site" a prestigious list of the world's outstanding natural and cultural sites under UNESCO's World Heritage Convention. By that time, the neighboring countries like India and Nepal have had national parks listed as World Heritage Sites and to end this regional imbalance, the IUCN was asked in 1992 to initiate the groundwork for a new national park in the vicinity of K2 (8,611 m), the world's second highest mountain (Knudsen, 1999). The initial park proposal for the "Central Karakoram National Park" (CKNP) covered about 3,000 square km and included the major mountain massifs, watersheds and glaciers of the central Karakoram region.

The park boundaries were redefined in 1996 and in 1999, IUCN Pakistan prepared a Draft Management Plan (the 1999 Plan) as a consultative document to be finalized through discussions with local and regional key stakeholders. The1999 Plan was preceded by a draft preliminary management plan in 1997, and was the result of various consultative and planning exercises carried out since the park's notification in 1993. The 1999 Plan roughly demarcated the boundaries of the CKNP and in addition to providing a purpose, vision, and context for the future of the park, also provided a basic framework for more detailed management planning. However, this plan could not be implemented and practical management of the park remained ignored until 2004. In 2004, the IUCN working through the Hagler Bailly Pakistan (HBP) carried out baseline studies and prepared recommendations for management planning (HBP, 2005). Meanwhile, the Government of Pakistan initiated a development and management process for the CKCC, and engaged WWF-Pakistan to develop PC-I (Participatory Management and Development of Central Karakoram National Park). The principal PC-1 partners were; GB Govt, HKKH partnership project, Karakoram Trust Project and WWF-Pakistan. In order to address complexities (spatial, temporal, social and ecological) those exist in CKCC, following multilevel management planning process was adopted by the PC-1 partners.

As an outcome of the aforesaid developments, the IUCN through HBP developed another management plan for CKNP in 2009 (IUCN and HBP, 2009). This management plan together with two sub plans for species management and education and awareness redefined the boundaries of the park and proposed land-use zoning with 16 watershed valleys covering an area of 16,243 km². The park was renamed as Central Karakoram Conservation Complex (CKCC) with a broader vision "A resilient, sustainable and co-managed landscape delivering ecological and economic services, equitably benefiting nature, culture and people". However, like the 1999 plan this plan was also not implemented due to unknown reasons.

In 2009, Social Economic and Environmental Development (SEED) project was launched by Ev-K2-CNR in collaboration with Karakoram International University (KIU) and other partners as a result of an agreement between the Italian and Pakistani Government known as Pakistan-Italian debt for Development Swap Agreement (PIDSA). The phase 1 of SEED project aimed at an integrated development of CKNP region through supporting the implementation and management of CKNP, improving local wellbeing and livelihood options during a period of 6 years (2009-2015). Development of management plan of CKNP was one of the major objectives of the project (Ev-K2-CNR, 2016). The Ev-K2-CNR in collaboration with CKNP Directorate developed the current management plan of CKNP in 2014 through a series of management planning process (Ev-K2-CNR and CKNP Directorate, 2014). Among other management prescriptions, this plan re-delineated park boundaries and defined two major zones. The total area of the park was defined as 10,557.73km² with core zone of 7,606.83 km² and buffer zone with an area of 2,950.9km². The latter encompasses the 13 buffer valleys. Next, Valley Conservation and Development Plans were formulated for the 11 buffer valleys of CKNP under the SEED project.

Qurumbar National Park (QNP) is the third national park that falls in the Karakoram Pamir Landscape . QNP was officially notified in 2011 and is the first ever national park established on the request of the local communities. The park is located in Ishkoman valley of District Ghizer and is surrounded with Wakhan Corridor of Afghanistan in the north, Broghil Pass of District Chitral in the west, Hunza valley in the east and Ghizar river in the south. The core area of the park extends over 740km² and has been carved out after excluding all permanent habitations on communal land by creating a buffer zone of about 650km². Alpine wetlands constitute major ecosystem of the park. WWF-P has long conservation history in the area and facilitated the draft of the management plan for QBP (WWF, 2016). The Snow Leopard Foundation (SLF) initiated research, conservation and education programs in the area in 2010. The extensive camera trapping and occupancy surveys of SLF resulted the first visual evidence of snow leopard and endangered Pallas cat in QNP (Hameed et al. 2014). The studies also documented brown bear in QNP and identified critical brown bear habitats based occupancy modelling.

1.4 APPROACH FOLLOWED IN THE PREPARATION OF KARAKORAM PAMIR LANDSCAPE MANAGEMENT PLAN

Review of the current status of the protected areas in the Karakoram Pamir Landscape and management planning history reveals management gaps, especially with respect to the conservation and management of flagship species like snow leopard which occur in low densities and occupy large home ranges. The situation suggests thinking out-of-the-box and considering larger landscape-level management prescriptions as proposed by the GSLEP.

Having developed the NSLEP, the Snow Leopard Foundation is facilitating its implementation in collaboration with the National and Provincial Governments. Development of management plan for the Karakoram Pamir Landscape is one of the short term targets (2 years) set by the GSLEP for the range countries. Management planning for such a vast landscape, targeting elusive and flagship species like snow leopard requires ample socio-ecological information. Realizing the

need, SLF initiated an ambitious data collection program in the snow leopard range in 2008 to enhance our understanding of snow leopard distribution, habitat requirements and conservation challenges. An area of ~40,000km² (50% snow leopard range) was sampled using sign-based site occupancy surveys, camera trapping, genetics, and assessment of wild prey base until 2015. Besides, human-snow leopard interaction was studied throughout the snow leopard range. All these information form bases for the development of management plan and makes SLF team a well-informed body to take on the planning process.

Furthermore, the core management planning team of GSLEP Secretariat is providing guidance and technical assistance to the range countries. The team has developed management planning toolkit that consists of series of advice documents to help guide practitioners through various steps of the planning process. While carrying out strategic planning of the Karakoram-Pamir Landscape, following guideline documents were followed:

- Strategic-Management-Planning-in-Snow-Leopard-Landscapes
- Participation in Conservation
- Stakeholder Analysis in Snow Leopard Landscape Management Planning
- Integrated Management and Governance of GSLEP Landscapes
- Incorporating Climate Change in Snow Leopard Landscape Management Planning
- Mapping to Support Snow Leopard Landscapes Management Planning
- Green, Resilient Economic Development in Snow Leopard Landscape Management Planning
- General Guidelines for snow leopard Landscape Management Planning.

Table 1-1 Summary of Consultative Meetings

Sr. No	Date	Place of consultation	Stakeholder (s) consulted	Attendance
1	13-04-17	Office of Conservator Wildife, Gilgit, GB	Conservator Forests GB, Conservator Parks & wildlife, DFO Direction, DFO Wildlife, DFO Gilgit, Administrative Officer Parks & Wildlife GB	10
2	20-04-17	Islamabad	Secretary Forest and Wildlife, GB, Mr. Sajjad Haider	02
3	21-04-17	Peshawar / KPK	Chief Conservator Wildlife, Conservator Wildlife, DFOs, PD National Parks, PD Zoo, DFO HQ	12
4	26-04-17	Muzaffarabad / AJK	Chief Conservator Forests, Director Wildlife & Fisheries, Deputy Director Wildlife	08
5	25-05-17	Gilgit / GB	Chief Secretary GB, Secretaries of Forest and Wildlife, P&D, conservators and other key officials of GB	20

Sr. No	Date	Place of consultation	Stakeholder (s) consulted	Attendance
6	26-05-17	Gilgit / GB	Secretary Forests & Wildlife, Conservator Parks & Wildlife, Conservator Forests Diamer, Director EPA, Chairman Bio-Dept. KIU, UNDP, WWF, WCS, BWCDO, NTFP, REDD Strategy, Fisheries Dept, Ministry of Climate Change	30
7	14-06-17	Peshawar / KPK	Chief Conservator Wildlife, KPK	3
8	19-04-17 to 24-04-17	GB	Community Based Organizations in GB	56
9	29-04-17 To 11-06-17	KPK	Community Based Organizations in KPK	35
10	13-07-17	Islamabad	Federal Secretary Climate Change, IGF, Secretary Forest & Wildlife GB, Officials from Federal Government, Provincial Forest & Wildlife Departments, Representatives of NGOs and Academia	38

Figure 1-2 Photographs of Stakeholder Consultations

<table>
<tr><td> 
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<tr><td>Consultative workshop in Islamabad, 2017</td><td>Consultative workshop in Islamabad, 2017</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Consultative Workshop in Gilgit Baltistan, 2017</td><td>Consultative Workshop in Gilgit Baltistan, 2017</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Consultative meeting with Chief Secretary GB</td><td>Meeting with wildlife department KPK</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Consultative Meeting in GB</td><td>Meeting with forests & wildlife departments, AJK</td></tr>
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2. BACKGROUND INFORMATION AND ATTRIBUTES OF KARAKORAM-PAMIR LANDSCAPE

2.1 PHYSIOGRAPHIC DESCRIPTION OF THE LANDSCAPE

The Landscape of Karakorum-Pamir is a diversified field full of majestic attributes ranging from the highest mountains peaks to the communities living along the silk route having centuries old historic civilizations and culture. . The landscape has largest glaciers of the world outside the poles, second highest peak of the world and bounded by three snow leopard range countries. Rich natural resources, unparalleled tourist attractions and unmatched cultural diversity make the Karakoram-Pamir Landscape a unique region.

2.2 GEOGRAPHICAL POSITION, AREA AND ADMINISTRATIVE INFORMATION

The Karakorum-Pamir landscape covers an area of 38,245 km² and constitutes about 48% of the snow leopard's range in Pakistan. Administratively, seven districts including Nagar, Hunza, Skardu, Shigar, Ghangche, Ghizer and Gilgit of Gilgit- Baltistan fall in Karakorum-Pamir landscape. Most of the outward boundary is international border with China, India and Afghanistan. Eastward, the Karakoram-Pamir Mountains border with India and extends to Khaplu and Skardu in the south. The external boundary stretches bordering with China, from the east to north to the Ghizer district. At Ghizer, it touches the international border with Afghanistan's Wakhan corridor in the north and Chitral District of KPK Province in the west. The southeastern boundary of the landscape starting from international border at Kharmang extends to Khaplu and passes through Skardu and Gilgit towards northwest to Ghizer where it meets with Chitral District of KPK Province.

2.2.1 Terrain and Land-cover classes

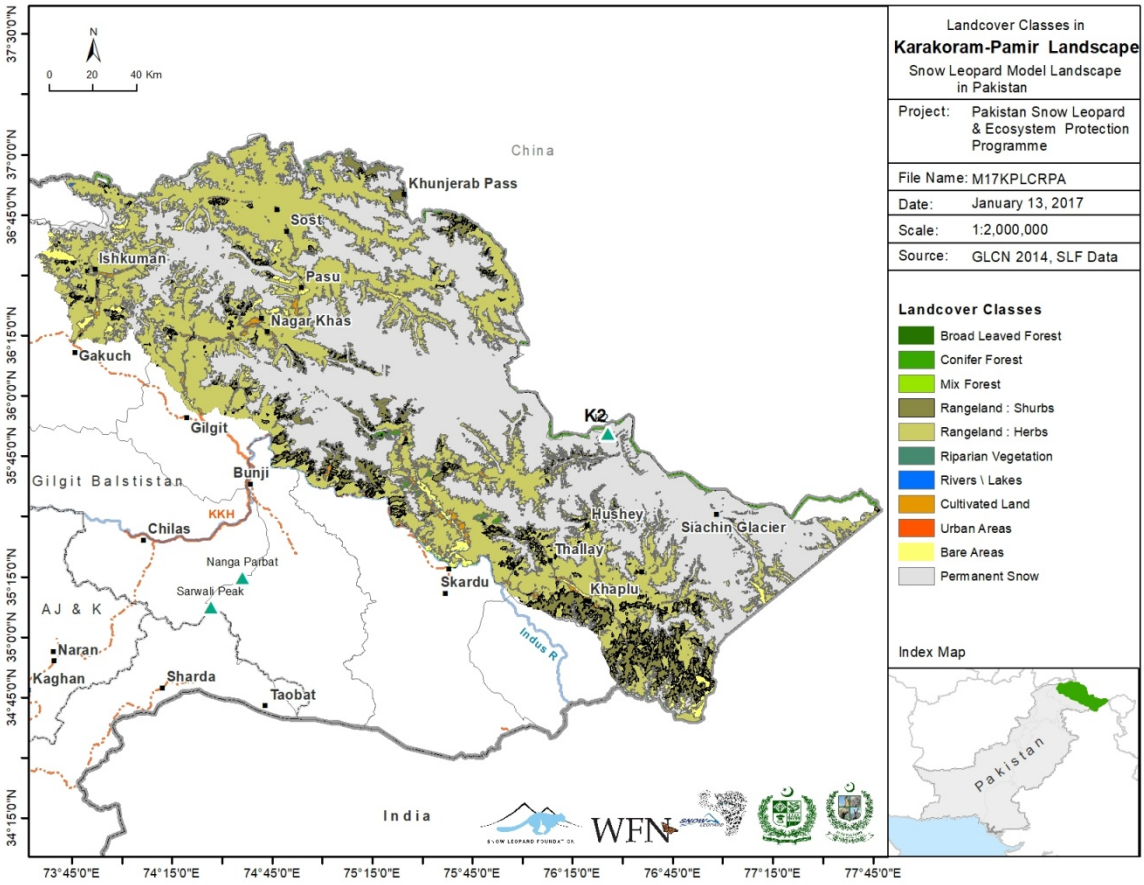
The Karakoram-Pamir Landscape shows great altitudinal variation ranging from 1,219 meters at near Bunji to 8,600 meters at the K2 peak. Most of the landscape falls above 2,500 meters. Major portion is snow covered. Rest is divisible into rangelands, barren lands and arable lands. In most parts, the rangelands and barren lands are very steep and rocky slopes. Some valleys are wider and open, where most of the human settlements are present while some are very narrow trenches surrounded by high standing peaks. The areas of major land classes are mentioned in Table 2-1.

Landscape Classes have been represented in a map in Figure 2-1

Table 2-1 Land cover classes in the Karakoram Pamir Landscape

Land cover class	Area km^2
Coniferous Forests	81.1
Barren Land	1257.61
Cultivated Land	1231.14
Range land herbs	14296.75
Range Lands Shrubs	5225.74
Snow Glaciers	15565.64

Figure 2-1 Land cover classes in the landscape



2.2.2 Climatic Conditions

The Karakorum-Pamir Mountains are positioned in such a way that they separated the Central Cold High Asia from the warm and sub humid South Asia. The climatic conditions of the landscape can be broadly classified as dry temperate with dry hot summer and colder winter with snowy precipitations (Abbas et al., 2013) termed as highlands climate zone and usually referred as zone A, which is characterized by short summers with dry and warm conditions (Salma and Shah, 2012). Spring and autumn are very short, particularly in higher elevation. Within the landscape, temperature at the base and top of a valley significantly differs both in summer and winter (Bano et al., 2014).

In Gilgit city temperature drops to -2 ºC and increases up to 40 ºC, a similar situation exists in other towns such as Skardu, Ali Abad, Nagar, and Gahkuch, in the Landscape. Temperature decreases as much as -18 in areas of 3,000 meter elevations such as Naltar and similarly rainfall increases to 254-400 mm as compared to Gilgit City where average rainfall is three times less than Naltar (Sheikh et al., 2002). Normal trend in temperature is decreasing from south to north with increasing elevation. In the higher valleys like Tormik, Hisper, Shimshal, Misgar, etc. winter is more prolonged and hostile with low temperature while summer is short and mild (Abbas et al., 2016).

2.2.3 Geology and mineral Resources

The Karakoram-Pamir Landscape contains four major tectonic units having the sutures running in different parts of the landscape (Gaetani, 1997). In the south, Gilgit and adjoining areas fall in the

Kohistan Island arc while along the Indus River the Nanga Parbat, Haramosh Massif extends the landscape up to Nagar Khas. The areas on east to the Nanga Parbat Haramosh Massif fall in the Laddakh Arc. Next to the northeast and northwest from the Kohistan arc, falls the Shyok suture or Northern suture of Kohistan arc which extends in east to west direction making a bulging curve in the north. In the west, parts of the landscape such as Qurumbar fall in the East Hindu Kush Wakhan zone (Zanchi and Gaetani, 2011). Much of the areas of the Landscape come under the Western Geological Karakorum (Gaetani, 1997).

The sedimentary profile of the landscape exhibits different types of sediments, which also decipher the evolutionary history of different units of the area. The Karakorum mountain range, which occupies major part of the landscape, is built on Peri-Godwanian continental crust separated and moved apart from Gondwana during Late Paleozoic ages and merged to the southern Eurasian margin during the Upper Mesozoic (Gaetani et al., 1990). The Kohistan Laddakh Island Unit has formed from two large areas expanding on either side of the Nanga Parbat Massif. It's considered part of a large section of another oceanic island (Tahirkheli et al., 1979). The East Hindu Kush Wakhan zone shares many features with the Karakorum Range; both are product of the same collisions: Indian and Eurasian continental plates (Encyclopedia Britanica). By the end of the Paleozoic, the East Hindu Kush Wakhan appeared as a thin continental crust separating the South Pamir and Karakorum. The East Hindu Kush Wakhan zone in itself is a Godwanian fragment (Zanchi and Gaetani, 2011; Gaetani, 1997; Ferrari, 2014). The characteristic sediments in the landscape are axial batholith, Paleozoic Wakhan slate, Southern metamorphic belt, northern sedimentary belt, Mesozoic granitoids and Permian Cenozoic sediments (Gaetani, 1997; Zanchi and Gaetani, 2011).

The geological evolution with the associated processes of metamorphism and multi-phase deformation has resulted in a great distinctive geological and mineral wealth in the mountain ranges of Karakorum-Pamir. The landscape has a variety of rich mineral resources in different parts. A variety of minerals and gemstone specimens have been collected from the area for years. Industrial minerals like china clay, feldspar, limestone and marbles are abundant in the area (Malkani, 2014; GB Govt,). In the alluvial deposits placer gold occurrence and collection in the valleys and river beds of the landscape is well known, and survey conducted in 1998 revealed annual collection of 15 Kg gold from the Indus, Ghizer and Hunza rivers and tributaries (Sheikh et al., 2007; GB Govt). Arsenic in different forms and combination such as arsenopyrite are found in the Daniyor valley and Bagrot Valleys of the landscape. Similarly, bauxite, copper and gold associated with gossan/red iron oxide/ochre are also found in different areas of the landscape (Malkani, 2014). Precious gemstones like aquamarine, quartz, red ruby and spinel, pargasite cabochons (also called Hunza emerald), rose quartz and pegmatite containing beautiful pyrite, malachite and azurite are found in different areas including Hunza, Chipursan, Gilgit and Skardu (Malkani, 2014).

2.2.4 Water resources

The Karakorum-Pamir Landscape contains largest glacier, torrential rivers, crystal clear streams, springs and high altitude wetland lakes. Within the Central Karakorum National Park (CKNP), 711 glaciers have been identified covering an area of 4,606.7km² and making about 38% area of the Park and 31% of glaciated areas of Pakistan. The glaciers are of various sizes ranging from 0.025 Km2 to more than 600 Km2, whereas the large glacier bodies are few and smaller glacier bodies account for 61% of the total glaciers. These glaciers, along with other present in the Karakorum-Pamir Mountains, form base to the many freshwater resources in the landscape.

Table 2-2 Major rivers and streams in the landscape

No	Name of River	No	Name of River
1	Indus River	8	Shingo River
2	Shyok River	9	Chalt River
3	Shiger River	10	Yasin river
4	Gilgit River	11	Bartar Nullah
5	Ghizer River	12	Danyor Nullah
6	Qurumbar River	13	Sosat Gol
7	Hunza River	14	Birgal Gol

Landscape and different small and large rivers and stream are falling into it at different locations. The rivers and streams are originating from various glaciers in the landscape. Among the major rivers which make much of the flow of the River Indus are Shingo River, Shyok River, Shigar River, Gilgit River, Hunza River, Chalat River, Yasin River, Qurumbar River and Ghizer Rivers (Table 2-2) which constitute a greater portion of the Indus River. Along the large rivers many small streams such Daniyor Nallah, Bartar Nallah, Sosat Gol, Khatuiti Gol and Birgal Gol are also originating and flowing through the landscape. The Karakorum-Pamir Llandscape also contains a number of important high altitude wetlands and lakes which are of high importance in socio-ecological perspective. Qurumbar Lake, Sheosar Lake, Rush Lake, Jabaso and Naltar Lake are some of the significant freshwater high altitude lakes in the landscape (WWF, 2014).

Table 2.3 Number of glaciers feeding each major river with area of each glacier

No	Name of Basin/River	Number of Glaciers	Area km^2
1	Gilgit	585	966
2	Hunza	1050	4677
3	Shigar	194	2240
4	Shyok	372	3547
5	Indus	1098	688
6	Shingo	172	37
	Total	**3471**	**12155**

The glaciers in Karakorum-Pamir Landscape are main source of fresh water in the country. There are more than 3471 glaciers that vary in sizes, in the Karakorum-Pamir and as many as 700 of them are present in the CKNP (Hussain et al., 2015; Campbell, 2004). Some of the major river with glaciers are mentioned in Table 2-3. Collectively these glaciers occupy an area of 12,155 Km2 (Campbell, 2004). Glaciers retreat is common phenomenon in this era of global climate change and the global warming is causing thinning of the glaciers resulting in GLOF in Pakistan's northern parts (Hussain et al., 2015). The catchment area of the Indus located inside the Karakorum-Pamir ranges which have high peaks, including the second highest in the world, containing seven large glaciers. Slopes of beds of the rivers and Nullahs are very steep making the bank erosion a major contributor in flooding (MWAP, 2015). According to studies there are 1503 glacial lakes with potential danger as glacial lake outburst floods (Noord and Shah, 2014).

2.3 BIODIVERSITY PROFILE OF KARAKORUM PAMIR

The Karakorum-Pamir Landscape falls in the Palearctic eco-zone in the Himalayan Highlands and consists of Montane grassland and shrub-land Biomes. The northwestern parts fall in the Pamir alpine range. Being at the boundary of Palearctic and Oriental zoogeographic regions the area has an exceptional biodiversity features. Characteristic habitats in the landscape comprised of alpine steppe, alpine shrubs and alpine meadows, Sub alpine scrub, Steppe of Artemisia and dry temperate forests (WWF-Wild finder, 2017; Sheikh et al., 2002; UNDP, 2005).

The Karakorum-Pamir Landscape encompasses three national parks; Khunjerab National Park, the Central Karakorum National Park and Qurumbar National Park besides, several other protected areas including Community Controlled Hunting Areas (CCHAa) and Game Reserves (Table 2-3). The total protected area is 22,277 km², national parks constitute 15,752 km², major part of which is the CKNP which is 10,557 km² along with buffer areas. The remaining part is constituted by Qurumbar National Park 740 km²and Khunjerab National Park 4,455 km². All the national parks are connected by common boundaries with one another or at very close proximity to each other. The Qurumbar National Park connects the Karakorum-Pamir Landscape the Hindu Kush Mountain range where it has common border with the Broghil National Park on one side and on the other side Wakhan National Park Afghanistan beyond the international border. The CCHAs and game reserves are situated in the surroundings of the national parks.

Table 2-3. Protected areas in Karakoram-Pamir Landscape

No	Name of the Area	Type of protected area	Area (sq.km)
1	Central Karakorum National Park	National Park	10,557
2	Khunjerab National Park	National Park	4,455
3	Qurumbar National Park	National Park	740
4	Naltar	Wildlife Sanctuary	272
5	Klik Mintika	Game Reserve	650
6	Danyore	Game Reserve	443
7	Nar/Goro	Game Reserve	334
8	Bar Valley	CMCA	906
9	Gulmit Minapin, Nagar	CMCA	544
10	Sikandarabad-Jaffarabad, Nagar	CMCA	114
11	Shinaki Hunza	CMCA	233
12	Khyber	CMCA	324
13	Ghulkin	CMCA	104
14	Hussaini	CMCA	114
15	Passu	CMCA	295
16	Sokhterabad Gojal	CMCA	324

17	Shimshal	CMCA	168
18	Kanday-Saling	CMCA	272
19	Hushey	CMCA	583
20	Qurumbar	CMCA	547
21	Ishkoman	CMCA	298
	Total	**Protected Area Network**	**22,277**

The landscape is not only home to the endangered snow leopard but also many other important wildlife species including both carnivores and herbivores. Alongside the wild fascinations the landscape carries a multitude of human settlements of different origins and ethnicities within the valleys. The human inhabitants are dependent on the natural resources and ecosystem goods and services for their survival.

2.3.1 Fauna of Karakorum Pamir Landscape

A number of important animal and plant species have been reported from the Karakorum-Pamir Landscape yet thorough and systematic investigation is still needed to have a clear picture of fauna and flora of the area. Most of the species occurring in the Karakorum-Pamir Landscape are of high conservation value. There are 30 recorded mammalian species and probable range of two additional species of wild Indian dog (*Cuon alpinus*) and wild ass (*Equus hemionus khur*) and more than 126 species of birds have been recorded from the area including migratory birds. The mammalian species consist of 10 large mammals which include four large carnivores and six ungulate species. In addition, the mammalian list includes eight small and medium sized carnivores, 3 lagomorphs and eight (8) rodent species. Freshwater fishes occur in different water bodies across the landscape of Karakorum-Pamir, which include exotic, indigenous and endemic species numbering 18 collectively. At least fourteen species of herpeto-fauna have been recorded from the area including 11 reptiles and three amphibians.

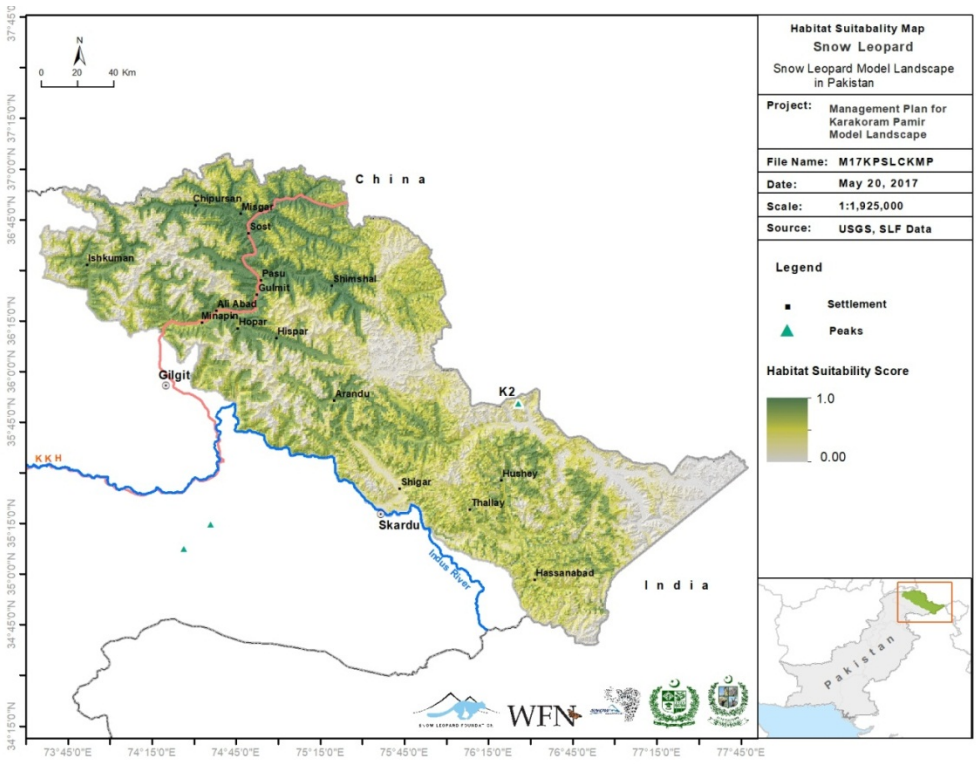
2.3.2 Habitat Suitability Modeling of Species

Habitat suitability models are useful for understanding species distribution and guiding management and conservation strategies. Habitat suitability models were developed, for key mammalian species of the Karakoram-Pamir model landscape, based on the data collected through camera traps, analysis of scat samples, and direct observation points over a 10 years period in the landscape (SLF unpublished data). In case of the carnivores, presence only data were used from the results of camera traps and genetic sampling. Environmental variables incorporated into the final model included temperature seasonality, mean temperature of the wettest quarter, annual precipitation, precipitation seasonality, altitude, slope, Normalized Difference Vegetation Index (NDVI), ruggedness, distance to roads, distance to rivers, land cover, and soil. The final sets of environmental variables were selected from a larger set of 28 variables. The candidate variables also included all 19 bioclimatic variables (Hijmans et al. 2005) and distance to settlements. These were pruned down to 14 by identifying variables that were auto correlated and selecting the ones believed to have the most logical influence on snow leopard habitat. The suitable habitat were estimated for each species using maximum entropy (MAXENT) modeling and identified suitable movement corridors using the Circuitscape tool.

2.3.3 Snow Leopard

In Pakistan population of snow leopard is estimated to be 200-420 scattered in an area of 80000 km² range, the estimate is based on different studies in different parts of the range (Snow Leopard Network, 2014; Pakistan NSLEP, 2015). To overcome the information gaps in snow leopard ecology, data collection was started in 2008 throughout the range. The data of snow leopard occurrence was gathered through sampling 50% of the known snow leopard range through camera traps and genetic analysis of the scat collected. MaxEnt modeling of the data revealed that the Karakorum-Pamir Landscape provides high quality habitat to snow leopard (Fig. 2-2). Modeling for potential movement corridors of snow leopard was done using Circuits-cape 4.0 software. The analysis show that Karakorum-Pamir Landscape is not only providing most suitable habitat to snow leopard in the country but also provides connectivity links and potential movement corridors to different habitats particularly that in China and Tajikistan. The areas of Misgar, Chipursan in the Khunjerab National Park appear to be best habitat for snow leopard in the country (J. Forrest and Shoaib Hameed, 2016).

Figure 2-2 Snow leopard Habitat suitability in Karakoram Pamir Landscape



The map developed based on the data obtained from camera traps and DNA analyses used as confirm presence in different areas for the MaxEnt analysis. Population estimate of snow leopard in the country through camera traps and genetic analysis is still need to be completed. A recent camera trap study in the Hoper-Hisper Valleys of CKNP confirmed population of at least four snow leopards in the area, which is a small part of the park (Khan, 2016). It indicates that the area is a stronghold of snow leopard in the range.

2.3.4 Other carnivores

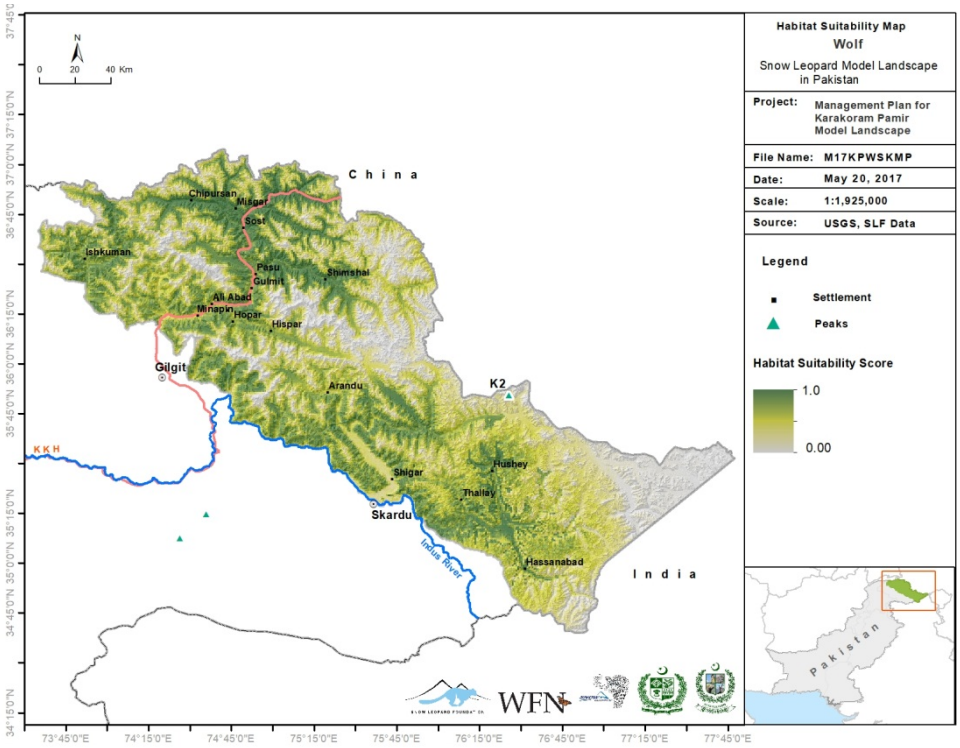
Besides the snow leopard a number of large and medium sized carnivores occur in the landscape of Karakorum-Pamir region. Some of the large carnivores are discussed below.

The Himalayan brown bear (*Ursus arctos isabellinus*), which inhabits alpine pastures and grassy mountainous areas, found in many areas of Northern Pakistan. Brown bears have been recorded from different areas of the Karakorum-Pamir Landscape including protected areas and adjacent valleys. They are known to be present in Qurumbar National Park, CKNP and other adjacent valleys like Misgar in the Karakorum-Pamir Landscape (Qureshi et al., 2011).. In the CKNP brown bear has been recorded from Karchanai Nulla and Zoi Saam Nullah, Padekishk Nullah, Wologh Dor Nullah and Toghroqin Nullah (Qureshi et al., 2011). Being omnivorous, brown bear relies on grasses, rodents like marmots and some invertebrates as parts of its diet. Mammals' survey in the CKNP recorded brown bear from Arandu, Braldu, Khuplu and Rakaposhi Valleys with a population estimate of not less than 30 animals (Mammals Distribution CKNP 12).

Grey wolf (*Canis lupus*), inhabiting a variety of habitats from hot deserts to tropical thorn forest, tropical dry scrubland, subtropical scrubland to the alpine zone is one of the major large carnivores in northern Pakistan. Being a major partner in human wildlife conflict across the range wolf has faced active persecution. In Gilgit-Baltistan the population is estimated to be 300-450 (Abbas et al., 2013). Wolves have been documented from the protected areas and adjacent valleys in the Karakorum-Pamir Landscape (Abbas et al., 2013; Khan et al., 2012; Qureshi et al., 2011). The topography of the Karakorum Landscape and the different ecological zones present within, suggest a good quality habitat for the wolf future. Spatial extant of suitable habitat for wolf was modeled, using occurrence data from camera traps and genetic analysis of scats collected. Analysis of the data showed that a major part of the suitable habitat lies within the Karakorum-Pamir Landscape which also acts as connecting links and corridors to other isolated populations both in and outside the country (Figure 2-3).

Lynx (Lynx lynx isabellinus) the only large felid next to snow leopard in the snow leopard range is present throughout the landscape. The Himalayan lynx is largest of all the globally occurring lynxes. It's capable of preying on lagomorphs, rodents, ungulates of moderate size and livestock. In the Karakorum-Pamir Landscape it occurs in all national parks, other protected areas and surrounding valleys (Qureshi et al., 2014; Khan et al., 2012; Virk et al., 2003).

Figure 2-3 Habitat Suitability map of wolf in the landscape



2.3.5 Ungulates

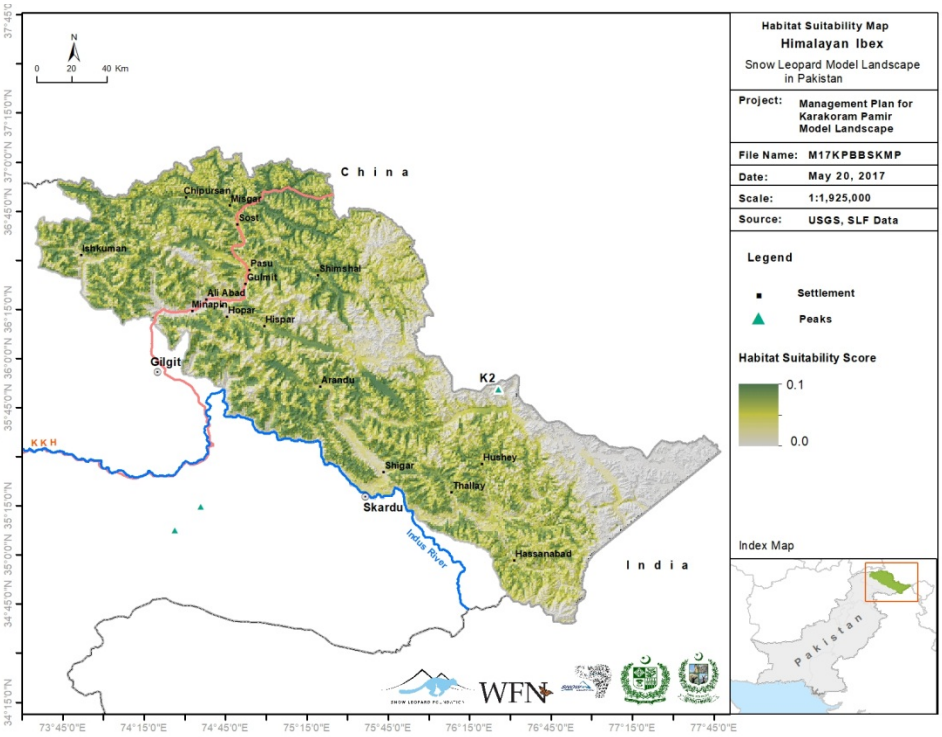
Six ungulate species dwell in the Landscape of Karakorum-Pamir, which are main prey of snow leopard and other carnivores. In many valleys, community controlled hunting areas and game reserves have been established to manage the ungulates and benefit the local communities through trophy hunting.

Among the ungulates, ibex is present in most of the protected areas in northern Pakistan including KNP, CKNP and Qurumbar National Parks in the Karakorum-Pamir Landscape. This ungulate is supposed to be the most abundant and safe species in Pakistan including the Karakorum-Pamir range (Hess et al., 1997; Nawaz, 2009). Population of Himalayan ibex was estimated to be 15,526 for the region based on annual surveys in the area (Khan et al., 2014). While Ahmad (2015) estimated a population of 1,965 animals in the Khunjerab National Park and surrounding community controlled hunting areas. Habitat suitability map developed for Himalayan ibex show that areas of Huza, Nagar, Shimshal and adjoining areas in the Karakorum Landscapes are good habitat of the species. (Figure 2-4)

Markhor commonly called as Astore Markhor are abundant in the lower valleys of the landscape such as, Sikandarabad Nula in the CKNP along Hunza-Nagar River. Markhor are also found in the Naltar valley along the Gilgit River. Population once considered extinct from Haramosh has now recovered (Michel and Michel, 2016). Our previous surveys in the CKNP recorded Markhor from different areas of the Park and the population estimated was greater than 250 animals (Mammals Distribution CKNP 12).

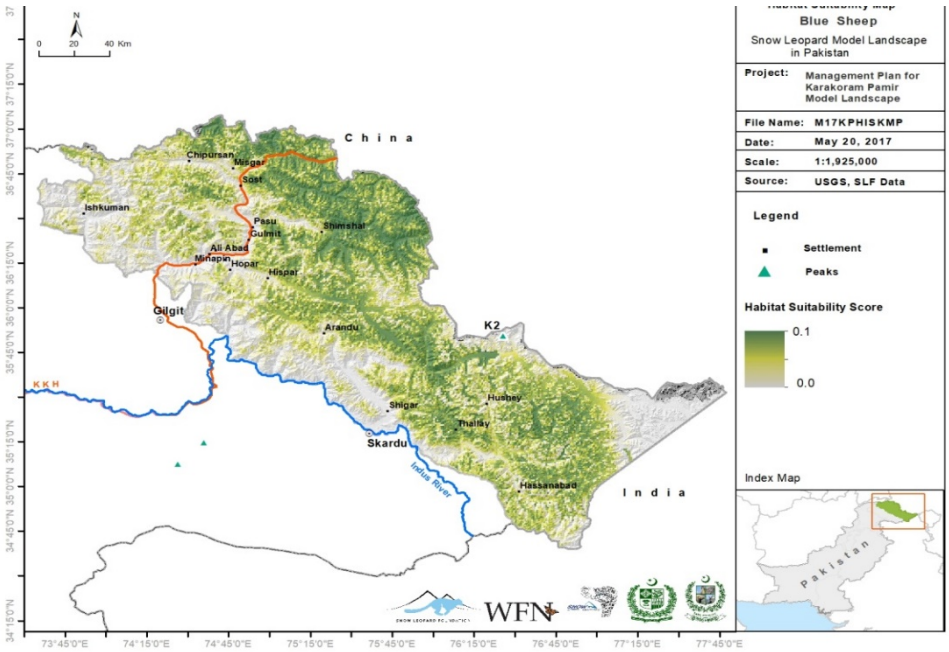
Blue sheep (Pseudois nayaur) has been reported from Khunjerab National Park and surrounding CCHAs in the Karakorum-Pamir Landscape, from the valleys of Sokhterabad, Shimshal, Misgar, Shigar, Baltoro (Harris, 2014). A five-year survey has estimated population of more than 1,000 individuals of different age groups from the Park (Khan et al., 2014).

Figure 2-4 Habitat suitability map of Himalayan Ibex in Karakoram Pamir Landscape



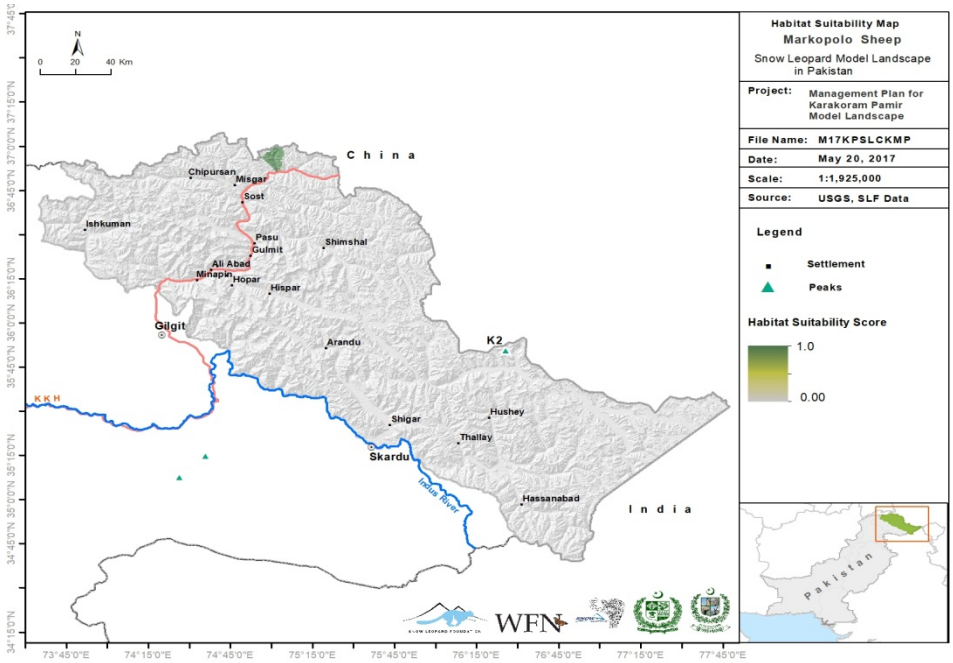
Similarly, Khattak (2015) counted 754 blue sheep in the Shimshal and Socterabad CCHAs. The surveys have been done in a limited area within the range and it can be fairly said that currentlyits population is not less than 1000 in Pakistan. Habitat suitability model developed based on points of direct sightings and camera traps shows habitat availability in different parts of the landscape including those in KNP and some areas of CKNP like Shigar, Ganche etc.

Figure 2-5 Habitat suitability and distribution of Blue sheep in the landscape



Marcopolo Sheep (*Ovis ammon polii*), or the mountain argali is one among the nine subspecies which occur in the highland pastures in Central Asia. They have very small distribution in Pakistanand have been reported only from the Khunjerab National Park. Historically their range have been shown in the Kilik and Mintika passes but currently they are found in Karachanai nallah of the Khunjerab National Park in the extreme north district of Hunza (Hess et al., 1997). It is reported that the females with sub adult males usually come to Karchanai in late May for lambing and stay there till mid- September and return to Taxkorgan (China) with lambs for wintering. No comprehensive record exists of population estimate. In a survey around 48 individuals were sighted including 21 males and 26 females (Khan et al., 2014). The population is believed to be not more than 100 (Harris & Reading, 2008).

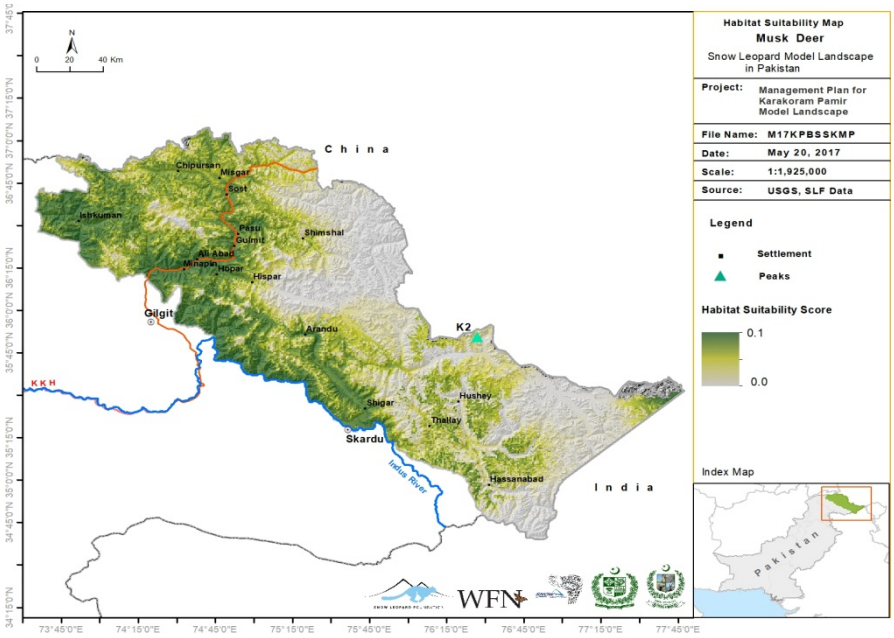
Figure 2-6 Distribution range of Marco polo sheep in the Karakoram Pamir Landscape



Musk Deer (Moschus spp) is another important ungulate of the landscape, although present in limited areas of the landscape and also most of the habitat is also not suitable for this species. This specie inhabits forest and alpine scrubs forest. (Figure 2-7)Although, exact population estimates for the landscape do not exists for the species, animal sighted in different valleys including Braldo, Hushey, Basha, Stak-Tormak etc. in previous years indicates a population estimate of 140-200 animals in the Central Karakorum National Park and surrounding areas (Mammal Distribution CKNP 12).

Laddakh Urial (*Ovis orientalis vigeni*) occurs in different areas of the Karakorum-Pamir Landscape. Population assessments present are from Schaller (1977) and Roberts (1997). It's found from Bunji area to the Hisper and Hoper Valleys, though the population is patchy (IUCN, 2016). The said population contains about 30 animals and also a small population of 10-15 animals reported from Hunza Valley (IUCN, 2016). Survey conducted in the CKNP, documented considerably good population of the animal on the eastern parts of the Karakorum Range in Pakistan. Majority of observations were made in the Braldo Valley, estimating the population between 60 and 90 (Mammals distribution CKNP 12).

Figure 2-7 Habitat suitability of Musk Deer in the Landscape



2.3.6 Small Mammals

Besides these large predators and ungulates, more than seventeen species of small mammals and meso-carnivores also occur in the area. Khan et al., (2012) have documented nine species of small mammals from Khunjerab National Park. The small mammals and meso-predators which have been documented from the landscape include long tailed marmot, stone marten, yellow throated marten, Ermine/stoat, cape hare, Alpine weasel, Indian/Himalayan Pika, Migratory (or gray) Hamster, long tailed bat, red fox, jackal, field mouse, Karakorum Pika (Ochonta macrotis), Chines birch mouse.

The only endemic mammal: Wooly flying squirrel, recorded from Gilgit Baltistan, occurs in the landscape (Din et al., 2015). Still there are species less known and need to be confirmed such as the red dog or Indian wild dog (Cuon alpinus) and Tibetan wild ass (Equus kiang). Their occurrence has been reported from Shimshal Pamir which is adjacent to the Xinjiang Province China (Virk et al., 2003). Earlier accounts suggest occasional crossing of these species from China into Pakistan around the Braldu and Oprang rivers, but there is no confirmation of recent sightings of these species (Virk et al., 2003).

2.3.7 Avifauna

Geographic location of Karakorum-Pamir mountain range between the cold high Asia and tropical Southeast Asia make it a junction point for many birds' species. The area serves as a native, transitory, migratory, breeding and staging ground for different variety of birds. Among the 670 species of birds occurring in Pakistan about 291 have been documented from Gilgit Baltistan (Grimmett et al., 2008; Roberts, 1992; Avibase, 2016) and it's thought that lesser efforts have been done in documenting avian fauna of the area (Abbas et al., 2014). Different studies in and around the national parks in the Karakorum- Pamir range have documented more than 126 species of birds in the area which include residents, migrants, summer visitors (Abbas et al., 2014; Khan et al., 2012; Qureshi et al., 2011), nevertheless the list is not exhaustive. The recorded species are grouped into 38 families and 16 orders. Some of the threatened species such as Golden Eagle, Peregrine Falcon and Lesser Kestrel are also found in the Karakorum- Pamir

Landscape (Abbas et al., 2014). Globally important species such as Himalayan Snowcock, snow partridges, Chukar partridges, snow pigeon and many other also occur in the area and facing constant hunting pressure.

2.3.8 Fish Fauna

Water resources although abundant, but most of them are in the form of glaciers or some high altitude rivers which become loaded with suspended solids in summer season and thus not providing suitable habitats for most of the fish species occurring in different rivers of Pakistan. Similarly, temperature is another limiting factor for many fresh water species like that of carps. Despite all these, some shallow rivers and streams which mainly originate from springs, thus having clear water and food to sustain fish population provide good habitat for fresh water fishes. Up till now seventeen fish species have been recorded from different water bodies of the area (Rafiq and Khan, 2012). Three of the fish species Triplophysa stoliczkai, Ptychobarbus conirostis and Schizopygopsis stoliczkai are endemic to Gilgit Baltistan and occur in the Karakorum-Pamir Landscape (Virk et al., 2003; Rafiq, 2000). Among the seventeen reported species three species Rainbow trout (*Oncorhynchus mykiss*), Brown trout (*Salmo trutta fario*) and Common carp (*Cyprinus carpio*) are exotic in origin (Rafiq, 2000).

The following seventeen of species of freshwater fishes belonging to four families have been documented by different researchers from the landscape. Oncorhynchus mykiss, Salmo trutta fario, Racoma labiate, Schizopyge curvifrons, Schizopyge esocinus, Schizothorax plagiostomus, Schizothorax longipinnis, Schizothorax skurduensis, Triplophysa stenurus choprai, Triplophysa microps, Triplophysa tenuicauda,Triplophysa trewavasae, Triplophysa yasinensis, Glyptosternum reticulatum, Ptychobarbus conirostris. Cyprinus carpi, Triplophysa gracilius (Rafiq and Khan, 2012: Virk et al., 2003; Rafiq, 2000).

2.3.9 Herpeto-fauna

In contrast to avian fauna and mammalian fauna herpeto-fauna is represented with few species of reptiles and amphibians in the Karakorum-Pamir landscape. It may be partly due to the high elevation and cold temperature which does not favor the cold blooded nature of herpeto-fauna. Fewer efforts have been done to describe herpeto-fauna of the region (Virk et al., 2003). The above statement can be sensed as *Laudakia pakistnica, Laudakia himalayana* were collected from Khunjerab National Park for the first time in 2011 (Qureshi et al., 2011). Similarly, a single species of toad and rock agama were collected from Qurumbar National Park (Management Plan QNP, 2016). Nevertheless, literature survey confirm presence of the following herpito-fauna in the area are Bufo pseudoraddei pseudoraddei, Laudakia badakhshana, Laudakia caucasia, Laudakia nupta, Laudakia pakistnica, Laudakia himalayana, Naja oxiana, Gloydius himalayanus, Laudakia tuberculata. The high elevation of the area and extremely harsh climatic conditions may be the main reason of fewer specie of herpeto-fauna in the area but it also decreases species movement and migration thereby increasing endemism (FICETOLA et al., 2010; Khan et la., 2012).

2.3.10 Flora

Phyto-geographically the Karakorum-Pamir Landscape falls in the Iran-o-Turanian and Sino-Japanese Sub regions (Ali and Qaiser, 1986). The landscape has diverse vegetation type due to the varying altitudinal and climatic conditions (Abbas et al, 2013). More than 155 plant species have been documented from various valleys of the landscape which exhibit the major habitat types found in the landscape, thus uncovering most of the floral diversity of the area (Sheikh et al., 2002; Bano et al., 2014). The landscape also hosts at least 8 exclusively endemic species along with hosting other 86 species endemic to Pakistan (Alam, 2009; Bano et al., 2014). Dominannt families

include Asteraceae, Polygonaceae, Saxifragaceae and Rosaceae (Sheikh et al., 2002). Species composition may be influenced by the temperature and rainy season which differs from the rest of the country, in lower areas snowy precipitations occur during December February. From March to May mostly rains while the summer is mostly dry and warm. As for as the higher elevations are concerned, snowfall starts earlier and melts in late April to May; still snowfall can be predicted in summer months (Abbas et al., 2016; Abbas et al., 2003; Alam, 2009).

Besides selling the aromatic and medicinal plants for cash income the plant species found in the area have multiple uses; they are used to cure different ailments, food for the livestock, fuel and firewood in the houses. Not only the timber is used in construction of buildings and houses but also the bushes and grasses are used in roofing the traditional alpine huts and cattle pens

3. SOCIO ECONOMIC AND CULTURAL SETUP IN KARAKORAM-PAMIR LANDSCAPE

3.1 DEMOGRAPHY

The Karakorum-Pamir landscape encompasses seven (7) different districts of the Gilgit- Baltistan province, previously known as Northern Areas. The total area of the landscape is 38,245 km². Population in the seven districts is scattered in different valleys and sub valleys. According to 1998 census population living within the valleys of the landscape is 313,466 individuals. No census has been conducted in the last 19 years. According to 1998 census average growth rate of population was documented to be 2.5 percent. A projected population based on the growth rate projects current population to be 454,526 in the landscape. There are about 244 different villages in the landscape having 42,979 households with average household size of 8 in the landscape (Table 3-1).

Table 3-1 Demographic information of the Karakoram Pamir Landscape

District	Ganche	Shigar	Skardu	Gilgit	Hunza	Nagar	Ghizer	Total
Area (sq.km)	9,660	7,678	1,399	2,134	11,286	3,520	2,568	**38,245**
Villages	56	57	12	18	46	39	16	**244**
Households	13,154	7,503	1,792	5,715	6,076	6,658	2,081	**42,979**
Population(1998)	89,445	45,947	14,332	46,291	46,784	51,936	18,731	**313,466**
Household size	6.8	6.1	7.8	8.1	7.7	7.8	9	**53**
Growth rate	1.8	2	2.2	2.7	2.7	2.7	3	**17**
Population Projected (2016)	**118,425**	**62,488**	**20,007**	**68,788**	**69,521**	**77,177**	**28,846**	**445,252**
Pop. Density	12	8	14	32	6	22	11	12

3.2 TRIBES AND LANGUAGES

Like other parts of Gilgit-Baltistan, the Karakorum-Pamir Landscape is a diverse area in terms of tribes inhabiting and languages spoken. Migration from other parts of the country for job opportunities and business purposes has added in the diversity of tribes and languages. Shin and Yashkun are the major tribes in the landscape along with the Balti, Khow, Mughals, Kashmiris, Rajas, Pathans and others. Most of the languages spoken in the area are of Dardic origin; a sub group of Indo-Aryan languages group (Decker, 2004). Shina is the main language spoken by majority of people in different districts within the Karakorum-Pamir range. Balti is spoken in Skardu and Shigar districts of the landscape. It's the largest language of Baltistan division of the province. Brushuski is spoken mainly in the Hunza district and some parts of Nagar districts, Brushuski speaking people are also settled in Gilgit district. Khowar is spoken in some parts of Ghizer district and Gilgit district, while some people in Hunza may also speak Khowar. The majority

of population in the Pamir speaks Wakhi. Other languages are Domaaki, Gojri which are also spoken by small populations in different districts of the landscape.

3.3 EDUCATION

Being remote and mountainous region most of the valleys and villages have lesser educational facilities as compared to the urban areas of Pakistan. However masses of the landscape show greater tendency towards education despite the socioeconomic and geographical barriers (Table 3-2). During the previous years, educational conditions in the area have shown an increase both in terms of enrollment and literacy rate (Alif Ailaan, 2015; GB-SWO, 2016).

Average literacy rate in the Karakorum- Pamir Landscape is 41%, showing a great disparity between male and female literacy rate. Male literacy rate in the area is up to 57% while that of female is less than 25% (GB-SWO, 2016). The standing of the province on 4th position on the basis of education score among the 8 different regions of Pakistan continuously from 2013-2015 as ranked by Alif Ailaan Pakistan (2015) is an encouraging factor. There are 996 primary, 193 middle and 120 high schools and 13 colleges (Table 3-3) in the areas falling in the Karakorum-Pamir landscape (GB-SWO, 2016).

Table 3-2 Literacy rate in different areas of the Landscape

Literacy rate in seven districts of GB falling in KPL (1998 census)						
	Districts					
	Ganche	**Shigar**	**Skardu**	**Gilgit**	**Hunza/Nagar**	**Ghizer**
Male	53.1%	51.0%	51.0%	66.1%	66.1%	53.2%
Female	13.5%	14.0%	14.0%	38.8%	38.8%	26.9%
Total Average	33.5%	33.9%	33.9%	53.3%	53.3%	39.6%

Table 3-3 Educational facilities in the Landscape

District	Primary	Middle	High	Colleges
Gilgit	227	65	47	6
Ghizer	179	18	17	2
Skardu	391	78	32	4
Ganche	199	32	24	1
Total	**996**	**193**	**120**	**13**

3.4 LIVELIHOOD AND ECONOMIC ACTIVITIES

The landscape is a mountainous area with a large portion of which is covered under glaciers, comparatively a very smaller portion of land is available for cultivation (Table 2.1 Chap 2). The Karakorum Pamir landscape is more arid and hilly as compared to lower elevations. Agricultural practices have remained confined to the valley bottoms where some crops have been cultivated on the lands developed on alluvial fans and river terraces. Use of mechanized tilling is decided by the size of the agricultural field, in smaller fields manual tilling is done. Agriculture is irrigation

based in the area, which is supplied and distributed to the farmers according to the customary laws. The customary laws are nor similar nor documented across the landscape. The customary laws governing the distribution of water and other resource use are based on household number rather than agricultural land in most of the areas. The mountainous agriculture has always been substituted by livestock rearing for centuries which constitutes major source of livelihood for pastoral communities.

The valleys of Karakorum-Pamir landscape are mainly arid with sparse natural forest on the hill slopes limited to the southern fringes under monsoon influence. On alluvial fans at valley bottoms mainly subsistence-oriented combined mountain agriculture prevails, whereas the high altitude areas are used as summer pastures. The agricultural landholding varies across the landscape between families. The high altitude pastures are communal property distributed between different adjacent villages and used as defined by the customary laws. Time of migration to high pastures by transhumant herders is influenced by seasonality, market influence and terrain of the pastures and valley. Livestock are grazed through three different grazing systems. In some areas the communities jointly hire a herder and pay him annually. In some communities a turn system operates where one or two household took the responsibility of grazing the cattle for a day, while some household may graze their livestock themselves based on the availability of human resource in the household. Some hardly accessible pastures are rented out on annual basis to the landless nomadic herders coming from down country. Marketing of the pastoral products i.e. wool, butter, cheese slightly vary based on the strategy of pastoral practices.

3.4.1 Agriculture

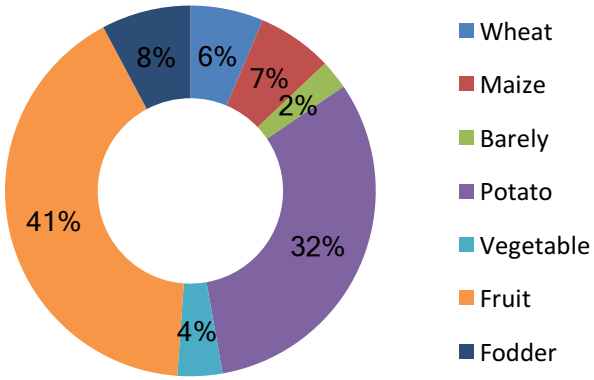
Traditionally, the mountain communities have been dependent on agriculture and pastoral activities as livelihood means. Due to arid climatic condition cropping is mostly done on irrigated alluvial fans. Main crops consist of staple including maize, wheat, barley, sorghum, millets, and some fruits such as apple, grapes, walnuts, mulberry, apricot, almonds and some vegetables like potato, turnip, cabbage, beans, tomato, and carrots (Table 3.4). In recent past, however, the agricultural patterns have been changed from subsistence scale to commercial. Horticultural practices have started in the recent years. Dry fruits particularly apricot production is high in the Skardu and Ganche Districts both in terms of area and production, while Ghizer district stands third in the province. Total apricot production is estimated 108,188 tons from different areas of the landscape (Mir and Khabir, 2013). Change in the apricot processing methods from sun drying to solar drying tunnels has increased the productivity 150% in the area (Sendall et al., 2013)

Table 3-4 Crop production and area under cultivation in the landscape

Crop	Area (hectare)	Production (Tons)
Wheat	11757	23077
Maize	9107	23746
Barely	4738	9,201
Potato	7464	114,777
Vegetable	766	14,148
Fruit	20711	148,626
Fodder	5664	28,157
Total	**60207**	**361732**

Arable land constitutes about 2% of the total area and 1% is cultivated, which is less than 1 kanals per capita (Khan, 2016). The total land under agriculture is approximately 60,207 hectares and the total estimated production is 361,732 tons. Fruits and potato are the main part of the production. Fodder cultivation is a necessary requirement for the agro pastoral communities in order to sustain the livestock in winter season when snowfall covers the rangelands for several months. Other crops include wheat, maize, barely and vegetables which are cultivated in the landscape.

Figure 3-1 Proportion of different agricultural products from the landscape



3.4.2 Livestock rearing

Around 19522.49 Km² area of the landscape consists of rangelands which serve as a major source of livestock feed. The availability of rangelands varies from valley to valley and so does the number of livestock. Around 2.6 million livestock heads depend fully or partially on the 19522.49km² rangelands with a density of about 130 animals per square kilometer. Since, different livestock types such as goat, sheep and yak have different grazing impacts on the rangelands as feed requirement varies with body mass. Until now, no such measurements have been carried out to evaluate the pressure on pasture and rangelands by different livestock types. Consequently, nothing can be truly said about how sustainable these pastures and rangelands are except a generalist view that these resources are constantly degrading in the landscape.

The mountainous areas of the landscape are used as feeding grounds for both wild ungulates and domestic animals. Number of livestock is on an increase with the increasing population as it's a major source of livelihood and no family whether farmer or businessmen can live in these remote valleys without livestock. Most of the families keep mixed herds including few goats, sheep and cattle. The vast majority of small ruminant-flock owners are small-scale farmers, sometimes landless. Mixed flocks are common, although separate flocks of sheep or goats can also be seen. Communities very close to the pasture also keep yak, which are free ranging animals. More than 2.5 million livestock are kept in the villages of Karakorum-Pamir landscape. Goats and sheep constitute 50% of the total number of livestock in the landscape.

Three major breeds of sheep are reported from the region. The weight and milk obtained varies among the different breeds. The Gojal breed is highest in terms of weight and used for milk and meat. The other two are Baltistani and Khoai breeds. Goat is categorized into four breeds based on their weight, milk production and dressing percentage. These are Jara-khiel, Baltistani, Paimiri

and Khoai breeds and Jara-Khel is the highest in body weight and milk products. These local breeds are highly adapted in the landscape but efforts to conserve these genetic resources and their survival is yet to be done (Khan, 2003).

The livestock depends on farm refuse, fodders, and adjacent ranges on mountain slopes for grazing. During the persistent droughts, when there is shortage of water in ecosystems, people largely depend on forest plants and shrubs, which survive in the droughts and floods. The agro-pastoralists residing in the three landscapes use forage through loping of trees and shrubs and grasses for their animals.

Inside narrow valleys, semi-transhumant system, with a short distance travel inside the valleys with altitudinal variations is prevalent, and is characterized by mono cropping of primarily maize and potato. Altitudinal migration between the summer pasture and winter home starts with the snow melt and snow fall. The dependence on livestock is more and different ecological sites are continuously utilized during short summer duration. The grasslands near the cultivated lands and settlements are harvested for hay. In winter when the valleys are under snow cover, livestock are stall fed with oak leaves, Medicago, Prongos pabularia and other dried stored feed collected from the pastures during summer. In valleys with broad plateaus of alpine pastures, the transhumant/semi-nomadic system, long distance travel from other valleys is practiced.

In almost all valleys of Karakorum-Pamir Landscape yak is the principal animal reared for marketing and earning revenues. The farmers find yak easier to rear as compared to other species of livestock due to its limited intensive feeding and housing requirements for most part of the year. In Shigar valley of Karakorum-Pamir landscape, yak crossing with cow is common and the non-conceivable hybrid female give more milk than the pure milking yak. Yaks are marketed during the month of October, November and December. Previously, yaks were kept free in pasture even in winter months but with the increasing number of carnivore predation particularly snow leopard on yak and their young ones, has compelled locals to guard and house them during night inside the communal corrals. This has led to the communal yak farming in various valleys.

Table 3-5 Livestock Population and Types in the Landscape

District	Cattle	Yak	Buffalo	Sheep	Goat	Camel	Equine	Total
Gilgit/ Hunza /Nagar	209,754	3,367	516	179,772	529,505	-	13160	936,074
Ghizer	101,275	4,171	161	80,099	130,529	23	6801	323,059
Skardu	206,015	11,969	246	286,167	415,011	-	2657	922,065
Ghanche	79,987	8,857	24	97,659	157,872	-	5476	349,875
Total	**597,031**	**28,364**	**947**	**643,697**	**1,232,917**	**23**	**28,094**	**2,531,073**

Livestock Marketing and revenue generation

An estimated 37% of the gross farm income is earned from livestock in these mountainous regions of Pakistan (AKRSP, 2010). The income mainly consists of the cash equivalents of meat, milk, wool, and hides of the animals as well as manure contribution to the agricultural land. Rather than sale, mainly the products are for domestic consumption with around 5-15% real cash income in different villages. The meat consumption is still mostly limited to winter season and festivities or sorrowful occasions. Marketing of animal and livestock products are predominantly confined to villages (Ehlers and Kreutzmann 2000).

Marketing of livestock and livestock products is mostly informal in the region. In the marketing system small scale retailers (middle man) play a major role in the business. The middle men collect the saleable goats and sheep from different villages and shift to the main market for sale (Rahim and Viaro 2002). Similar practices exist for milk products such as cheese, desi ghee, and other livestock products such as animal skins, wool, woolen robes marketing. Some livestock products such as robes produced from yak's hairs have declined due to competition from plastic, polyester and other robes availability in the market and their comparative durability and low price.

Similarly, goat hair is used in rope-making and rug-making for domestic use. Traditionally, woolen handicrafts are produced and marketed in Gilgit, Skardu and Hunza and sometime in other markets in the country. The traditional caps made of woolen patti is a symbol of tradition and widely used in the landscape and other parts of Pakistan. These products are not only locally used, but are also famous in the surrounding regions and are regarded as distinguishing feature at national level.

Milk and Milk Products

In the agro-pastoral communities of the landscape milk and its products are of high value for domestic use as well as generating cash income. Usually, the non-farming and trade oriented households purchase milk and other dairy products from the farming and pastoral household, but sometimes, milk products such as cheese is sold and bought by traders in the city markets. However, the local milk trade is rapidly declining due to availability of packed milk, although the butter oil is still in high demand.

Butter oil is extracted from milk and yield high income as compared to fresh milk. Although, the labor invested in the production is overlooked by the communities, mainly due to lack of availability of alternative income source. Production season of butter oil is mostly summer season, when the pastoral communities migrate to high pasture and the livestock have the availability of good quality feed in the pastures. The communities depend on milk products during winter seasons as the climatic conditions in the landscape leave almost nothing to obtain from the soil and the households have very little monetary capacity to obtain vegetables or pulses from the city markets. Butter oil quantity produced by a family also indicates the wealth and status of the family. In many mountain areas the surplus butter oil is buried in clay pots underground and is brought out during particular celebratory occasions like weddings. The older the butter oil the more it is considered valuable. Cheese and dehydrated whey (qurut) are the other commodities produced at high pastures during summer. Cheese is mostly sold in the market but whey is utilized at homesteads during winter (Kreutzmann 2005). Fresh milk, yogurt and whey are commonly used as daily food in the communities. Milk is also used for tea making. Very few households also convert milk into cream that's also confined to domestic use.

3.4.3 Fisheries

There are as much as 18 fish species inhabiting the fresh waters of Karakorum-Pamir Landscape, which include both indigenous and exotic species. Although, fishery is not very well developed sector in the landscape like other areas of the country, yet it provides a major source of income to many communities. According to the provincial fisheries department, 63 ton is harvested from the Karakorum-Pamir Landscape and 50 ton of which is harvested through private sector. This harvest generates 85 million PKRs annually in the landscape (Table 3-6)Most of the harvest and income come from the exotic species some of which have been introduced in few rivers and others from culture ponds which have been constructed for commercial purposes.

Table 3-6 Harvest and income from fisheries sector in the landscape

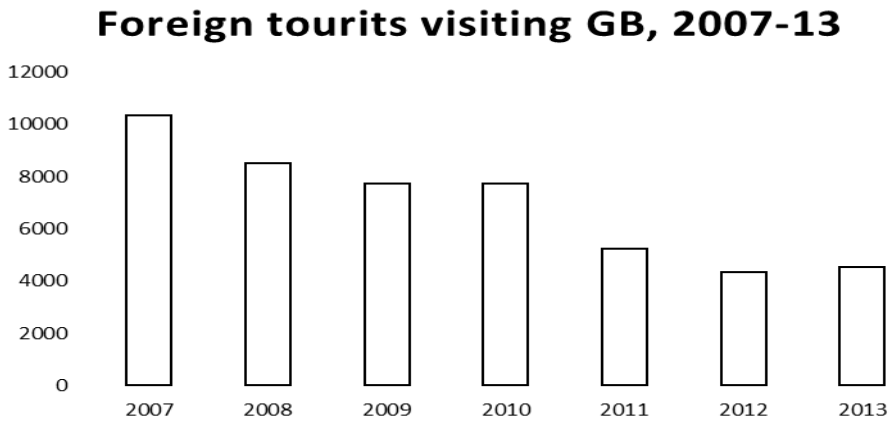
Harvest/Income	Public Sector	Private Sector	Total
Harvest (Tons)	13	50	63 (Tons)
Income (Million PKRs)	10	75	85 (million PKR)

Source: Livestock and Fisheries department Gilgit Baltistan

3.4.4 Tourism

The Karakorum-Pamir landscape encompasses breathtaking sceneries, high snow covered peaks, trekking routes and other unique fascinations in the charming landscape which offer unmatched destinations for tourists from across the globe. Tourism is one of the off-farm sources of income to the economically marginalized communities of the mountainous areas (Rahman et al., 2013).

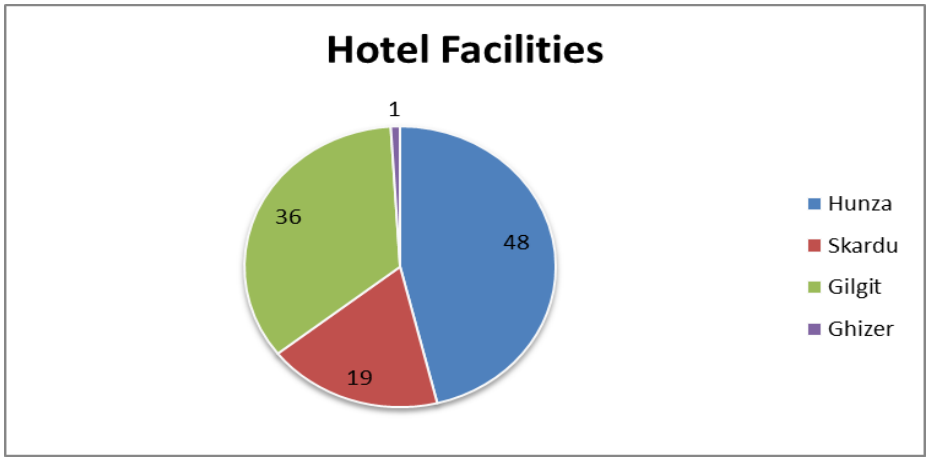
Figure 3-2 Number of foreign tourist visiting the landscape during 2007-13



Both foreign and domestic tourist come to the area in summer season, occasional visitors can also be fund in winter months. As tourism is always subject to change over time depending on the law and order situation and perception developed through mass media (Rahman et al., 2011) a decrease has been recorded in tourist flow in the area after 9/11 and other security situations at national level (Rahman et al., 2013) (Figure 3-2).

Tourist facilities in the landscape have increased over the past several years, which include accessibility, road networks and accommodation. Figure 3-3 shows number of hotel facilities in the landscape. Local investors and Pakistan Tourism Development Corporation (PTDC) have invested in the accommodation facilities. Hotel facilities in some areas like Hunza have increased nine times as compared to 1970 (Rahman et al., 2013). This indicates the contribution of tourism in the local economy.

Figure 3-3 Number of hotel facilities in the landscape (Source: Rehman et al., 2013)



3.4.5 CPEC

The landscape is a gateway of the China-Pakistan Economic Corridor (CPEC) which is being developed under One-Belt One Route initiative of China. According to estimates approximately up to fifteen heavy vehicles are supposed to pass through this route in one minute. It means addition of huge amount of carbon to the atmosphere of this fragile ecosystem. The current climatic conditions are rapidly changing affecting large amount of glaciers in the landscape. As a first mitigation measure vegetation cover should be increased with species of high carbon sequestration. Along the road and huge traffic on the route several other developmental and industrial project are planned in the landscape under the CPEC initiative. It will uplift the economic conditions of the local communities in the landscape simultaneously it willl have great impact on the natural environment, fauna and flora of the landscape. Initiation of developmental projects always has impacts on the environment therefore it's necessary to carry out the environmental impact assessment of such projects.

3.5 NATURAL RESOURCE MANAGEMENT AND UTILIZATION

The inhabitants of Karakoram-Pamir have dwelled in the remote areas for centuries depending on the natural resources for food, fodder and fuel. They have managed and utilized the natural resources in the best possible way under their traditional customary laws. These customary laws however, vary from place to place.

Fodder for livestock is not only cultivated on the arable lands but also collected from the pastures, particularly by the families having higher number of livestock heads. The collected fodder is stall fed during winter months. Stall feeding starts after the harvest in September, and are fed with willow leaves, wheat or barley straw, alfalfa, and other plant residues, in the morning and evening. Supplements of local barley and wheat (grounded 250 gram) are given during late pregnancy and early lactation periods. Women normally are responsible to feed the young yaks during winter season. During the day time animals graze freely in fallow lands (sunny day), or are only fed hay reserves and crop residues.

Apart from utilizing natural resources for livestock and their products, families visiting the high pastures also utilize an array of non-livestock products as well. The pastoral products in Karakoram-Pamir can thus be divided into livestock and non-livestock origin. The livestock related products include live animal sold for slaughter, milk products and wool/hair products. While the non-livestock related products include medicinal and aromatic plants, wild fruits and gemstones.

Among the local people a significant number is associated with the tourism sector as guide, porter with the domestic and foreign tourists in the landscape.

The land available for crop cultivation varies in different villages and the land also varies in texture. The plain land with deep soil is mostly used for staple and cash crops, while the sloping lands with shallow soils are used either for fodder production or as grasslands. Currently 36.8% land is for direct fodder production, while 26% used for staple crops also produce crop residues used for livestock feeding.Tree leaves from orchards and willows are also stored for winter feeding.

3.5.1 Non-Timber forest Products

Pine Nuts

The pine nuts (Pinus gerardiana or chilgoza) are produced in specific forest patches in some areas of the Karakoram Pamir landscape, particularly in the lower reaches. The harvesting period is between September and October. Women and nomadic Gujurs play a major role in chilgoza harvesting, packing, and marketing.

Chilghoza is an additional source of income for many families living in proximity to the forest resources. Average annual income of the agro-pastoral families associated with chilghoza collection is 20,000-30,000 and an estimated 3000 are involved in chilghoza collection in Gilgit Baltistan (IUCN 2007).The future production capacity of the trees may decline and in some areas survival of the species in certain areas may be at risk due to unsustainable harvesting by cutting branches of the trees to access the cones.

Medicinal and Aromatic Plants

Utilization of plants and herbs for therapeutic purposes in both organized and unorganized form dates back to time immemorial (Girach et al., 2003). Herbal medicines have come into use as their healing properties were discovered in many cultures. The inhabitants of the Karakoram Pamir have also relied on the traditional medicines for many ailments for centuries (Abbas et al., 2016). The indigenous knowledge of the medicinal plants of the area is as old as the civilization and culture itself. Almost 70% human population have depended on the indigenous system of medicines for centuries to treat different ailments of human and their livestock (Singh et al., 2013).

More than 100 herbal and aromatic plants besides the large tree species such as deodar, Birch, Juniper and ballot etc. are a source of livelihood and subsistence for the local people. Non-timer forest products such as mushrooms, spices, honey, medicinal plants and other wild fruits and nuts have great potential to develop into a growing modern industry. Estimated income from the trade of medicinal plants is about 4 million USD (NRSP, 2013; NSLEP, 2016).

Cumin (zeera) is found all over Gilgit-Baltistan, however in some areas it is much valued (Rasool 1998). The market price varies from Rs 150 to 300 per kg depending on the quality and smell. The herb is being collected by shepherds and farmers from the pastures and brought to the market for sale. Though it is categorized as minor forest produce under the provision The Forest Act 1927 (West Pakistan Amendment 1964), yet there is no restriction on its extraction and large scale extraction and export is allowed by the Forest department on payment of a royalty.

Through experience complementary interrelations have been evolved leading to better understanding of nature at local level and therefore, enhanced the chances of human survival in harsh mountain environments (McCorkle, 1992). This “primitive” way of life is fast disappearing. The relentless exploitation during the transition from traditions to modern and subsistence to market orientation disturbed the ecological balance and adversely affected their economic life

along with the resource base. As a result the mountain people lost control over their economic destiny, slowly (Singh et al. 2003). The reasons for the degrading exploitation of natural resources are however, not so simple, some rooted deeply in development patterns, rapidly increasing population, fragmentation of land-holdings and slow growth of job opportunities (Repetto and Gillis 1990), and other in lack of effective institutional mechanisms.

3.5.2 Mineral resources and mining

The landscape has large reservoirs of important minerals and precious gemstones. A variety of minerals and gemstone specimens have been collected from the area for years. Occurrence of placer gold from the river beds of the landscape is well known, annual collection from which is estimated at 15 Kg/year from Ghizer, Hunza and Indus rivers (Sheikh et al., 2007; GB Govt). In the valleys of Danyore and Bagrot, Arsenic and its different forms and combination such as arsenopyrite are found in good quantity. Similarly, bauxite, copper and gold associated with gossan/red iron oxide/ochre are also found in different areas of the landscape (Malkani, 2014). Precious gemstones like aquamarine, quartz, red ruby and spinel, pargasite cabochons (also called Hunza emerald), rose quartz and pegmatite containing beautiful pyrite, malachite and azurite are found in different areas including Hunza, Chipursan, Gilgit and Skardu (Malkani, 2014).

Industrial minerals like china clay, feldspar, limestone and marbles are abundant in the area (Malkani, 2014; GB Govt). Mining activities to extract gemstones are usually carried out at pastoral areas and it has impact on rangelands. On one hand such activities make the pastures more vulnerable to erosion; while on the other hand it provides additional income to the people through direct extraction in small scale or as mining labour in large scale mining operations. In some areas large scale mining activities have started as early as 1960, where the local people are involved as mining labour (Naureen et al., 2016). Some individuals are associated in small scale mining or precious stone collection in the landscape. Although such small scale activities are an alternative or additional source of income for the people involved, true worth of income from such activities is difficult to figure out

4. STAKEHOLDERS IN KARAKORAM-PAMIR LANDSCAPE

This chapter presents the analysis of major stakeholders in the Karakoram-Pamir landscape including major government and non government organizations operational in the area. The Landscape management plan promotes landscape approach, where multiple stakeholders are working in development as well as conservation sectors. Here, we are profiling these wide range of organizations with ultimate goal of recognizing their respective roles in development, livelihood and conservation and explore ways to leverage their ongoing initiatives to support conservation and sustainable development of the landscape.

4.1 ADMINISTRATION

The Karakoram-Pamir Landscape spread across seven out of ten districts out of Gilgit-Baltistan (GB) province. Each district is headed by District Administrator called Deputy Commissioner (DC) who is responsible for maintaining law and order, collection of revenue, developmental program coordination and common welfare of people, respectively. In the absence of local government representatives i.e. District Chairman, the DCs are responsible for overseeing progress of the line departments at District level. The DCs are also functioning as chairman of the District Conservation Committees (DCCs) established in each district to foster conservation agenda at district, valley and village levels. The DCC reviews and endorses the conservation management plans developed at village or valley levels and forwards for notification of new Community Managed Conservation Areas (CMCAs). Thus, the role of district administration in promoting conservation and sustainable development initiatives at landscape level is crucial. The GB Province is further divided into three divisions which are lager administrative units and headed by Commissioners. Two of these units i.e. Gilgit and Baltistan Divisions falls in Karakoram-Pamir Landscape. The Gilgit Division consists of District Gilgit, Ghizer, Hunza and Nagar, while Baltistan Division encompasses District Skardu, Kharmang, Shighar and Ghanche. The Commissioners have reporting line with the Secretary, Home Department which is in turn supervised by the Chief Secretary, who is the provincial administrator. Under the current management set up, the Chief Secretary also holds the responsibility of the Chief Conservator, Wildlife and Chairman of the Wildlife Management Board. The Wildlife Management Board is the apex conservation body in the province with membership from line departments, law enforcing institutions, nongovernment organizations and community reps. The Wildlife Management Board is responsible for overseeing the conservation initiatives at provincial level and notification of protected areas. In nutshell, the provincial and district administration have greater say in the management of the landscape

4.2 GOVERNMENT LINE DEPARTMENTS

There are fifteen (15) government departments operational in the GB province with mandate of fostering holistic development of the province (Table 1). Each department has set up in each district which is headed by district head and supervised by respective Secretary of the department stationed at provincial headquarter. All the line departments will have influence in the management of the landscape and implementation of landscape management plan in one way or the other but the Forest, Wildlife and Environment department has direct role to play.

The Forest Department has senior management designated as Conservator in each Division supported by Divisional Forest Officers (DFOs) and team stationed in each district. The forest department has mandate of ensuring sustainable management of forest resources in the province

by implementing the Forest Policy and associated conservation measures. While, the Parks and Wildlife Department is headed by Conservator stationed at provincial headquarter with mid and lower cadre officers and field staff stationed at district levels. The department is responsible for the management of wildlife resources and associated mountain biodiversity through enforcement of the Wildlife Act and sustainable harvesting of selected wildlife species by promoting public-private partnership. Establishment, expansion and management of protected areas also constitutes key mandate of the department.

The Environmental Protection Agency (EPA), GB is another important newly established attached department which is responsible for the implementation of the relevant environmental acts and monitor the effect of developmental activities environment. The Tourism, Agriculture, Livestock, and Fisheries Departments are some of the other important bodies to have potential role in the management of the landscape.

4.3 NONGOVERNMENT ORGANIZATIONS (NGOS)

A number of national and international nongovernment organizations are active in the Karakoram-Pamir Landscape. Generally speaking, these can be grouped into Developmental and Conservation or Environmental NGOs.

The major Conservation NGOs operational in the landscape include the World Wide Fund for Nature (WWF), International Union for the Conservation of Nature (IUCN), Wildlife Conservation Society (WCS), Snow Leopard Foundation (SLF) and Baltistan Wildlife Conservation and Development Organization (BCDO), respectively. These organizations are working for conservation and management of natural resources through research, conservation, education and capacity building of the participating community organizations.

The notable development NGOs operational in the landscape include various entities of Aga Khan Development Network (AKDN) and recently launched “Economic Transformation Initiative (ETI)” program of Government of Gilgit-Baltistan, co-funded by International Fund for Agricultural Development (IFAD). The AKDN organizations are working in the region for last many years in the field of rural development, economic empowerment, education, health and cultural development. The AKDN has been the pioneer of promoting community participation in developmental initiatives by establishing community based organizations and capacity building.

The Economic Transformation Initiative is a seven-year development program of Govt. of Gilgit-Baltistan, co-funded by IFAD with a total cost of Rupees 12 billion to boost regional economic activity through agriculture value-chain development. The program aims at improving income, reducing poverty and malnutrition in the rural area of seven districts of Gilgit-Baltistan. The specific objectives are to improve production and productivity by bringing in additional 50,000 acres of irrigated land benefiting around 100,000 small landholders including women and landless; improving connectivity to market through construction and updating 400 km of farm to market roads and promotion of demand-driven value chains of regional products.

Besides, a number of community based organizations registered with different nametags such as Local Support Organizations (LSOs) established by AKDN and Valley/Village Conservation Committees (VCCs) established by the Wildlife Department in collaboration with nongovernmental organizations are active in the landscape.

4.4 ACADEMIC INSTITUTIONS

The Karakoram International University (KIU) is the key academic institution in the landscape. The KIU is a leading institution of higher learning committed to social development and evolution of peaceful and pluralistic societies in the mountainous areas of Pakistan and geographically similar

regions elsewhere. The institution has initiated various research projects relating to natural environment such as studies of climate change, flora and fauna and environmental impact assessment in collaboration with national and international organizations.

4.5 GOVERNMENT ALLOCATION FOR DEVELOPMENT AND CONSERVATION IN THE LANDSCAPE

The total budget of GB for the fiscal year 2016-17 is ~44 billion rupees which includes 25.361 billion for non-development expenditures and 6.450 billion for food subsidies. An allocation of 6.450 billion was set aside for Annual Development Program (Fig. 4-1). The Public Sector Development Program (PSDP) has outlay of 2 billion rupees including schemes for education, health, law and order, irrigation and agriculture, communication, infrastructure, environment, water and energy sectors (Table 2). Information on relevant line departments mandate collected through personal interaction with the dept. officials and from GB Government official website.

Figure 4-1 Sector Wise Summary of Annual Development Program of Gilgit Baltistan 2016-2017

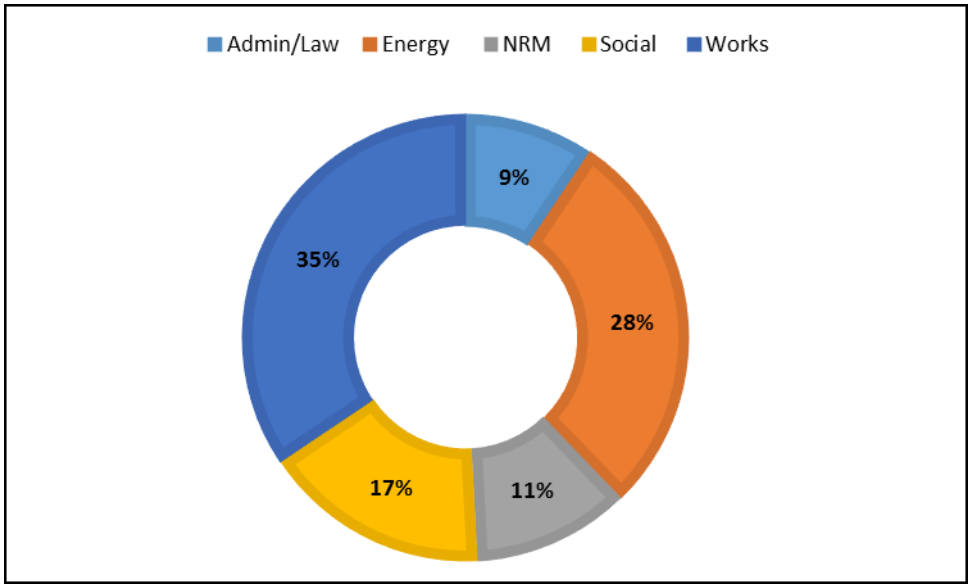


Table 4-1 Information on Relevant Line Departments mandate

Sr No.	Department/Sector	Key Mandate	Possible Role
Government Departments			
1	Home and Prisons	Administration, law enforcement and crime control, etc.	Supervise landscape management bodies, coordination among stakeholders and curb wildlife poaching and trafficking
2	Finance	Management of public funds among other	Support develop and implement financial mechanism for the landscape management

Sr No.	Department/Sector	Key Mandate	Possible Role
3	Food and Agriculture, Fisheries and Animal Husbandry	Development and sustainable management of agriculture, fisheries and livestock resources	Promote sustainable resource management and harvesting to enhance socioeconomic status of the communities while keeping the mountain ecosystem intact
4	Forest, Wildlife and Environment	Scientific management of forest and wildlife resources and reducing environmental hazards	Primary stakeholders to take on the implementation of the landscape management plan
5	Education, Social Welfare and Women Development	Enhance literacy rate by promoting education and improve socioeconomic development and empowerment of women and marginalized group	Enhance awareness of the importance of nature conservation and capacity building of women and disadvantaged group of the society within the landscape
6	Health and Population Welfare Department	Enhance health status of the population by rendering health services and controlling population growth	Promote healthy and manageable human population in the landscape
7	Works Department	Infrastructure development	Support enhance the socioeconomic status of the landscape communities by initiating sustainable infrastructure development schemes and improving communication
8	Local Government, Rural Development and Census	Empower local communities and update socioeconomic data	Empower local communities and rural development in the landscape
9	Water and Power Department	Generation, distribution, maintenance, and supervision of electricity	Enhance power supply in the landscape to reduce dependency on forests and NTFPs.
10	Tourism, Sports, Culture and Youth Department	Raise tourism by promoting culture, sports and youth development initiatives	Promotion of ecotourism and cultural conservation in the landscape besides taking initiatives to enhance the skills of youth.

Sr No.	Department/Sector	Key Mandate	Possible Role
11	Mineral Development, Industries, Commerce &	Labor	Promote mining, industrial and commerce development
12	Planning and Development Department	Development, approval and monitoring of annual development plans/programs and schemes in collaboration with line departments.	Support development and approval of developmental programs for the landscape
Nongovernment Organizations and academia			
13	Snow Leopard Foundation	Conservation of snow leopard, other wildlife and associated mountain ecosystem through research, conservation and education programs.	Support development, implementation and monitoring of wildlife in the landscape and measures to reduce threats.
14	WWF-Pakistan	Conservation of natural resources and environment	Support implementation of the landscape management plan by augmenting conservation and awareness raising measures.
15	Wildlife Conservation Society	Sustainable management of biodiversity	Support community development and governance in the landscape
16	IUCN	Natural resource management	Support develop and implement governance mechanism at landscape level
17	AKDN	Social, economic and cultural development	Support enhancing the socioeconomic status of the communities
18	ETI-GB/IFAD	Socioeconomic development of the communities	Support implement livelihood improvement initiatives at landscape level
19	Karakoram International University	Promote research culture and skill development	Improve understanding of biodiversity values of the landscape

Table 4-2 : Summary of Annual Development Programme (ADP) of Gilgit-Baltistan for the year 2016-17 for NRM Sector

S#	Department	No of Schemes	Approved cost (million rupees)
1	**Agriculture, Livestock and fisheries**	**47**	**2500.698**
	Ongoing	*39*	*2311.698*
	New	*8*	*189.000*
2	**Forest, Wildlife and Environment**	**23**	**1055.204**
	Ongoing	*19*	*915.204*
	New	*4*	*140.000*
3	**Minerals, Mines ,Industries and Commerce**	**19**	**538.387**
	Ongoing	*15*	*406.397*
	New	*4*	*131.99*
4	**Tourism, Culture and Youth Development**	**41**	**2266.999**
	Ongoing	*32*	*1795.449*
	New	*9*	*471.55*
	Total	**130**	**6361.288**

Source: Official website of Government of Gilgit-Baltistan

5. THREATS TO SNOW LEAPORDS AND ASSOCIATED BIODIVERSITY

5.1 IMPLICATION OF SOCIO-ECONOMIC DEVELOPMENT AND A BRIEF SYNTHESIS OF SOCIO-ECONOMIC CONDITIONS

The total area of Karakoram Pamir Landscape is 38,245 km^2 of which 40% is under permanent glaciers and snow cover. The available land in the Landscape, excluding glaciers constitutes 22,679.36 km^2 of which 86% comprised of rangelands and an additional 5% is barren areas. More than 0.4 million people reside in the landscape and are highly dependent on the natural resources with very limited alternative opportunities. Agricultural production is very limited in the landscape both in terms of area and yield form the land. Most of the households subsists their needs from pastoral products. Livestock rearing is the major livelihood mean and the landscape supports more than 2.5 million livestock of the agro-pastoralist communities. The increasing resource extraction induces great pressure on the land and limits the availability of resources and space for snow leopard, its prey species and other wildlife. Collective yak farming has emerged as a trending practice in most of the remote valleys of the landscape. Sufficient income can flow into the communities from this practice, though increasing the number of semi-wild yak in the pasture may increase the threats to wild herbivores and habitats.

Cultivated land is less than one kanals per capita where production of wheat is insufficient to fulfill the domestic need and some cash crops such as potato and some fruits earn money for the farmers to fill the gap (Chapter 2 Table 2-1) An estimated 37% gross farm income is earned from livestock in these regions (AKRSP, 2010). Income from fisheries resources is limited to lower elevations and urbanized areas in the landscape. Data from the government department shows an increase in the foreign and domestic tourist flow into the region in recent years (Chapter 3, Figure. 3.2). The actual number of people and households earning from the tourism sector is not known.

Deposits of gemstones and precious stones in the reservoirs of sedimentary rocks of the landscape are in huge amount. Mining activities are carried out in the Valleys of Nagar, Shigar, Braldu, Haramosh, Thallay, Hushay, Danyore, Astak-Tormik and many other areas in the landscape. These local mines are good source of income for the people. More than 30,000 people are associated with mining in these areas. Mining activities are very old; in some areas they have been carried out since, 1960. Miners work in groups, there may be various numbers of groups in each locality based on the numbers of mines. In some areas more than 0.7 million PKRs is earned by a single group. Mining is also a seasonal activity in these areas, mostly carried out in summer season (Naureen, 2016).

5.2 ADDITIONAL RESOURCE EXTRACTION IN THE LANDSCAPE

Available data of resource extraction such as fuel wood and fodder collection is limited to some valleys of the landscape. Given the similar socio-economic conditions and high dependence on natural resources by the communities in the landscape, the data can be taken as reflecting the overall situation of resource extraction throughout the landscape. Fuel wood collection varies from valley to valley based on the availability of forest resources. In valleys of lower elevation where spruce, pine and juniper forests are available the communities rely on them whereas in areas with low forest resources shrubs are collected. In some areas of high altitude to meet the

high demand of fuel wood animal dung and peat is used as alternative source. In areas with relatively high forest resources such as the Haramosh Valley, for instance, fuel wood extraction and consumption exceeds an average of 3715 kg/HH/year. In addition, trees are cut down for house construction (Naureen et al., 2016). Similarly, in Shigar valley 41% of fuel consumption is derived from natural plantation. In areas where forest resources are limited, Artemisia spp, sea buckthorn and other shrubs are collected and used as fuel wood. With expanding human population the construction of new houses is increasing thus dependency on the forest resources is also increasing. For example, during a five-year period 585 trees of poplar and willow were cut down in Thallay Valley of the landscape (Naureen et al., 2016). It shows in almost all valleys of the landscape fuel wood is collected from the forests and pastures.

Livestock are grazed in the pasture from April up to December, which is primarily determined by snowfall and snowmelt. Livestock are rotated between lowlands and upland pastures. The rotation is not determined by any assessment of the pasture but only following the snow line or other customary practices. For stall feeding in winter, the communities collect fodder from the pastures in summer season. Although some customary laws are present to control the grazing and fodder collection practices they are not followed by herders. Assessment in Braldu Valley shows 29% to 33% degradation of the rangelands in upper and lower areas of the Valley (Naureen et al., 2016). A similar situation has been observed in Shigar valley where alpine and subalpine pastures have 21% degradation and mid and low rangelands have degraded up to 32% (Naureen et al., 2016).

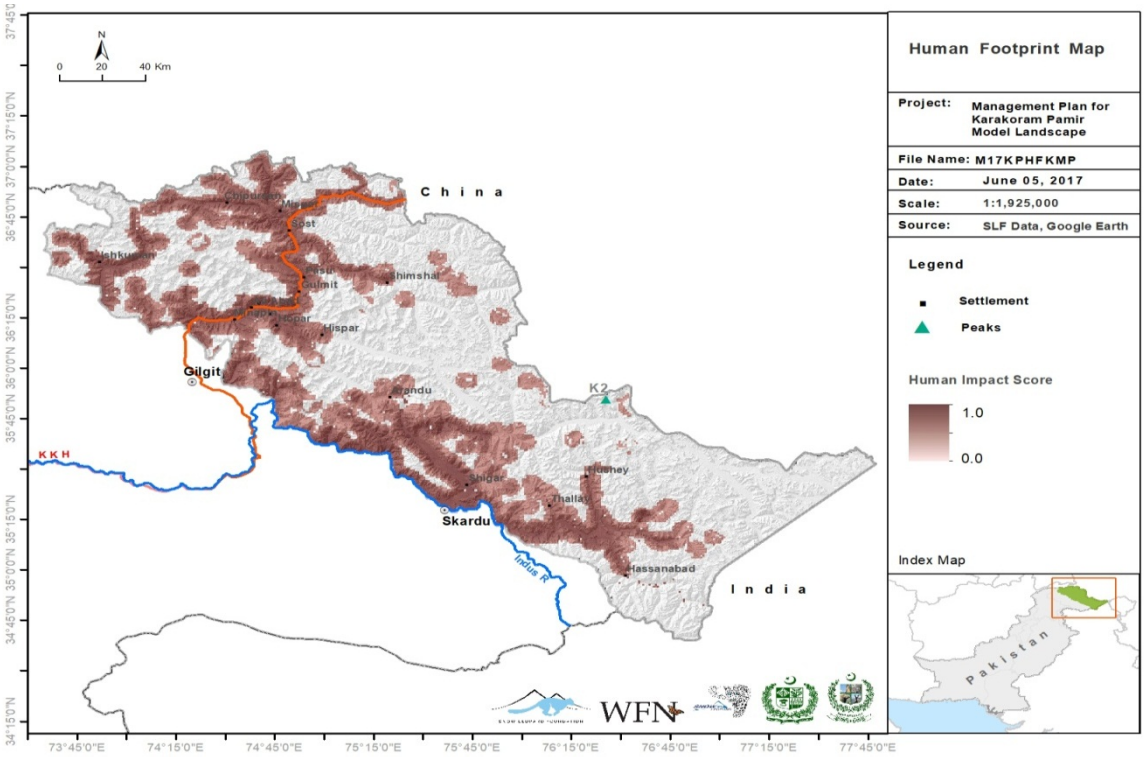
5.3 EXTENT OF HUMAN IMPACT/ FOOTPRINT IN THE LANDSCAPE:

Direct human impact calculated on the basis of human population, road access and land uses in the landscape show a significant pressure in the landscape (Fig. 5-1). In the figure only populated place location has been taken into account as proxy for population excluding small hamlets. Roads divided into two levels: a. highways and paved roads b. un-metaled roads and jeep able roads. Similarly, land uses and land cover classes have been used with a degradation score assigned to the different types of human altered lands.

The map, (Fig. 5-1) shows human impact on the landscape in terms of population, road and land uses. There are several other things such as trekking routes and walking tracks inside the landscape which have not been included in the analysis. Tourist influxes inside the wild habitats, mining in many wildlife areas of the landscape are some of the other human disturbances which may produce great impact in the landscape. Northeastern areas of the landscape along the Sino-Pak and Indo-Pak borders are among the areas which have negligible human population and infrastructures.

A detailed methodology of developing human impact map is described in chapter 8 of this document

Figure 5-1 Human Impact in the Karakoram Pamir Landscape



5.4 THREATS AND OPPORTUNITIES

There are various threats to Snow Leopard in Karakoram Pamir Landscape. We have analyzed these threats into four broad categories. Category A analyzes the Habitat and Prey Related Threats, Category B focuses on Direct Killing of Snow Leopard, Category C looks at the Policy and awareness issues effecting snow leapord, its prey and habitat while Category D looks at the emerging threats for Snow Leopard in the region. Furthermore, we have also ranked these threats to snow leopard and their prey specie in the landscape later on (See Table 5-1)

5.4.1 Category A: Habitat and Prey Related Threats:

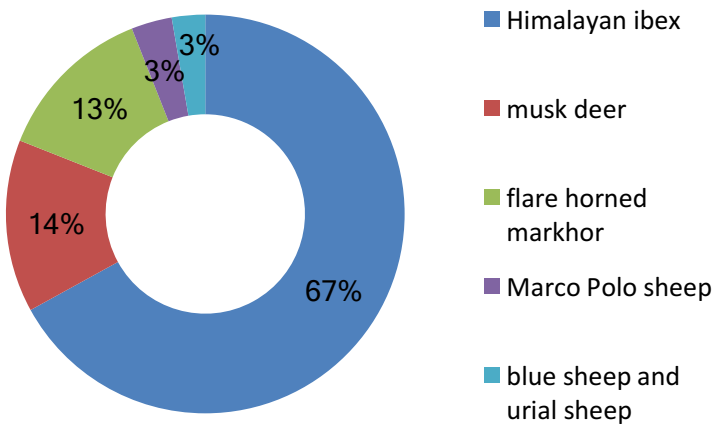
Habitat fragmentation and degradation due to overgrazing by livestock:

As mentioned earlier (Chapter 2. Table 2-1) around 2.6 million livestock are dependent on the 19522 km2 rangelands. Currently, stocking rate and status of the rangelands has not been evaluated but previous studies show the rangelands were overstocked and burdened 20 years ago. Stocking rate has been estimated in the area is 5.2 ha/animal unit, which is three times higher than the FAO's critical stocking rate of 16 ha/animal unit for low potential range (Khan, 2003). The overall trend of livestock rearing is increasing in the area, as studies show since 1976, with an annual growth rate of 3.5% in livestock numbers. Coupling the degrading status of rangelands with increasing number of livestock grazing we can assume that the rangelands are highly degraded with a potential for competitive exclusion of the wild herbivores. Overgrazing has resulted in a high composition of less palatable forage species, including wide-spread weeds and poisonous plants. Grazing also impacts Juniper forests as young seedlings are susceptible to the browsing and trampling of livestock. The livestock based livelihood system is highly impacting the wild prey by pushing them to unfavorable habitats and less palatable forage. Hence, this results in reduction of wild prey and creates a threat for Snow Leopard.

Reduction in natural prey due to Illegal hunting and competition with livestock

Depletion in wild prey base is a big threat to snow leopard and other carnivores throughout the world. Hunting of game species has remained a widely practiced phenomenon in these mountainous areas, which has not been fully controlled yet despite the efforts of the concerned authorities. A number of limitations both in human and financial resources and loopholes in the existing laws are contributing in such practices. Our study reveals, besides carnivores a total of 244 ungulates have been illegally hunted for meat and other monetary gains in various areas of the snow leopard range a majority of them occurred in the Karakoram Pamir Landscape (SLF unpublished data Fig 5-2). These include Himalayan ibex (67%), musk deer (14%), flare horned markhor (13%), Marco Polo sheep (3.3%) and blue sheep and urial sheep (2.7%) were also reportedly killed illegally. Figure 5-2 illustrates this in a chart. This translates into 22 animals per year.

Figure 5-2. Illegally killed wild ungulates in snow leopard range, Pakistan



It can be understood that many cases go undetected and the reported cases are presenting a minor fraction of the total incidences. It was also observed that some of the snow leopard, brown bear pelts and horns of Marco Polo Sheep are smuggled from and traded with the neighboring countries of Afghanistan and through Khunjerab Pass to China. Along with illegal hunting and killing, the remaining ungulate populations are pressed by the increasing number of livestock in the pastures. As mentioned earlier ungulates are pushed to unfavorable habitats and unpalatable forage.

Disease transmission to wildlife

Disease transmission from livestock to ungulate species is well known and threatening the snow leopard and their prey species (Frölich et al., 2002; Hudson et al., 2002; Ostrowski et al., 2012). Disease outbreaks killed more than ten markhor in the Tooshi Game Reserve in the near past. It was likely transmitted from domestic livestock of the area. In Chitral district annual average loss of livestock to disease was estimated to be 7.1% of livestock holdings, ranging from 3.7% to 11% in different areas. Similarly in the Shimshali area of GB, since 1996, the yak herders have reported death of several hundred blue sheep (Pseudois nayaur) and the carcasses characterized with skin lesions. Dagleish et al. (2007) identified the disease as sarcoptic mange, a highly contagious disease caused by Sarcoptes scabiei. An outbreak of pneumonia in 2010 claimed about 20% of

markhor populations in Tajikistan (Ostrowski et al., 2012). In such cases further studies are needed to explore actual prevalence and significance risk of the disease. In March 2012, about 12 young markhor were found dead in the Tooshi Game Reserve, Chitral. A postmortem of an infected animal carried out at the Veterinary Research Institute, Peshawar, suggested a mixed infection of contagious caprine pleuropneumonia (CCPP) and enterotoxaemia. This situation is a serious threat to snow leopards as it can cause infections and prey depletion.

Illegal timber harvesting

Forest resources have declined and degraded due to illegal harvesting of timber, unsustainable collection of fuel wood and other NTFPs by local people who are highly dependent on these resources for fuel and income.

Forest resources are limited in the landscape and the needs are growing day by day with expanding population. In many areas cumulative annual increment of firewood is less than the annual need of the communities (Ferrari, 2013). In the recent years flash floods resulting from deforestation coupled with climate change have negatively impacted not only communities of the landscape, but people outside the landscape dwelling in and depending on the Indus watershed.

Sedimentation following the loss of forests brings enormous social costs as a result of reduced storage capacity of reservoirs, loss of fertile soils, increased maintenance cost of irrigation infrastructure, reduction in agricultural production and increased vulnerability. Growing human and livestock populations, coupled with government control over forests in northern Pakistan and erosion of traditional systems of forest resource management has led to overuse of timber and NTFPs. Local communities rely on forests, particularly juniper, for construction material, fuel wood, thatch, fencing material, grazing ground for livestock and household medicine/remedies. Collection of wood and NTFPs in juniper forests has resulted in severe degradation of, causing reduction of juniper forests from 640,000 ha to an estimated 295,000 ha (or reduced by 46 percent) over the past 20 years in Gilgit-Baltistan translated into 14,750 ha per year. Junipers have endured long periods of heavy human use, primarily for grazing of livestock and gathering.

5.4.2 Category B: Direct Killing of Snow Leopards

Poaching of snow leopard & other carnivores

Economic hardship is one of the root causes prompting herders to kill snow leopards to protect their livestock, and retribution killing of snow leopards in response is considered a high threat to the species (SLSS 2014). In addition, to compensate for livestock losses and supplement their incomes, herders in the region have also relied on poaching of snow leopard and wild prey to sell in the black market. International net trade in snow leopard between 1975 and 2000, as reported by CITES Parties, is 1042 items (skins 53, specimens 570, garments 3, trophies 3, bodies 9 and skeletons 2). Studies indicate that estimated 23-53 snow leopards are annually poached in Pakistan majority of them are killed in retaliation (Nowell et al., 2016). Our study reveals that 89 snow leopards were killed during the last 11 years in Pakistan (SLF, unpublished data), 74% of the poaching cases reported to occur in the Karakoram Pamir Landscape. The study also documents poaching of other large carnivores such as wolf, brown bear, lynx and black bear.

Major issues contributing to the prevailing situations of poaching and killing of snow leopards and other carnivores are linked to resource deficiencies drawbacks in the existing policies. The wildlife staffs and other stakeholders have limited capacity to monitor, investigate and prosecute poaching incidences. The landscape is connected to the neighboring countries and different administrative units of the country through various routes and passes from where trafficking of wildlife and their products occur. These routes and passes are currently not monitored with

vigilance due to lack of human and financial resources. The current laws and regulations dealing with the poachers are mostly outdated; the penalties are too low to curb the offense. In the far-flung areas of the landscape, one way of effectively controlling wildlife poaching and trade is to involve the local communities, for which mechanism is not in place.

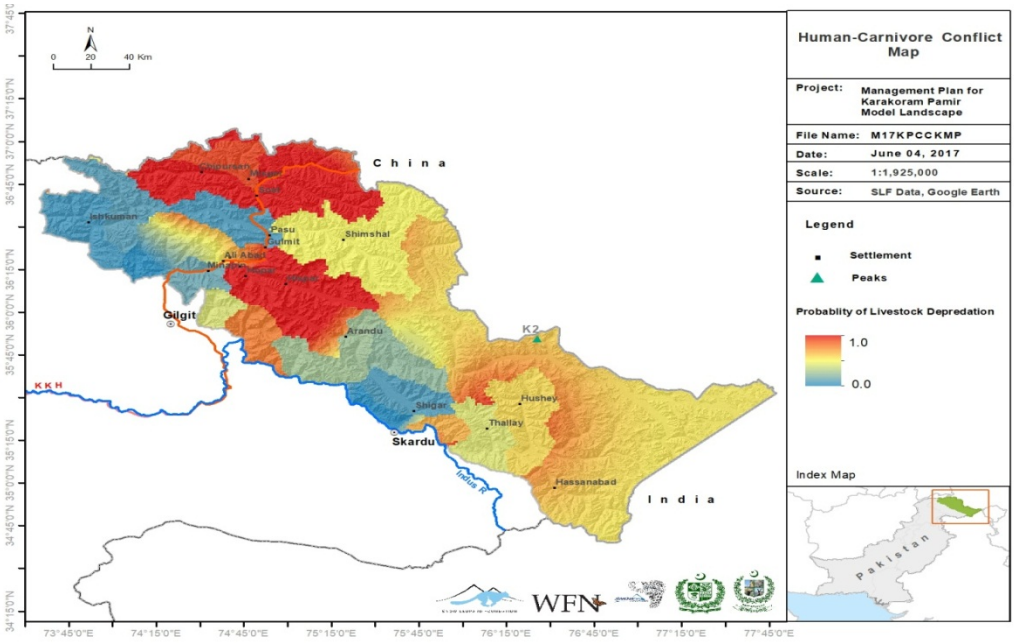
Human- Wildlife conflict:

Human-carnivore conflict in the Karakoram Pamir landscape is predominantly defined by carnivore predation on livestock of the pastoralist communities and killing them in retaliation. Ungulates rarely ride on the crops as they reside on the high rangelands away from the agricultural fields. In some areas where brown bears are near to the agricultural fields feed on maize and potato crops. Informants (n= 1191) from the landscape reported, on an average 4 animals per household per year were killed by large carnivores including snow leopard in Karakoram-Pamir. Figure 5-3 gives a map of Human-Carnivore Conflict in the landscape. The agro-pastoralist mountain communities depend on livestock rearing as a major source of livelihood and market/cull surplus animals for day-to-day monetary needs. While poverty has a direct connection to increased reliance on rangelands and overgrazing, it is also responsible for much of the illegal hunting and killing of wildlife in northern Pakistan. Degraded rangelands, reduced abundance of wild herbivores, and increased prevalence of domestic livestock culminate in increased conflict between local communities and predators. As report indicate that 60% of the snow leopards from the country, entering into illegal trade are basically killed in response to livestock predation (Nowell et al., 2016). It has been observed that killing of snow leopards and other carnivores in response to livestock predation can be minimized by managing the conflict. It's also important to note that the traditional system of livestock management is a major cause of livestock predation such as the lack of proper guarding and poorly build livestock pens. Table 5-1 Gives a summary of livestock predation across Karakoram Pamir Landscape

Table 5-1 Summary of Livestock Predation across Karakoram Pamir Landscape

Predation small ruminants (in 5 years period)	3.3	0.5-7.3
Predations large ruminants (in 5 years period)	0.4	0 - 1.9
Average predation for all livestock in 5 year period	3.7	
Average annual predation per household	0.7	
No of Valleys Surveyed: 20 **Number of Households Surveyed: 1136**		

Figure 5-3. Map of Human-Carnivore Conflict in Karakoram Pamir Landscape



5.4.3 Category C: Policy and Awareness Issues Affecting the Conservation of Snow Leopards, prey, and habitat

Lack of appropriate policy and awareness in the policy makers and communities

Stakeholders ranging from local communities to the concerned custodian departments are engaged in the management of natural resources. However, there have been major constrains in terms of financial and human resource capacity to create a sense of ownership among the concerned departments and communities therefore the awareness and education programs has remained restricted to a very limited area or operated only for a short span of time. Policies and legislation dealing with the natural resource management and wildlife conservation have been duplicated from other parts of the country or even from outside the country. This development without consulting the concerned communities and without keeping in view the socio-economic and ecological conditions of the area has led to certain issues including a lack of support from the local communities and other stakeholders which are ultimately affecting conservation of the wildlife.

Lack of institutional capacity and enforcement

There are gaps within the custodian departments and concerned organization for effective implementation of laws regarding wildlife, there is also lack of proper monitoring of the effectiveness of policies. A needed change in policy can only be realized after effective implementation and on ground monitoring. Capacity of the available human resource is very week, and not according to the current day needs. To be able to enforce the law the personnels should be well aware of the law. To prevent crime in wildlife they must have the ability to identify parts and bones of the species.

5.4.4 Category D: Emerging threats

Climate change

There are more than three thousand glaciers in the landscape covering a major part of the land. Warming trend in the mountainous regions of Karakorum Hindu Kush in Pakistan has been recorded faster than the lower elevations (Rasool e t al., 2006). This increase in temperature has resulted in melting of the glaciers causing retreat in more than 35 glaciers in the Karakorum Range and at least 11 of them are surging with a higher rate (Din et al., 2014). Glaciers retreat is common phenomenon in this era of global climate change and the global warming is causing thinning of the glaciers resulting in GLOF floods in Pakistan's northern parts (Hussain et al., 2015).

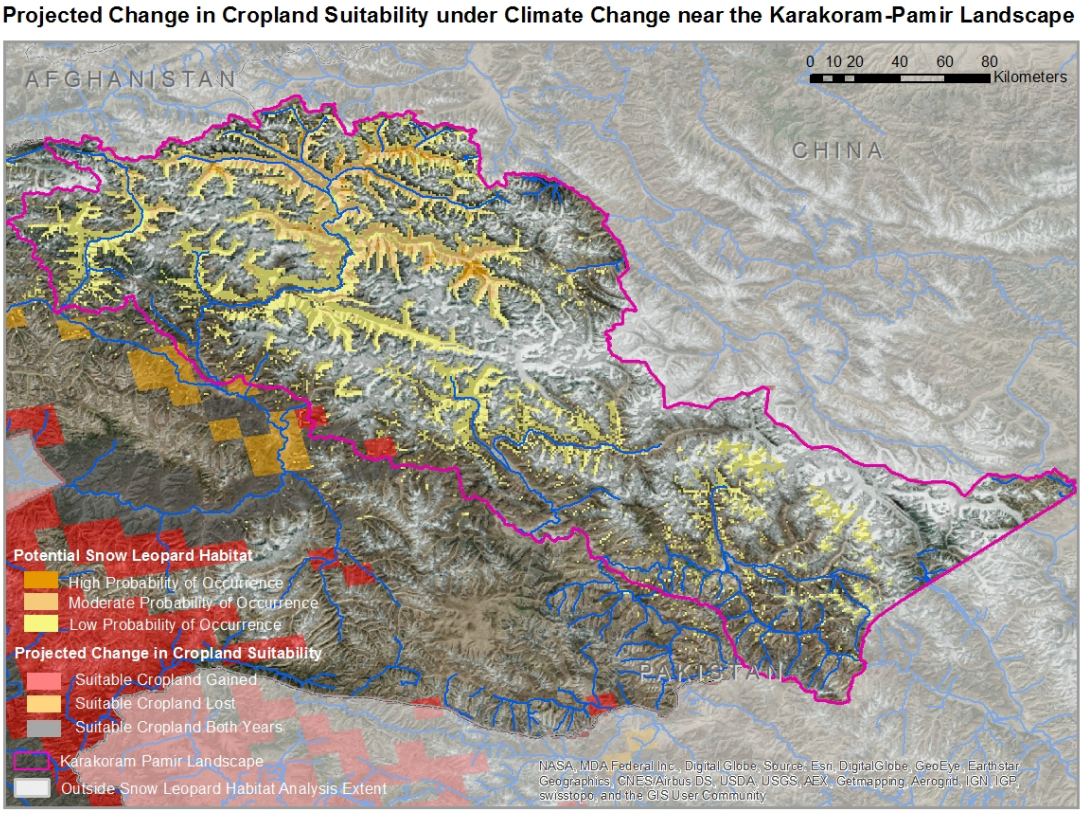
Due to Climate Change, the available arable land downstream of snow leopard habitat is likely to increase, resulting in a higher pressure on the water originating in the snow leopard habitat, particularly which can be an emerging threat and requires a need for snow-leopard friendly water management practices and planning. Fig 5-4 shows a projected change in cropland near Karakoram Pamir Landscape due to Climate Change. (Shoaib et al. 2017).Map taken from report (Landscape Mapping for Biodiversity Conservation, Water Resources Management, and Climate Adaptation at Six Sites in the Snow Leopard Range,2016)

Another Emerging Threat predicted due to climate change is a warmer and wetter climate, this can lead to treeline increasing in elevation. (Forrest et al. 2012 . Areas which may get effected y this increase in treeline are the ones in lowest elevation and at the south (Reference report) This may result in loss of some snow leopard habitat. This loss may effect in the landscape and lead to to bottlenecks if these habitats are not properly managed. (Shoaib et al. 2017).

Climate Change is likely to increase the temperature of Karakoram Pamir Landscape throughout the year. It may also moderately increase the winter precipitation and snow. (CCSR and WWF 2016. Climate Change projections state points toward the possibility that the landscape will experience a decrease of upto 1 to 3 months in frost. Figure 5-5 shows a decrease in monthly freeze extent. Map taken from Report (Landscape Mapping for Biodiversity Conservation, Water Resources Management, and Climate Adaptation at Six Sites in the Snow Leopard Range,2016)
The map The loss of frost months will occur in the spring and fall which could result in permafrost lossa nd a distuption in the life cycle events for the wildlife. This may also result in high risk of flooding in the area which can be a threat to the biodiversity. (Shoaib et al. 2017).

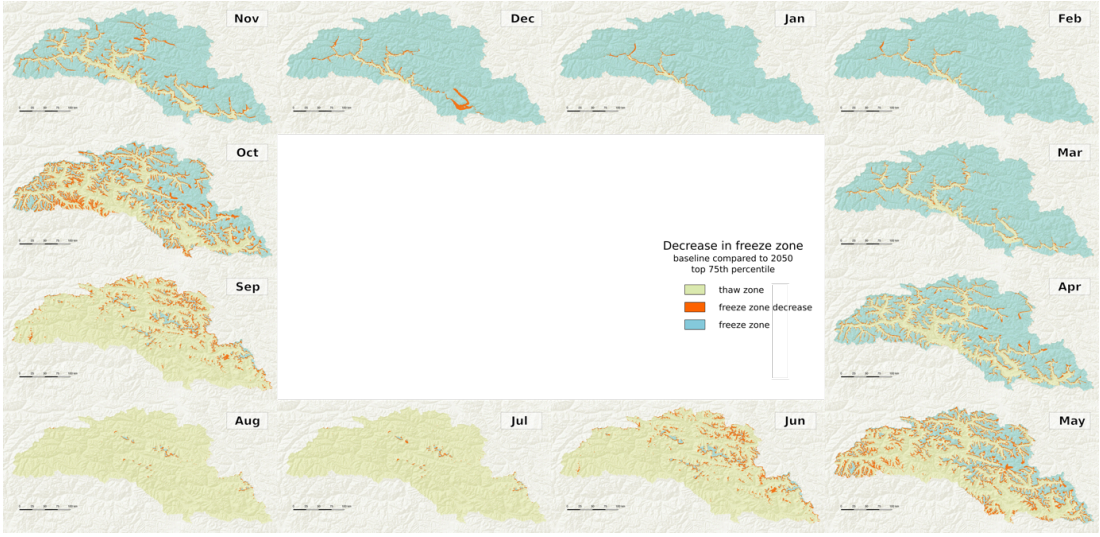
Impact of climate change on the fauna and flora are not well documented. Climate change could impact not only the ecological attributes of the landscape but the livelihood means and ways of the communities are also supposed to change. To adapt to the changing socio-ecological situations there should be a clear policy in hand. To deal with the negative consequences of climate change the people must be prepared with advanced training and strategies to scale up their livelihood activities with the changing circumstances.

Figure 5-4 Projected Change in Cropland Suitability under Climate Change



Projected change in climate suitability for agricultural crops under a high emissions (A2) scenario to the year 2100. *WWF & SLF 2017*

Figure 5-5 Decrease in monthly freeze extent under temperature rise



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Large scale developmental projects and mining and other resource extractions in the snow leopard habitat

Ongoing large scale development projects and those in the coming future will enhance the socio-economic conditions of the people in the landscape. At the same time it could greatly influence

the biological attributes of the landscape. One of the future development projects is the China Pakistan Economic Corridor (CPEC) which connects the two countries in this landscape. These initiatives can impact snow leopard and its habitat. Access of local people to resource extraction from the wild habitats and uncontrolled tourist activities are of significant disturbances particularly in the core wildlife areas. In some areas along the Sino-Pak border, the Karakoram Security Forces (KSF) have been deployed and stationed. In the Khunjerab National Park personnel of these paramilitary forces are reported to involve in firewood collection and poaching of wildlife inside the Park area. Such situations produce major negative impact on the landscape. Anthropogenic waste with an increasing trend, generated by the camping tourist in the wild habitats is one of the threats associated with human activities.

More than 30,000 people are associated with mining as an income source in various areas of the landscape although per capita income earned from mining need to be evaluated. The activity has great consequences for the wildlife and significant impact on the habitat. A significant number of mines are situated inside or in the buffer zone of CKNP. Although Park obligations only allow low impact blasts and cease mining activities during wildlife birth seasons, such rules are rarely considered by the miners. The park authorities deem EIA of the mining activities necessary to evaluate loss of fauna and flora of the area. Apart from the harm to wildlife and habitat, the untrained labour without modern equipment and selling the mine products in raw form are the major reasons hampering to obtain maximum benefit for the local people. Proper training of the workers, equipping them with modern tools and value addition to the gem and gemstones can enhance their income and help regulating the uncontrolled mining activities.

5.5 RANKING OF THREATS

The below given Table (5.1) shows ranking of different threats to the snow leopard and its prey species in the landscape. Ranking of threats to snow leopard and prey species has been carried out in light of the guidelines of GSLEP and Pakistan's NSLEP. Threats such as poaching and retaliatory killing are reflecting that particular threat only while some threats such as human disturbance include threats from mining, developmental activities, unregulated tourist camping and so on. Similarly, some threats are associated with particular season, for example those arising from tourism activities or mining and these activities are largely confined to summer season. Human disturbance is a cumulative of different threats still its impact is restricted temporally, therefore ranked a bit lower as compared to other threats.

Table 5-2 Ranking of threats for snow leopard and associated biodiversity in the landscape

Threat	Area	Intensity	Urgency	Total Ranking
Category 1: Habitat and Prey-Related				
Habitat degradation	4	4	3	11
Habitat fragmentation	3	4	3	10
Prey reduction due to illegal hunting	5	5	5	15
Prey reduction due to competition with livestock	4	5	4	13
Prey reduction due to legal hunting	2	1	0	3
Prey reduction due to disease	3	4	5	12
Fencing that disrupts movements/natural migration	1	1	1	3

Threat	Area	Intensity	Urgency	Total Ranking
Category 2: Direct Killing or Removal of Snow Leopard				
In retribution for livestock depredation	5	4	5	14
Poaching for trade in hides/bones	4	3	5	12
Zoo and museum collection of live animals	0	0	0	0
Traditional hunting of snow leopards	0	0	0	0
Secondary poisoning and trapping of snow leopards	1	2	3	6
Diseases of snow leopards	5	2	4	11
Potential threat from legal hunting of snow leopards	3	1	1	5
Category 3: Policy and Awareness Issues Affecting the Conservation of Snow Leopards, prey, and habitat				
Lack of appropriate policy	5	2	2	9
Lack of effective enforcement	5	4	4	13
Lack of trans-boundary cooperation	5	2	2	9
Lack of institutional capacity	5	4	4	13
Lack of awareness among local people	5	4	4	13
Lack of awareness among policymakers	5	3	3	11
Category 4: Other Issues				
War and related military activities	5	3	1	9
Human population growth (rapid)/poverty (indirect threat)	5	4	1	10
Feral dogs attacking snow leopards and prey	5	1	1	7
General poaching and wildlife trade by migrant workers	5	3	3	11
General poaching by military personnel	5	2	2	9
Emerging threats				
Climate change	5	3	3	11
Growing livestock populations and intensifying human-wildlife conflict	5	5	5	15
Large-scale development projects	4	3	3	10
Direct and indirect impacts due to mineral exploration and mining (local)	3	3	3	9
Impacts due to hydroelectric projects	3	3	3	9
Impacts due to roads or railroads	3	3	3	9
Disturbance related to Cordyceps collection	0	0	0	0
Other: (write below and add rank values)				

5.6 A BRIEF SYNTHESIS OF THE ISSUES

People and their livelihood activities have varying impact on the landscape with respect to habitat and wildlife species. In some areas livelihood options have diversified resulting in reduced dependence on the natural resources. Over the years, network of developmental infrastructure

has evolved bringing the products of the mountain communities with a faster speed but at the same time, disturbance for the wildlife and fragmentation of their habitats has also emerged. The communities have adopted modernized agricultural practices with better processing and marketing capacity. Extraction of NTFPs has also increased to enhance their financial conditions. An overall scenario is, human population has increased and likely the number of their livestock. When studied at micro level, in some areas livestock number have decreased given the availability of alternative livelihood sources and job opportunities, in other areas the people have increased their livestock numbers by evolving new strategies and systems to rear them. Thus the overall extraction of resources from the landscape has increased.

Previously, obtaining a mouthful meat was the only purpose of hunting, but now people have been introduced to the market value of horn and pelt of the wildlife species. Thus the drivers of poaching have increased as compared to the past.

Over the years, new lands has been brought under agriculture, number of livestock have increased pushing the wildlife to unfavorable and marginal areas. This has led to the increased human wildlife conflict across the landscape. To spend their leisure moments, tendency of camping in the wild has increased among the local people, particularly youth. Although they are owner of the resources lack of awareness and environmental responsibility they are impacting the environment most negatively among the national tourists. The landscape is a large area, however the concerned wildlife department has limited capacity and human and financial resources to look after the resources.

Policy makers should keep in view the unique features and ecological conditions in these mountain ranges with updated knowledge from the area. Besides general education and trainings, Personnels of the line departments in the landscape should be equipped with skill and knowledge specific to the area.

Current and future development activities in the landscape should be initiated keeping in view the fragile ecosystem and associated biodiversity. Environmental impact assessment of the developmental projects should be carried out and the recommendation given thereafter should be strictly considered to minimize the hazardous effect on the ecosystem.

SNOW LEOPARD FOUNDATION

PART ONE
THE KARAKORAM–PAMIR LANDSCAPE (KPL) : EXISTING SITUATION

6. OBLIGATIONS FOR KARAKORAM-PAMIR LANDSCAPE MANAGEMENT

Management of natural resources is a socio-ecological process involving diverse stakeholders ranging from governmental organization to local communities. Existence of laws and regulations is necessary to manage the issues of management and conflicting interests. Before the inception of Pakistan, wildlife protection was mainly focused on protecting the game species in hunting areas and game reserves under the customary laws of the local rulers in the landscape. Development and management of National Parks started in the area in late sixties. In 1970, The Wildlife Inquiry Committee suggested creating a network of National Parks and sanctuaries to conserve the fauna and flora of the country. After 1950 different regulations and policies gradually extended to all parts of Pakistan with the first being the Wildlife Protection Ordinance 1959. In the past 70 years Pakistan became signatory to different international treaties and organizations and committed to implement the concerned laws in its territory. The Karakoram Pamir Landscape Management Plan will be implemented in the light of the following policies and obligations.

6.1 EXISTING PROTECTED AREAS

The following protected area types exist in the landscape:

National Park
Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities. (IUCN)

Wildlife Sanctuary
Naturally occurring geographic territory set aside as breeding ground for wildlife. Inside the wildlife sanctuary fauna and flora are protected from hunting, predation, competition and any other influence. No developmental, educational and recreational activities are allowed in a sanctuary.

Game Reserves
Game reserve is an area set aside for protection and conservation of game species. Hunting and shooting of game species is not allowed except issuance of legal permit from the concerned authorities. The revenue generated from game hunting is collected by the concerned department and used for conservation purposes.

Community Managed Conservation Areas
Geographic territory set aside to manage and sustainable harvest of wild animals and plants by the concerned communities. These areas offer promotion of conservation and sustainable use of the natural resources by the communities. Hunting and shooting is exercised with the permission from concerned authorities and the revenue is distributed in 80% & 20% ratios between the communities and government.

6.2 POLICY OBLIGATIONS

6.2.1 Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES)

Pakistan became party to the CITES in 1976 and bond to follow the obligations as devised by CITES. CITES Scientific and Management Authority in Pakistan is National Council for Conservation of Wildlife (NCCW). NCCW is an attached department of the Ministry of Environment, which performs various functions. It formulates appropriate policy for conservation of wildlife in coordination with the provincial wildlife departments to implement these policies. It also cooperates with international agencies regarding wildlife conservation and implementation of conventions (CITES, CMC and Ramsar Convention) in the country. The following departments and institutions are collaborating with the NCCW for implementation of CITES in Pakistan:

1. Provincial /Territorial Wildlife Departments
2. Provincial/Territorial Forest Departments
3. Pakistan Customs
4. Pakistan Museum of Natural History (PMNH)
5. Zoological Survey Department (ZSD)
6. Pakistan Forest Institute (PFI)
7. National Herbarium
8. WWF Pakistan
9. IUCN Pakistan

In consultation with the provincial authorities and other stakeholders the NCCW developed a law entitled “Pakistan Trade Control of Wild Fauna and Flora Act” which has been passed by the National Assembly of Pakistan on 29th December 2010. It is an exclusive law at Federal level, for effective implementation of CITES provisions. It has also bridged previously existing legal gaps in implementation of the convention.

6.2.2 Convention on Biological Diversity (CBD) & National Biodiversity Action Plan 2015

Pakistan signed the CBD in 1992 at the Earth Summit in Rio de Janerio, and subsequently started implementing various articles of the convention. In the following year Pakistan developed National Conservation Strategy, 1993; a strategic biodiversity plan and submitting reports on the national biodiversity to the CBD. Up till now, Pakistan has submitted five reports to the CBD and the fifth report was submitted in 2014. With the submission of the report Pakistan developed a National Biodiversity Action Plan.

In line with the National Biodiversity Action Plan, a regional plan “Gilgit Baltistan Biodiversity Action Plan" has been devised in the same year. The plan has strategized for various targets and actions by 2020 to achieve the goals of NBAP and Aichi Biodiversity Targets. These set targets focus on targets such as awareness of biodiversity values, half the rate of loss of biodiversity and degradation of habitats and at least 10 to 17 percent of ecologically representative of all major habitat types be secured by establishing well connected and well managed protected areas. Moreover, effective mobilizations of existing and additional financial resources to implement the strategic biodiversity plan are among the set targets. It’s obvious that many of the targets of national and regional biodiversity action plan will be achieved through this landscape management plan.

6.2.3 National Forest Policy 2015

The national forest policy is new version of the series of policies right from the forest policy of 1962. In broader sense it aims for expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving livelihoods and human health in line with the national priorities and international agreements. Very few areas in the landscape have such forest resources as mentioned in the policy. The majority of high altitude species such as juniper and birch are kept out from the prime focus. The Karakoram Pamir Landscape management plan will focus on juniper and birch species in addition to other forests types with research and management. This will not only benefit the local communities and forest resource but also help to sustain and maintain such high altitude forest types elsewhere in the country.

6.2.4 National Climate Change Policy 2012

The landscape can be truly called water tower of Pakistan, where more than 1000 large and small glaciers are a source to fresh water in the country. These glaciers are the most affected parts of the country from climate change. Therefore, the national climate change policy 2012 especially focuses on these fragile mountain ecosystems to mainstream with the climate change scenario. Pakistan is prone to high vulnerability of climate change. The current decade has witnessed a greater impact of climate change in the form of flash floods, in the northern parts of the country in particular. Awareness raising, research, adaptation to climate change and management of various resources such as forests, livestock, water, agriculture and biodiversity in the landscape would be carried out in as per policy recommendation NCCP.

6.2.5 National Rangeland Policy 2010

More than 50% of the landscape comprised of rangelands supporting both domestic livestock and wild ungulates besides the many other products. As assessment deemed a degrading status of the rangelands with low productivity (Khan et al., 2013). After a baseline study of the rangelands, the ministry of environment drafted a National Rangeland Policy in 2010. The policy focuses on rehabilitation of the rangelands close to their potential productivity and sustainable management. It also guides to institutionalize range management employing rangeland experts and professionals under a chief conservator rangelands in each province. The policy asserts to develop provincial level rangeland policies in line with the National Policy. Unfortunately, after seven years of the National policy recommendation no step has been taken by the provinces. Similarly, there have been no laws and regulation to ensure sustainable range management therefore the policy recommends formulating rangeland act at all provincial level to operationalise the policies.

6.3 STATUTORY REQUIREMENTS

6.3.1 Wildlife Regulations of Gilgit Baltistan

The Wildlife Protection Ordinance 1959 and Wildlife Protection Rules 1960 were aimed at controlling hunting of some species, declare others as game species to be hunted under license and made provision for declaring game reserves and wildlife sanctuaries to improve quality of habitat and population of wildlife. In the 1970s, other laws and regulation evolved for wildlife protection and management in different provinces and the federally administered northern areas. After the evolution of Northern Areas as Province of Gilgit Baltistan in 2009, the same act was adopted for the conservation and protection of wildlife. Wildlife management and conservation in the landscape is regulated under the Northern Areas Wildlife Preservation Act, 1975. There

were many loopholes and gaps in the law. To overcome the challenges emerged during the past several years the Gilgit Baltistan Provincial Assembly has passed an amended version of the regulations as Gilgit Baltistan Wildlife Regulations 2017.The said law, will cover the limitations, loopholes existing in the previous rules. Management and conservation practices in the Karakoram Pamir Landscape will be carried out guided and governed by the said rules and regulations. Implementation of the rule and enforcing the current law in management of the landscape will also project limitation(s) present, conflicting situation(s) left unresolved, if any, in the law thus providing opportunity to its revival and smooth implementation.

6.3.2 Obligations under GSLEP and NSLEP

The Global Snow Leopard Ecosystem Protection Plan resulted from the Bishkek Declaration (2013) signed by governments of the snow leopard range countries. The snow leopard range countries under the GSLEP initiated its program in June 2014 by setting a goal of identifying and securing 20 snow leopard landscape by 2020. Each landscape will provide sufficient area to support population of 100 breeding snow leopards. These landscapes include not only the protected areas but multiple use zones outside the protected areas. Pakistan, contributing the common global goal developed a framework document to implement the goal entitled with Pakistan National Snow Leopard Ecosystem Protection (NSLEP). Pakistan identified three landscapes in the snow leopard range in Pakistan. Karakoram-Pamir landscape is the largest among them. Important wildlife habitats will be protected as core zones where ecologically degrading and damaging land uses will be with minimized. Other areas will be set aside as multiple use areas where sustainable land uses will allow economic growth of the communities with conserving ecosystem services.

The core wildlife areas in the landscape shall be managed and conserved by implementing the laws of wildlife protection and forestry management treating them as wildlife sanctuaries and National Parks in the province. The multiple use areas bearing communal rights, ecosystem services and biodiversity shall be managed under the law as that governing community managed conservation areas, game reserves etc. Any further need of amending, changing, updating of the existing laws will be identified and implemented to manage the landscape in the best possible way after consultations with the concerned stakeholders.

7. MANAGEMENT VISION AND OBJECTIVES FOR THE KARAKORAM-PAMIR LANDSCAPE

A Vision Statement defines the anticipated and superlative long-term state of conservation in the landscape. The Karakorum-Pamir Landscape is one of the three landscapes identified in the snow leopard range in Pakistan, as part of securing the vision of Global Snow Leopard Ecosystem Protection Program (GSLEP). The snow leopard is the conservation flagship for this landscape. The GSLEP philosophy is to secure a landscape based on sound scientific information and monitoring and truly participatory conservation management. All these attributes are reflected in the vision statement for the Karakoram-Pamir Landscape:

"We envision the Karakoram-Pamir Landscape supporting a large, secure, breeding population of snow leopards, other carnivores and abundant, functionally viable populations of wild ungulate prey. We envision a climate resilient, sustainable and co-managed landscape delivering ecological and economic services, equitably benefiting nature, culture and people. Finally, we envision the Karakoram-Pamir Landscape to become a globally outstanding example of endangered species conservation through good scientific research, research-based adaptive management, and strong community-involvement."

The following goals and objectives have been set out to accomplish the above vision. A goal describes the desired result required to achieve the vision, while objectives describe, how each goal can be accomplished.

7.1 GOALS AND OBJECTIVES

Goal 1
Establish a network of Core Landscape Units that are socio-ecologically important and acceptable and are innocuous from anthropogenic disturbance.

Context
This Management Plan addresses conservation and management of wildlife in the entire Karakoram-Pamir Landscape that comprises variety of land tenure systems. The wildlife and other biodiversity values of the landscape are widely acknowledged but facing ubiquitous anthropogenic pressure. Here, we suggest identification of patches having comparatively higher wildlife values to prioritize effective and focused conservation measures. This goal aims to identify such areas and ensure their management by promoting public-private partnership. The Core Landscape Units for prioritized conservation have been identified in the Management Plan based on values to the snow leopard, other sympatric carnivores and their prey species.

Objectives:
1.1. To identify Core Landscape Units in the entire Karakoram-Pamir Landscape including within and outside the National Parks based on their wildlife values and socioeconomic feasibility.

1.2. To establish baselines for wildlife populations in the Karakoram-Pamir Landscape, especially in the Core Landscape Units using robust scientific methods.

1.3. To take up with local people and other stakeholders for designation of socially fenced Core Landscape Units.

Goal 2
Gain the support of local communities, other stakeholders, NGOs and scientific organizations to address the threats to snow leopard and other wildlife in the Karakoram-Pamir Landscape.

Context
The Karakoram-Pamir Landscape supports rich wildlife populations. However, many wildlife species are subjected to both existing and emerging threats. These threats are mostly human induced and economically fueled and require multi-pronged tackling strategy. Understanding the magnitude, causes, and spatial and temporal spread of the threats will provide base for the development of the strategy. Furthermore, threats are envisaged to be changing both in terms of their importance and intensity with the passage of time.

Objectives
2.1. To understand major threats to wildlife and their habitat, based on scientific insight and local knowledge in the Karakoram-Pamir Landscape.

2.2. To undertake measures to mitigate human induced threats in the area using participatory approaches.

2.3. To develop targeted conservation awareness programs for local people, visitors and tourists, government and non-governmental agencies.

2.4. To establish measures to stop and reverse habitat degradation, especially of the rangelands.

2.5. To understand climate change in the context of Karakoram-Pamir and its impacts on local resources for both, people and wildlife.

Goal 3
Develop mechanisms for collaborative conservation efforts in the landscape involving local communities and all other appropriate stakeholders

Context
The Parks and Wildlife Department is the primary stakeholder for the conservation of wildlife in the landscape. However, in recent times local communities, NGOs and even other departments are taking interest in conservation activities. The Management Plan establishes that especially in the landscape context, where myriad of land tenure system in place, facilitating convergence in a manner that all groups are able to participate in and contribute to conservation is prerequisite.

Objectives
3.1. To construct operational mechanisms to ensure community participation in conservation planning and implementation. For instance, at the village or valley levels, Village/Valley Conservation Committees (VCCs) to be developed and endorsed by the Parks and Wildlife Department in appropriate landscape units.

3.2. To develop mechanisms for convergence to minimize conflicts between conservation and development in activities with other Government departments and NGOs working for development. For example, the Landscape Management Committee (LMC) established at landscape level will serve this purpose and aid in providing a forum for facilitating convergence and avoiding conflict with conservation interests.

3.3. To build capacity of local staff and officers of the Parks & Wildlife and Forest Department and other concerned departments in collaborative and participatory functioning.

3.4. To conduct tailor-made capacity enhancement of VCCs in collaborative planning and implementation of conservation projects

3.5. To undertake Wildlife and Forest Department staff welfare activities to improve the capacity and morale of the frontline wildlife staff with incentives and better equipment.

7.1.1 Activities to meet the objectives:

The Karakoram-Pamir Landscape Management Plan is meant to provide platform and take all potential stakeholders onboard to secure the goal of conservation and management of wildlife of the landscape while providing avenue for the socioeconomic uplift of the mountain communities through integration of conservation and development. Deliverables to achieve this goal will vary and range from addressing micro needs of the villages to cross cutting across the landscape. The Parks and Wildlife Department will facilitate the participation of all stakeholders in the efforts. The activities can broadly be grouped as follows.

1. At landscape level, the activities will focus on capacity building, inculcation of sense of stewardship for snow leopard and other wildlife, and monitoring and protection of wildlife populations at larger scale. While, efforts focusing on the landscape units i.e. core and multiple use areas will be led by the local communities and constitute localized actions based on micro planning. The village or valley conservation committees joined by other stakeholders such as NGOs, Wildlife and Forest Departments will develop mechanism for the designation and management of Core Landscape Units. Other activities at this level may include habitat improvement initiatives, human-carnivore conflict resolution through improved and improvised herding practices and insurance programs and other livelihood improvement incentives.
2. Activities to engage stakeholders other than Forest and Wildlife Departments and conservation NGOs in conservation of wildlife and associated mountain ecosystems. This convergence will give recognition to other agencies (both Government and Non-Government) role in conserving the environment and help better utilization of resources, and will include works relating to alternate sources of energy, education, agriculture and alternate employment.
3. The role elites i.e. Nambardar and religious leaders in crucial in promoting stewardship for snow leopard and other wildlife in the landscape. Islam is the religion of peace and encourages nature friendly attitudes. Numerous verses of the Holy Quran and sayings of the Prophet Muhammad (Peace be Upon him) readily support nature conservation.
4. Science based research activities to enhance our understanding of snow leopard and other wildlife, their habitat and interaction with humans' institute backbone of the Management Plan. Such research needs to be led by specialized national and state level research agencies.
5. Some of the livelihood linked interventions such as tourism, livestock grazing, mining, and agricultural activities could have negative impact on the overall environment. There may thus be a continuing need to take up activities by civil society organizations as also Government Organizations to work out policy or discussion documents for wider consensus and directions.

The type of activities specifically grouped according to the nature of work includes:

Research

Information, whether through scientific studies, action research, local knowledge, and meta-analysis, forms the foundation of the Management Plan and its implementation.

Capacity building

Equipping communities and other stakeholders with skills and attitudes required for the informed management of the landscape resources is highly suggestive for the success and sustainability of the management prescriptions. Achieving this will require conducting continued training in aspects such as participatory planning and action, dealing with offenses against wildlife, and wildlife monitoring.

Awareness and advocacy

Awareness raising and advocacy programs across the board is important for a better understanding and appreciation of the environment. Awareness interventions are likely to be important for almost all sectors at some stage or the other, whether it is conflict resolution, enforcement or dealing with offenders. The role of the religion and religious leaders and academia working closely with local education institutions and other platforms is emphasized.

Enforcement

The Parks & Wildlife and Forest Departments required detecting and dealing with offenses against wildlife to curb all illegal activities in the landscape. This will often include partnership with other law enforcing agencies and local communities in surveillance, intelligence and spreading awareness.

Reduce dependence on natural resources

These activities form an important part of the Plan as they will target improved livelihoods through conservation-friendly approaches and incentive programs, and will help in reduction of pressures on local resources. Most of this work will be carried out through the micro-plans, but some of it may be done directly by independent agencies.

Staff Strengthening

Achieving the conservation goals requires motivated and skilled staff. Strengthening of the Wildlife and Forest Department's staff needs good infrastructure and equipment and facilities to support research and training.

The Chapters ahead deal with the three goals, their objectives and activities in greater detail.

8. IDENTIFYING SOCIO - ECOLOGICALLY IMPORTANT AND SUITABLE LANDSCAPE UNITS IN THE KARAKORAM PAMIR LANDSCAPE

8.1 CONTEXT AND OBJECTIVES

This management plan is meant to ensure conservation management in the entire landscape of the Karakoram-Pamir. The landscape has complex land use system ranging from communal lands to the state owned with varied management paradigms in place for each landscape category. The biodiversity value of the landscape is unparalleled as the entire landscape harbors some of the threatened wildlife species such as snow leopard but the human dependence on natural resources is also ubiquitous which makes conversation a challenge. The Pakistan's NSLEP urges on identification of areas with relatively higher wildlife values in the landscape as conservation hotspots to safeguard critical wildlife species and their habitat through a myriad of conservation management prescriptions. Achieving this target requires identification of such areas in the Karakoram-Pamir Landscape that have relatively higher values for wildlife and then work with relevant stakeholders for its implementation.

The Karakoram-Pamir Snow Leopard Landscape has an estimated 7,400 km^2 of habitat that appears to be suitable to support snow leopards making it a valuable area with remarkable potential for Snow leopard. . This habitat consists of eight habitat blocks each greater than 100 km^2 (Hameed, Forrest, Sindorf, Nawaz, & Nawaz, 2017)

The Karakoram Pamir Landscape Management Plan is a strategic document which focuses on identifying different zones in the area and explains the overall approach on how to manage these zones. This plan will explore the detailed planning for these Zones. This will allow for a better scale zonation and a comprehensive management prescription.

This management plan first demarcates the major zones i.e. Core Zones (Priority Wildlife Area) and Multiple Use Areas in the landscape and then identifies three Core Zone Units based on the socio-ecological information. This landscape encompasses admix of protected and unprotected areas. The existing protected area coverage in the landscape is 25,212 km^2 which is 66% of the total landscape area and range from National parks to Wildlife Sanctuaries, Game Reserves and Community Managed Conservation Areas (CMCAs). Each of these protected area (PA) categories have different protection status and management systems. Furthermore, the boundaries of the existing PAs have been demarcated administratively rather on ecological grounds and some of the PAs such as the CMCAs have been notified to safeguard specific species of economic importance like wild ungulates. Conservation initiatives in the CMCAs have helped enhance the population status of the wild ungulates and the sustainable harvesting of these species are yielding much needed revenues for the custodian communities. However, at the same time, the

number of livestock is also increasing which has not only caused degradation of the rangelands but has also induced livestock depredation by large carnivores such as snow leopard and wolf.

Under the circumstances, a systematic characterization of the landscape, based on its potentials and threats, is required in order to effectively manage natural resources of the landscape. The zoning of the landscape is hence exercised to achieve:

1. Demarcation of priority wildlife areas (Core Zones) and Multiple Use Landscape Units in the entire Karakoram-Pamir Landscape based on their wildlife values and socioeconomic feasibility.
2. To establish baselines for key flora and fauna in the Karakoram-Pamir Landscape, especially in the Core Landscape Units, using cross cutting and robust scientific methods.
3. To ensure social fencing of the Core Landscape Units engaging local communities and government and nongovernment organizations.

8.2 APPROACHE TOWARDS CHARCTERIZING THE KARAKORAM-PAMIR LANDSCAPE

Having considered the complexity of the land tenure system and dependency of the communities on natural resources coupled with an array of protected areas and their management regime within the landscape, and divergent habitat suitability pattern within the landscape, the following strategy was adopted to identify Core and Multiple Landscape Units for management.

Step 1: Collection of Socio-Ecological data

Ecological studies using camera traps (20 sites; 774 trap station and 20,000 trap days), sign based site occupancy surveys (167 sites resulting in 1507 repeated surveys and detection of snow leopard signs), non-invasive genetic sampling (1000 samples of carnivores), human-carnivore conflict surveys (reaching >3000 informants) were conducted in the landscape from 2008 to 2017. The demographic attributes and major land uses in the landscape were also enlisted and marked. The human-footprint mapped revealed the high anthropogenic effects and activities mostly restricted to valley bottoms and rangelands for most part of the year (See Chapter 3 for details).

Step 2: Developing Habitat Suitability and Human Impact Maps

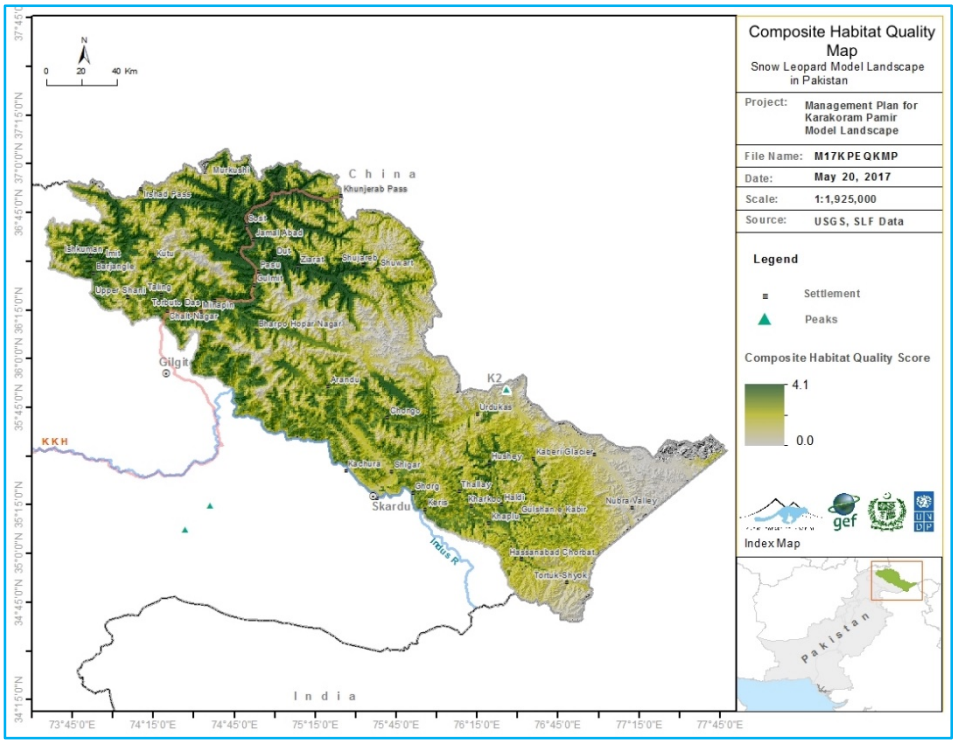
The ecological information collected on species such as snow leopard, wolf, brown bear, markhor, ibex, blue sheep and musk deer were translated into Habitat Suitability Maps using maximum entropy (MAXENT) modeling and the availability of suitable corridors between habitats using the function Circuit Scape in ArcGIS which provided base for the identification of potential hotspots for snow leopard and other species (See Chapter 2 for details).

Similarly, human foot print was mapped to demarcate extend and intensity of human activities in the landscape (See Chapter 3 for details). Human impact in the landscape was considered as one of the major attribute for landscape zonation.

Step 3: Developing Composite Habitat Quality Map

The habitat suitability index of snow leopard and other key species including brown bear, wolf, ibex, blue sheep, markhor and musk deer were overlaid to develop composite habitat suitability map to have overall picture of the biodiversity hotspots in the landscape (Figure 8-1).

Figure 8-1 Composite habitat quality map of key species in the Landscape



Step 4: Develop Ecosystem Quality map

The Human Impact index developed in step two and Composite Habitat Quality index produced in step 3 were overlaid to produce Ecosystem Quality map (Fig 8.2). The Ecosystem Quality map thus produced provided base for the identification of conservation hotspots and zonation of the landscape. Areas having good habitat with minimum human impact were considered candidate sites to be delineated as core zone (Fig. 8.3).

Figure 8-2 Ecosystem Quality map developed by overlaying composite Habitat Quality index and Human Impact in the Landscape

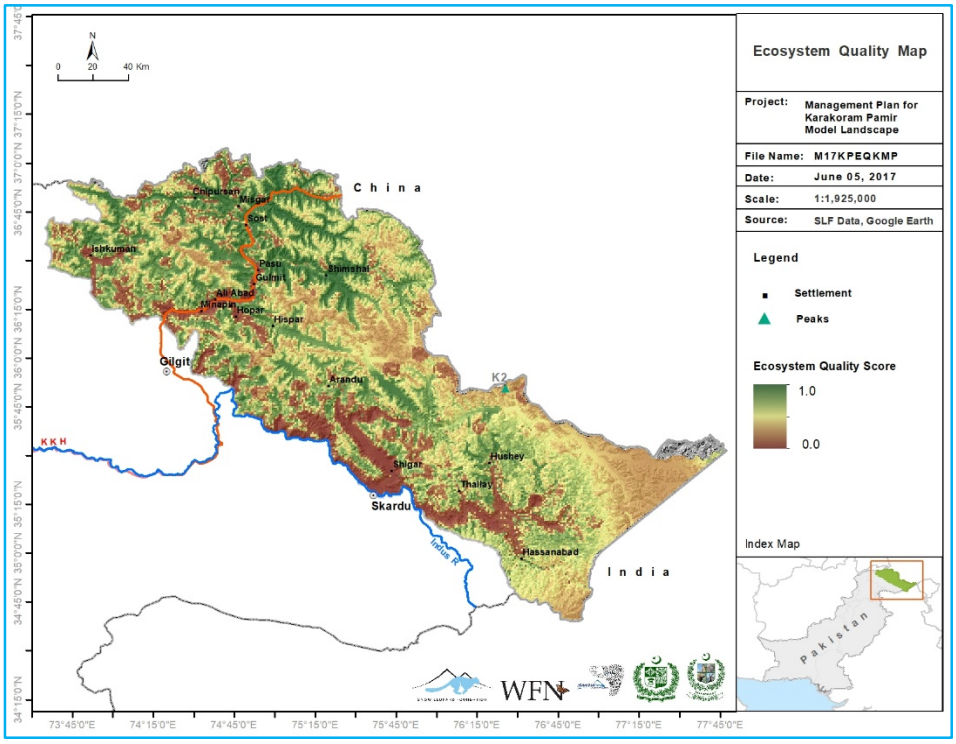
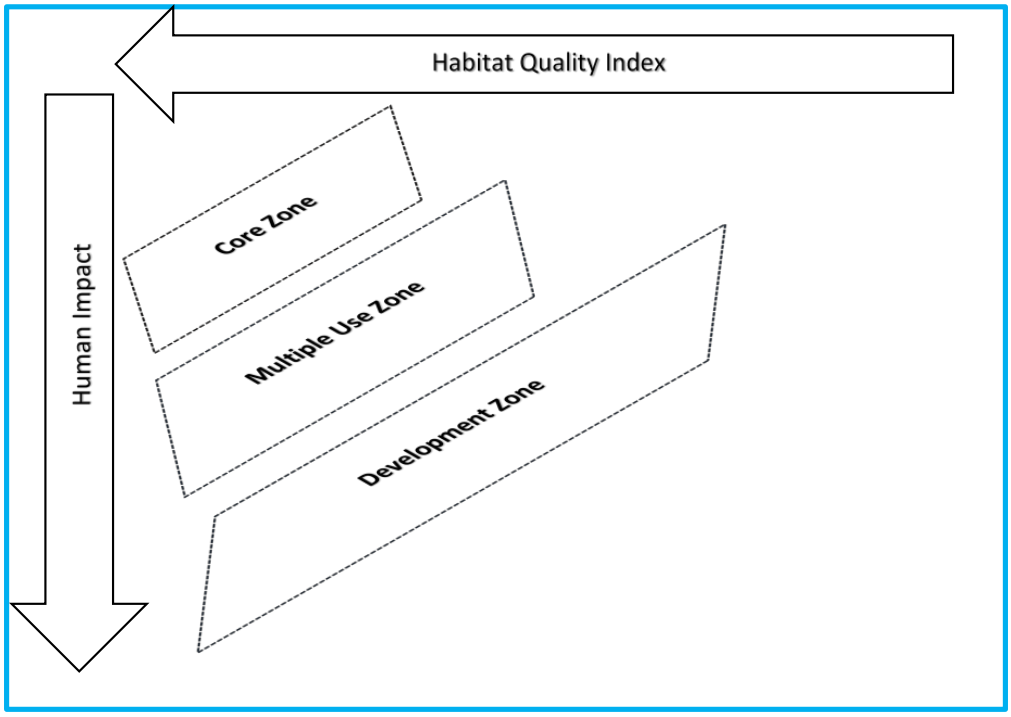


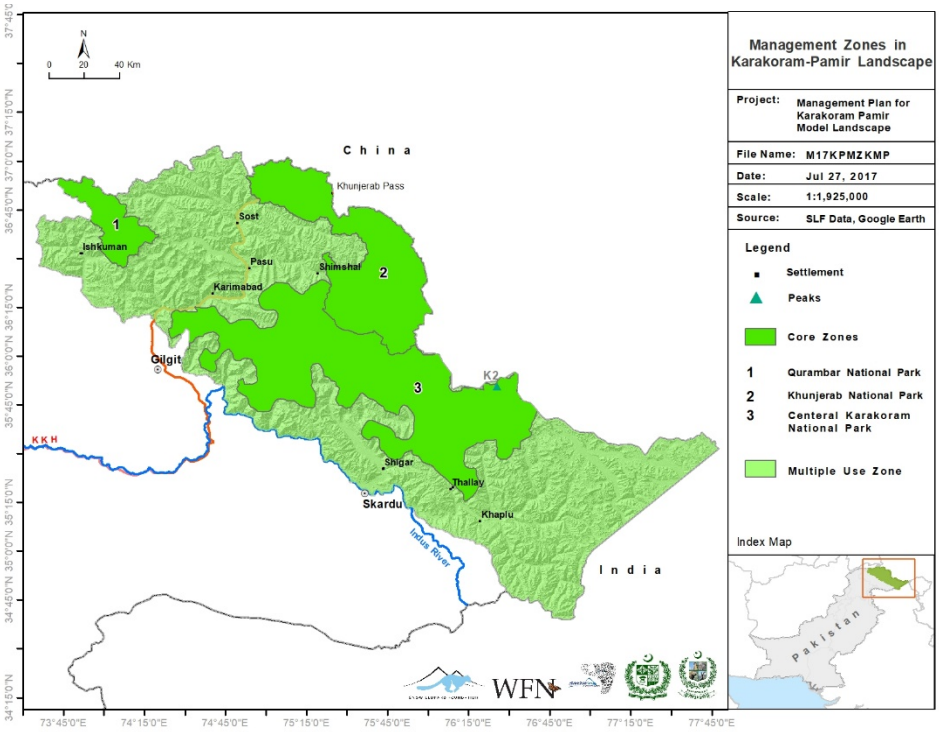
Figure 8-3 Management zoning based on Habitat Quality Index and Human Impact in the Landscape



Step 5: Classification of Management Zones

The management zones were delineated by incorporating human-carnivore conflict data collected from the entire landscape and boundaries of the existing protected areas in the landscape (Fig. 8-4).

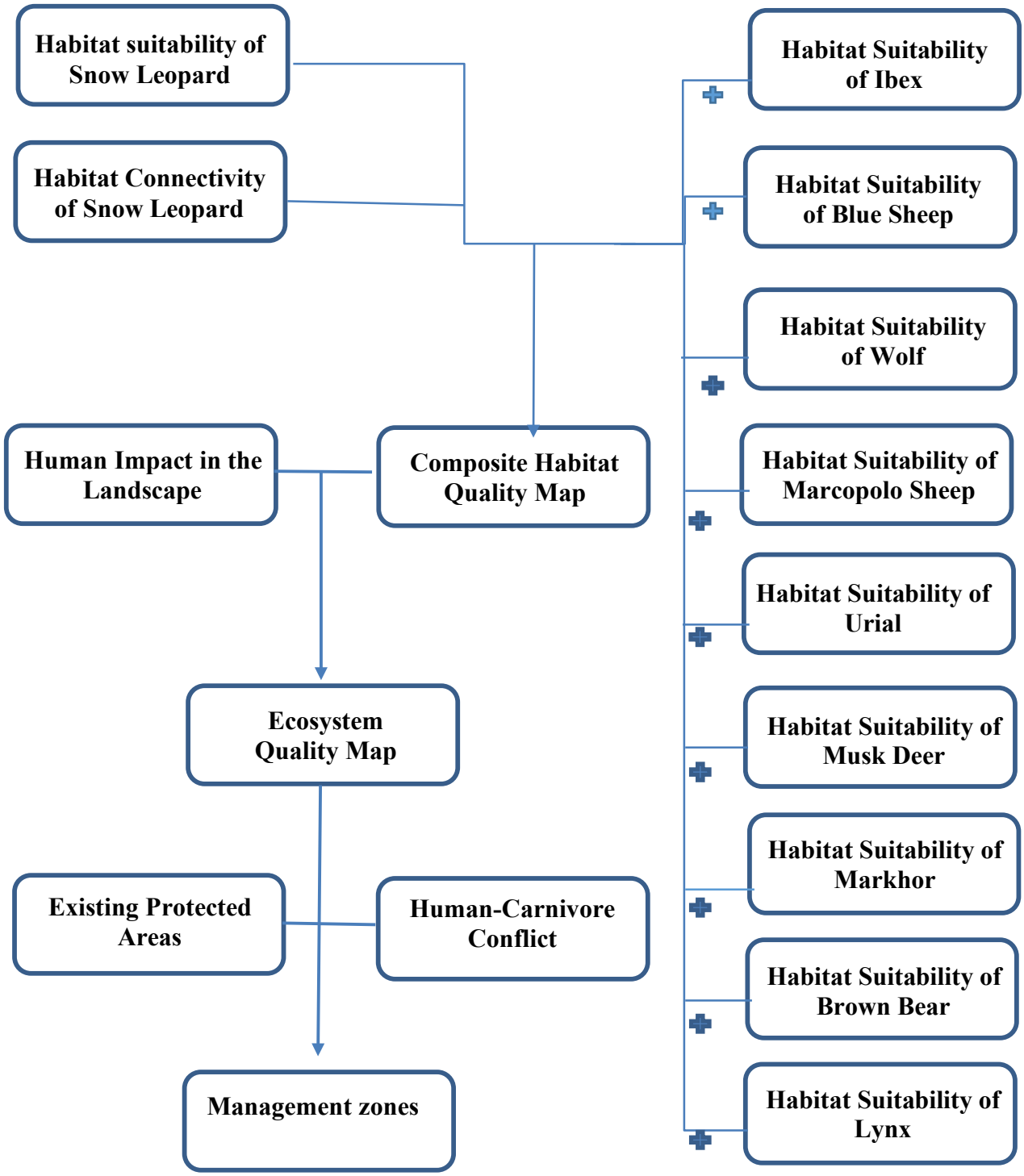
Figure 8-4 Management Zoning (Core Zones) of the Landscape



This whole exercise led to the identification and demarcation of the Priority Wildlife Areas (Core Units) and Multiple Use Areas in the Landscape (Fig. 8.4). Firstly, the Landscape was divided into Core and Multiple use units and then the Core Units were demarcated having considered on the existing Protected Areas boundaries and management system.

The Core Zone fall in areas having best quality habitats and minimum human impacts. While, in the Multiple Use Areas the human impact is high even though they encompass some of the good quality habitats fall in this zone resulting higher human-wildlife conflict. Furthermore, we are merging the pure development zones (valleys) in the multiple use areas (rangelands) as this plan depicts the holistic picture of the land management system in the landscape. These can be synthesized while developing of the valley management plans which is one of the outcomes of this landscape management plan. Schematic representation of the management zoning procedure adopted is given in Figure 8-5.

Figure 8-5 Schematic representation of the management zoning procedure



8.3 PRIORITY WILDLIFE AREAS (CORE ZONES) IN THE LANDSCAPE

Three major Core Zones are delineated in the Karakoram-Pamir Landscape. The Core Zone 1 fall in the Qurumbar National Park (QNP), while the Core Zones 2 and 3 fall in Khunjerab National Park (KNP) and Central Karakoram National Park (CKNP), respectively. The three Core Zones together constitute 38% of the overall Karakoram-Pamir Landscape. The Core Zone 1 (QNP) spread across 1,082km², while 2 (KNP) and 3 (CKNP) cover 4,439 km² and 8,926 km² respectively (Table 8.1).

All the three Core Zones have almost similarly been demarcated as Priority Wildlife Areas in the respective management plans of the three National Parks. However, the previous delineation was mostly based on administrative attributes, while the procedure we adopted here is follows the socio-ecological parameters of the landscape.

8.4 ATTRIBUTES OF THE PRIORITY WILDLIFE AREAS

8.4.1 Topography and Vegetation

The Core Landscape Units are spread across all topographic types of the landscape, but majority (70%) of the area fall in the upper slopes, that are relatively disturbance free. (Table 8.1). Majority of the area is thus rugged, and as a result rocky areas dominate. Rest is covered with rangeland herbs and shrubs.

Table 8-1 Area and Land Cover Classification of the Core Zones of the Landscape

Attributes	Qurumbar National Park	Khunjerab National Park	Central Karakoram National Park	Total
Area (sq.km)	1082	4439	8926	14447
Land Use				
Bare Areas	46	27	166	239
Conifer Forest	0	0	21	21
Cultivated Land	7	0	8	15
Lakes	3	0	0	3
Mix Forest	0	0	0	0
Rangeland herbs	544	1424	1347	3315
Rangeland Shrubs	22	242	320	584
Rivers	3	0	0	3
Snow Glacier	424	2719	6986	10129
Riparian Vegetation	0	0	0	0

8.4.2 Threats

Detailed of the threats have been discussed in Chapter 5. Here, we narrate some major threats to wildlife and habitat in the Core Landscape Units. Although most part of the Core Zones are free from periodic anthropogenic pressure yet threats are there and vary across the three Core Zones. For instance, livestock grazing and poaching of ungulate and carnivore species coupled with human encroachment to high altitude lands is the major threat in Core Zone 1 and these threats are also spread in relatively lower intensity in Core Zone 2 and 3. Similarly, uncontrolled tourism

is main threat in Core zone 2 and 3. In Core Zone 2, the negative impacts of larger developmental projects such as China-Pakistan Economic Corridor (CPEC) are strong and may increase with the passage of time. The heavy and uncontrolled traffic passing through the KNP (Core Zone 2) will fragment the wildlife habitat and restrict movement corridors of snow leopard and other species. There is a lot to do to reduce the impact of this project on the landscape conservation.

8.5 MANAGEMENT APPROACH FOR THE PRIORITY WILDLIFE AREAS

As discussed earlier, social fencing is prerequisite to preclude the increasing anthropogenic pressure on the landscape and the Core Landscape Units are some of the priority wildlife areas to serve this purpose. The wildlife population in the Core Landscape Units will serve as a source population and help maintain the ecological integrity of the Multiple Use Areas through spillover populations.

This may lead to an increased wildlife population in the Multiple Use Units with the march of time, which in return is likely to intensify human-wildlife conflict such as increased livestock degradation depredation by carnivores and crop damage in these landscape units. In the given scenario, the management will require multipronged and community-based conflict management initiatives. This in turn, will require a holistic management strategy by engaging all relevant stakeholders to promote coordination and cooperation among stakeholders to manage this expected threat and those mentioned above under 8.4.2. The cooperation and coordination mechanisms are discussed in earlier chapters (Chapter 10).

8.6 MULTIPLE USE AREAS IN KARAKORAM-PAMIR LANDSCAPE

The multiple Use Areas spread across 23,067km² area constituting 61% of the total area of the landscape. These units mostly encompass the valleys, rangelands and pastures at comparatively lower altitudes and are subjected to heavy human use for subsistence. Major activities in these landscapes include agro-pastoral and associated developmental activities. However, some parts of this landscape do support wildlife but the habitat is degrading due to human activities.

The promising landscape patches in these landscapes are protected by establishing Protected Areas (PAs) of various categories such as Community Management Conservation Areas to ensure sustainable harvesting of ecosystem resources.

8.7 ATTRIBUTES OF THE MULTIPLE USE AREAS

8.7.1 Topography and Vegetation

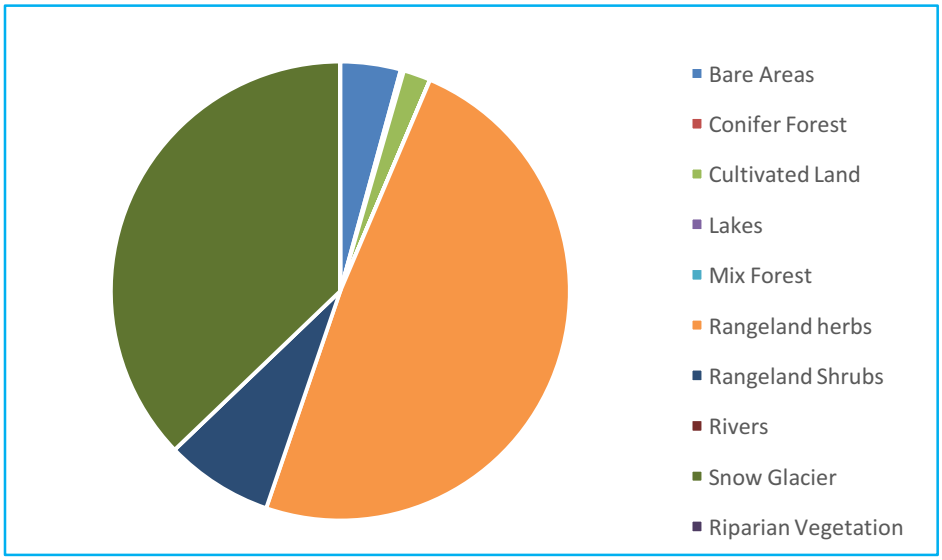
The landscape features in these landscape units are very similar to the Core Zone Units but lie comparatively at lower elevation. The rangeland herbs and shrubs cover major (55%) portion of the landscape. Cultivated land forms about 2 % while barren area and glaciers constitute 4 and 37%, respectively (Figure 8-6).

8.7.2 Threats

Major threats to wildlife and its habitat in these Landscape Units are human induced and economically fueled. The categories and intensity of threats are discussed in Chapter 5. However,

with the explosion of human population, the level of these threats is expected to intensify and require urgent attention.

Figure 8-6 Landover classification of the Multiple Use Landscape Units



8.8 MANAGEMENT APPROACH FOR THE MULTIPLE USE AREAS

As discussed earlier, threats in these landscape units are directly linked to the activities that are compulsory for the survival of the secluded mountain communities such as agro-pastoralism and envisaged to intensify with the increase in human population over time. Moreover, most of the communities in the landscape are deprived of basic civic facilities, even in this day and age. Development Projects are highly suggested in this area. However, such project may further add to the degradation of the fragile mountain ecosystem.

Any individual entity or organization cannot cope up with the growing existing and emerging threats to wildlife and their habitat in these landscapes unless coordinated efforts are made towards this end. The later, requires taking onboard all players while developing and implementing the valley micro (valley and village level) integrated conservation and development plans. Chapter 9 and 10 of the management plan come up with the management strategies to dilute threats to the entire ecosystem.

8.9 RECOMMENDED ACTIONS

Document key flora and fauna of the main landscape patches having high endemism or having significant concentration of important flora and fauna for possible inclusion in the network of cores in the landscape.

The Karakoram-Pamir Landscape spread across huge but challenging terrain. At present, both flora and fauna diversity of the landscape is poorly understood. Understanding the occurrence, status and threats to key flora (medicinal plants) and fauna (snow leopard, brown bear, wolf and ungulates) is highly suggestive to improve the delineation and management of landscape units. The Government Wildlife and Forest Departments have to assign this task to a well reputed and informed organizations during the second to fifth year of the management plan. The data available in this plan can help design the proposed studies.

Develop socioeconomic, cultural and ecological baseline of valleys in the multiple use area.

In order to understand potentials and management challenges in diverse geographical units of the multiple use area, a valley-wise baseline needs to developed on natural resources, as well as socioeconomic and cultural elements in each valley.

Develop Valley Management Plans (VMP):

Following the development of landscape management plan, detailed zone-based valley-specific management plans for conservation and development activities will be developed through extensive community consultation and in cooperation with local organizations (CBOs, VCCs, LSOs, DCCs). Valley plans for several geographic units in the Karakoram Pamir landscape are already developed by conservation organizations, including WWF and EvK2CNR. These plans needs to be adapted and updated if required.

Implement Valley Management Plans (VMP):

Through a coordination mechanism between communities and relevant stakeholders, as defined in Chapter 10, valley management plans will be implemented.

8.10 STRATEGIC PRESCRIPTIONS FOR THE PRIORITY WILDLIFE AREAS AND MULTIPLE USE AREA

Attributes and threat faced by Priority Wildlife Areas and Multiple Use Areas have been identified in the previous sections. Based on them we have identified activities which may be allowed in these Zones and activities which should not be carried out as well. These activities however highlight just few of the suggested activities and many more may arise during the implementation phase. The activities suggested have been divided into two landscape units (Priority Wildlife Area and Multiple Use Area) However some activities will depend on which category of zone they lie within the landscape area (such as Zone 1,2,3 in Priority Wildlife area). Each Activities is then analyzed on three bases and identified with following indicators

N = Cannot be allowed

The activities marked under this category are assumed to have egregious impact on the area and the environment and should be strictly not allowed. Regulatory authorities should ensure that such activities are not carried out in order to maintain the ecological balance in the area.

A = Can be allowed with restriction

These activities can be allowed in the area but they should only be allowed if they are properly monitored by concerned authorities in the area and certain restrictions are imposed to ensure that they these activities do not exploit the area and damage the environment. Proper guidelines should be created on how these activities should be conducted.

P = Activities which should be promoted

Activities which should be promoted are activities which are needed in the area. These activities could benefit the locals community or/and the environment provided that they are done in a sustainable manner with regulations. proper monitoring.

Table 8-2 Strategic Prescriptions for the Priority Wildlife Area and Multiple Use Area

Activities		Zone	
		Wildlife Priority Areae	Multiple Use Area
Community	Solar Power Generation	**N**	**P**
	Timber Harvesting	**N**	**N**
	Livestock Grazing	**A**	**A**
	Hunting	**N**	**N**
	Organic Farming	**N**	**A**
	Agriculture	**N**	**A**
	Herb Collection	**N**	**N**
	Settlements	**N**	**N**
Tourism	Wildlife Viewing	**A**	**P**
	Mountaineering, Climbing,Trekking	**A**	**P**
	Ecotourism	**A**	**P**
	Camping	**A**	**P**
	Tourist Information Center	**N**	**P**
	Hotel and Rest Houses	**N**	**A**
Development	Basic health, basic education, water	**A**	**P**
	High School & College Education	**N**	**P**
	Training of Departmental Staff	**P**	**P**
	Social Fencing	**P**	**N**
	Conservation Awareness Campaign	**P**	**P**
	Hospital	**N**	**P**
	Roads	**A**	**A**
Commercial Use	Fuel wood harvesting	**N**	**N**
	Timber harvesting	**N**	**N**
	Mining	**N**	**N**
	Research Surveys	**P**	**P**
Sceintfic Research and Eduction	Animal Capturing	**N**	**A**

Sample Collection	**A**	**A**
Community Interview	**A**	**A**

N: Cannot be allowed A: Can be allowed with restriction

P: Activities which should be promoted

9. MANAGEMENT INTERVENTIONS TO ADDRESS THREATS TO WILDLIFE

9.1 CONTEXT AND OBJECTIVES

This chapter addresses the second goal "Gain the support of local communities, other stakeholders, NGOs and scientific organizations to address the threats to snow leopard and other wildlife in the Karakoram-Pamir Landscape" of the management plan. Although the Karakoram-Pamir Landscape harbors rich wildlife diversity yet it is subjected to many threats as outlined in Chapter 5. All the threats are human induced and economically fueled and thus require multipronged strategy to address them. The first step is the ample understanding of the threat itself, in terms of its urgency, impact and intensity. This will provide base for developing tangible and informed strategy to address the threats in question. These aspects are covered in detail in Table 9.1 which also takes in to account the strategy elements and potential activities to tackle specific threats. These activities are further supported with general interventions in section 9.2.

Since, it is highly suggestive to have good understanding of threats to the snow leopard, its wild as well as domestic prey and their habitat in each core and multiple use units of the landscape, so that tangible measures are taken to address them with support from wide range of stakeholders as identified in Chapter 4. However, periodical monitoring of the existing and emerging threats is prerequisite to measure management performance and to enable course corrections with the passage of time. Furthermore, the threat reduction measures required to be ecologically feasible and socio-economically acceptable owing to the varied land tenure systems prevailing in the landscape. In view of the above, broad approaches to address threats in the Karakorum-Pamir Landscape are itemized in this section which require revisits to further improve and built upon in the longer run. Specifically, the following objectives are proposed.

1. Develop mechanism to understand the threats to wildlife and their habitat using a mix of scientific and local knowledge in the landscape (Goal 2 of the NSLEP).
2. Adopt participatory measures to offset negative impacts of natural resource use by the local communities in the landscape.
3. Ensure sustainable development in the landscape by evaluating and course correction of the developmental projects that are supposedly effecting degradation of the habitats.
4. Inculcate sense of resource stewardship in the communities, government and non-government agencies and tourists through tailor-made conservation education and awareness paradigm.
5. Understand emerging threats such as climate change in the landscape and its impacts on resources.

9.2 RECOMMENDED ACTIONS

9.2.1 Expedite socio-ecological information collection in the landscape

Most of the threats vary spatially and temporally and are partially understood. Ample knowledge of the major threats, their influence and impact over the time is highly suggestive to invoice proper mitigation measures. Resourceful organizations in collaboration with the Wildlife and

Forest Departments can assist in this and has to be engaged with the development of the management plan.

9.2.2 Build the capacity of the grass root organizations and communities

The Valley Conservation Committees (VCCs) with representation from all sects and age structures will be developed and strengthened to enhance their participation in natural resource management measures with informed attitudes. Organizations with expertise in conservation and management such as SLF can be engaged in developing participatory planning and action and wildlife monitoring modules that will be imparted through short training programs and workshops. This will help establish a strong group of youth, villagers and departmental people capable of implementing conservation and monitoring initiatives. The religious leaders and institutions which have long lasting impact in the landscape is another important avenue to explore for the management of the landscape.

9.2.3 Conduct conservation education and awareness raising events in the landscape

Lack of awareness of the importance of wildlife and other natural resources and support in their sustainable management is itself a threat to the fragile resources of the landscape. This can be reverted into an opportunity by developing and imparting cross cutting education and awareness raising events for general masses, youth, and school children and even for government structures. The specific strategies for various Categories of threats identified in the Chapter 5 are provided in Table 9.1

Table 9-1 Strategy elements to address the main threats to wildlife and their habitat in the Karakoram-Pamir Landscape.

Threats	Suggested Approach	Broad Conservation Targets for next Five Years
Category A: Habitat and prey related threats		
1.1. Excessive grazing by livestock and encroachment resulting in habitat degradation and fragmentation	• Studies to understand the carrying capacity of rangelands and pastures and pressure exerted thereof. • Identify hotspots and take measures to establish grazing free zones in consensus with the communities and providing incentives. • Revive traditional natural resource management systems such as rotational grazing and ban on extraction of fodder and fuel wood for certain period among others. • Reduce livestock numbers by sensitizing communities to opt for quality animals rather than quantity.	Suggested mitigation measures are implemented in the at least 25% of the landscape.

Threats	Suggested Approach	Broad Conservation Targets for next Five Years
	• Encourage agro forestry activities such as fodder cultivation and rehabilitation of barren lands. • Introduce alternate livelihood options like cash crops and horticulture to reduce dependency on livestock. • Educate communities to discourage pasture leasing to migratory herders. • Establish Community Managed Conservation Areas (CMCAs) to halt encroachment to habitat.	
1.2. Natural prey reduction due to illegal hunting, diseases and competition with livestock	• Initiate livestock vaccination program and develop quarantine facility to stop disease transmission from livestock to natural prey. • Identify transition zones and establish grazing free zones in areas grazed by livestock and wild ungulates. • Establish and strengthen CMCAs by offering incentives to the communities and enhancing watch and ward system	• Mitigation measures are implemented in at least 10 watersheds
Category B: Direct Killing or Removal of Snow Leopards		
2.1. Killing and poaching of snow leopards in retribution and for trade and poaching of wild prey	• Build capacity of wildlife department staff and communities in investigating, reporting and confiscation of wildlife poaching incidences. • Develop baseline of snow leopard and prey poaching and identify trade routes and centers. • Update wildlife act and enhance human resource base of the concerned departments. • Promote and expand trophy hunting program to gain support of the communities in discouraging illegal hunting	• Baseline is developed • 50 staff members of the wildlife department and communities are trained in coping with the poaching and trade in snow leopard and wild prey • Conservation programs are implemented in 10 valleys • Poaching is reduced by 50%

Threats	Suggested Approach	Broad Conservation Targets for next Five Years
	• Initiate conflict mitigation programs (livestock insurance, vaccination) and conflict reducing measures (predator proof corrals).	
Category C: Policy and Awareness Issues Affecting the Conservation of Snow Leopards, prey, and habitat		
3.1. Lack of appropriate policy and awareness in the policy makers and communities	• Arrange awareness and advocacy programs for policy makers • Initiate conservation education programs in the communities engaging youth and schools • Develop updated policy and procedures to promote conservation of predators and prey	• Awareness and advocacy campaigns are launched at valley, district and provincial levels • Conservation education is introduced in 10 valleys • Policy formulated and implemented
3.2. Lack of institutional capacity and enforcement	• Identify capacity gaps in the concerned departments and communities. • Develop and implement capacity building plan	• Capacity building plan developed and implementation started
Category D: Emerging threats		
4.1. Climate change	• Initiate studies to understand climate change impacts on snow leopards, their natural prey and habitat • Develop climate change adaptation policy • Implement the policy	• Climate change impacts understood in about 50% area of the landscape • Adaptation policy drafted and implementation started
4.2. Large scale developmental projects and mining in the snow leopard habitat	• Identify impacts of the ongoing developmental projects and mining on snow leopard habitat • Develop and implement threat reducing plan • Develop mechanism to assess the impacts of the upcoming projects • Initiate measures to reduce the negative impacts of the upcoming projects	• Impacts of the developmental projects are listed in the entire landscape • Mechanism developed to reduce negative impacts of such projects are implemented in 50% of the landscape.

10. FRAMEWORK FOR COOPERATION, COORDINATION AND GOVERNANCE MECHANISM FOR THE MANAGEMENT OF KARAKORAM-PAMIR LANDSCAPE

This chapter proposes cooperation and coordination framework among various potential stakeholders and instates governance mechanism for the sustainable management of the Karakoram-Pamir landscape.

10.1 FRAMEWORK FOR COOPERATION AND COORDINATION

10.1.1 Context and Objectives

As stated under chapter 4, there are many government and nongovernment organizations operational in the Karakoram-Pamir Landscape and each of them can play key role in the conservation of the landscape. The Parks & Wildlife and Forest Departments are the primary government agencies for the conservation of wildlife and associated mountain biodiversity. However, many other government and nongovernment organizations are increasingly taking interest in conservation and green activities. The Management Plan recognizes that particularly in the landscape context, where land use differs and ownership of land varies, facilitating convergence in a manner that all groups are able to contribute positively to conservation, based on their individual expertise, is important. Conservation goals must be achieved through direct threat reduction, protection of habitats and species. Local communities must be seen as an important stakeholder and potential driver of conservation efforts, and they need to be factored into any program for its long-term success.

It is acknowledged in this plan that wildlife conservation in the Karakoram-Pamir Landscape has to facilitate other core aspects of enabling conservation, such as better livelihoods for communities so that their dependence on local resources is reduced, energy efficient lifestyles, eco-development works by agencies incorporating environment friendly practices and enhanced awareness about these issues among general public, respectively. However, achieving these goals, as such, goes beyond the scope of management plan and requires increased coordination and understanding among diverse stakeholders for joint implementation. Thus, mainstreaming of conservation into the larger development agenda of the landscape is prerequisite in achieving the holistic goal of conservation and development. The avenues of conservation available in developmental priorities are discussed in table 10.1. It is evident that there is lot of potential for synergy among developmental and conservation organizations that can fostered to avoid duplication of efforts and achieving conservation development targets cost effectively. For instance, forest, wildlife, animal husbandry and even agriculture departments can collaborate for the management of watersheds and rangelands. Similarly, capacity building measures for different purposes ranging from tourism management, wildlife, forest and other natural resource management and rural development constitute another such example which can be undertaken by prompting cooperation and synergy among stakeholders. Promotion of eco-development activities such as non-conventional sources of energy and organizing community self-help groups for streamlining income options in wildlife areas are other some example in this connection. The Karakorum-Pamir Landscape is one of the fascinating sites in the region with lot of potential for promoting ecotourism which already fetches ample revenues for the mountain communities. All the stakeholders require to shoulder with the Wildlife and Forest Departments to ensure

sustainable management of the landscape while improving the socioeconomic status of the communities.

This can be made through developing cooperation and coordination among stakeholders so that their staff and resources can be utilized more judiciously and effectively. The current Management Plan hopes to set up mechanisms that enable this to happen in the Karakoram-Pamir Landscape.

It is also established that the NGOs having mandate of conservation and development can also play crucial role in the management of the Karakoram-Pamir Landscape. With their comparatively smaller area of operation, flexibility and limited scope, they are usually able to pilot innovative and replicable working models such as human-wildlife conflict management and sustainable harvesting of wildlife resources that can be adopted by government departments. The conservation programs are developed following the common perception that enhancement of the socioeconomic status of the communities will result their dependence on natural resource use. However, the success of this notion depends on the livelihood options that people adopt. The Karakoram-Pamir Landscape is famous for its agro production such as fruits, vegetables and crops, which has reduced dependence on livestock. But at the same time, the livestock number is increasing alarmingly. Such predictions should be taken into account while prescribing management measures in the longer run. This Plan notes that conservation actions are not always sanctified and constant in their significance over time and every action may have both positive and negative consequences. It is thus acknowledged that good monitoring, crosscutting discussions and team effort are necessary even for seemingly environmentally sound initiatives, so that mid-course corrections can be applied, if required. This Plan proposes the following objectives for enabling convergence in the Karakoram-Pamir Landscape.

Engage community in conservation planning, implementation and monitoring.

This can be achieved by identifying new Community Managed Conservation Areas (CMCAs) and establishing Conservation Committees at Valley of Village level. Where these structures area already available, their capacity can be built to better manage the resources.

Identify avenues and develop mechanisms for synergies among different stakeholders

This can be achieved by developing governance structures at landscape, district and valley levels. Details are provided in the subsequent sections.

Build capacity of field staff and mid management of stakeholders in participatory conservation and development

To understand the pros and cons of the convergence in managing the landscape, training of potential stakeholders in participatory management will add in achieving the holistic goal of conservation of the landscape. The Conservation Committees is required to be equipped with planning and implementation tools necessary for undertaking conservation projects with the involvement of multi-stakeholders' groups.

Initiate welfare activities to improve the capacity and morale of the frontline wildlife and forest staff and community members with incentives and better equipment

As identified earlier, improving the capacity and morale of the concerned staff and community members is very important and will ensure better cope up with conservation issues in the landscape.

10.1.2 Recommended Actions

The following actions are proposed to achieve the aforesaid objectives.

1. Identify and establish new Community Managed Conservation Areas
2. Establish Valley/Village Conservation Committees
3. Strengthen existing Conservation Committees
4. Establish/strengthen District Level Conservation Committees (DCCs)
5. Establish Landscape Level Conservation Committee
6. Boost convergence activities, especially in the fields of agriculture, animal husbandry, education and tourism that can help people's livelihoods and also in
7. conservation goals.
8. Carry out activities such as habitat improvement and protection as per need in the Landscape Unit.
9. Initiate capacity building measures, especially in identifying, planning, and implementation of projects, wildlife monitoring and tourism management, among others.
10. Equip field staff in terms of field gears, surveillance tools, and providing accommodation and camping facilities.

Table 10-1 Sectoral Convergence[1] for conservation in Karakoram-Pamir Landscape based on mandates and analysis of Annual Development Plan, 2016-17 of GB Government.

S#	Sector	Comments on Convergence or Divergence
1	Food, Agriculture, Fisheries and Animal Husbandry Department.	The agriculture department promotes cash crops like potato, apricot, apple and cherry through capacity building of farmers and introduction of improved varieties which constitutes source of income for more than 80% of the population. The region produces 70% of the dry fruits consumed inside the country and exported abroad. Boosting the agriculture sector may further reduce dependence of the communities on natural resources. However, increased use of pesticides and promotion of organic farming may have negative impact on environment that requires consideration. The animal husbandry sector is another important avenue to enhance the livelihood of the mountain communities. About 90% of the households keep livestock and the livestock number is reportedly increasing over the time. Sustainable management of this sector by replacing the quantity of animals with quality may help improve the status of mountain ecosystems. The GB region is also famous for fresh water fish species. Proper management of this sector can sustain the dependence on other fragile ecosystem services.
2	Forest, Wildlife & Environment Department	The trophy hunting program has not only helped improve the status of the wild ungulates but has also contributed to enhance the socioeconomic status of the communities. However, the program requires proper management to ensure its sustainability. The communities require sensitization that the revenues generated

[1] Convergence here refers to the possibilities of using departmental mandates for wildlife conservation

S#	Sector	Comments on Convergence or Divergence
		through the program are meant to protect the entire ecosystem not the specific species. The forest department needs to foster and upscale the social forestry program to reduce deforestation. The environment department needed to be more vigilant and enhance its role in assessment the impact of the developmental projects on the mountain ecosystem.
3	Education, Social Welfare and Women Development Department	Education plays vital role in equipping people with attitudes and skills required to implement the conservation agenda at local level. Education also paves way for employment and divert the dependency on natural resource use for subsistence. The allied sectors, provide opportunities and training to poor women in both urban and rural areas to enable them to generate their own income. They also contribute in the overall social and economic uplift of women through development schemes and program of Federal Ministry of Women Development and Youth Affairs. All these measures besides improving the socioeconomic status of the communities may also help lowering the natural resource use at household levels.
4	Tourism, Sports and Culture Department	The GB region in general and the Karakoram-Pamir Landscape in particular is famous for its scenic landscapes and rich cultural biodiversity. Thousands of national and international tourists visit the area each year and result in generation of valuable revenues. However, A lot needs to be done to minimize the negative impact of excessive tourist activity. Eco Friendly tourism needs to be promoted. Awareness about the ecological importance of the area and ways to reduce damage by tourist need to be spread across the area. Fines can be imposed on tourists not following laws regarding the environment
5	Health and Population Welfare Department	Health facilities in the region are not that developed as compared to other parts of the country. This can be supplemented with revitalization of the herbal medication as the region harbors variety of medicinal plants. However, this requires proper management. Safe disposal of medical waste items requires to be improved to maintain healthy environment.
6	Water and Power Department	Power is the backbone of development. There is however, a major deficit of electricity in the landscape. Mini & Micro Hydel projects in general, planned by the government should help overcoming this shortage. Conservation agencies often try to invest considerably in the energy sector (solar power, wind power and LPG) with the assumption that these will reduce dependence on local fuel resources. Works on community managed micro-hydel, solar lighting, and maybe even solar cookers and geysers can be complemented by the Management Plan process with some monetary contribution and with prioritization for communities participating in active conservation initiatives. Large power projects aren't yet lined up in the Landscape, but they often can cause serious environmental damage and need to be avoided.
7	Works Department	Development of integrated Communication Network for GB by construction, maintenance, repairs and improvement of roads and bridges is the mandate of the Works dept. which is vital enhancing import and attract tourists.

S#	Sector	Comments on Convergence or Divergence
8	Industries, Minerals and Commerce Department	Industrial development and commercial activities through cooperatives remain primarily potential options for augmenting local incomes and can be leveraged for conservation activities. Programs for providing credit, skills training, marketing, transport and even tourism enterprise is possible. The region is famous for mineral resources. Proper management of mineral extraction with defined system in place to ensure trickledown effect of the revenue generated to local people is vital in improving the livelihood of the communities.
9	Local Government, Rural Development & Census Department	The local government structures will make an important interface in the negotiations between the planners and local communities for designating reserves and other related activities. The local government structures in place also support socioeconomic interventions through rural development projects.
10	Planning and Development Department	This sector has to play important role in management of the landscapes resources as it has mandate of preparing the annual development program in coordination with all departments of the government, monitoring of the utilization of ADP funds and approval of development schemes.

10.2 FRAMEWORK FOR GOVERNANCE AND ADMINISTRATION

The Karakoram-Pamir Landscape is the first model landscape designated under National Snow Leopard Ecosystem Protection Program (NSLEP). Management of the landscape requires participatory approach and this plan envisages that participatory work in such vast area with remote villages, with numerous government and nongovernment stakes requires considerable structuring of the processes, so that effective consultation and participation can be ensured. Hence, this plan proposes 3 tiers structure from the provincial landscape management committee to district and valley level committees. Details about these structures is provided below.

10.2.1 Landscape Management Committee (LMC)

The Landscape Management Committee will be established at provincial level and work under the Chairmanship of the Secretary Forest, Wildlife and Environment Departments, Gilgit-Baltistan. The Conservator, Parks and Wildlife Department will serve as the Secretary of the forum with membership from all relevant government, nongovernment and academic institutions. The Landscape Management Committee will meet twice a year and will be responsible for general direction setting, overseeing, funds generation and disbursement, and facilitating periodic monitoring and evaluation of all the projects/programs initiated as part of the implementation of the management plan. The LMC will also look for potential avenues to generate resources for the implementation of the Landscape Management Plan. The Snow Leopard Foundation (SLF) among others will provide technical support to the committee in managing the landscape by developing wildlife monitoring protocols and assessing existing and emerging threats and generating resources to mitigate threats to wildlife and ecosystems. The LMC among others will notify the valley/village conservation plans developed and endorsed by the District Conservation Committees.

10.2.2 District Conservation Committees (DCCs)

As stated earlier, the Karakoram-Pamir Landscape is spread across seven of the ten districts of Gilgit-Baltistan with more than 100 villages. In some of the districts the DCCs are formed under various projects and functional. The DCC is Chaired by the Deputy Commissioner (DC) of the respective district with membership (heads) of the district government departments and representatives of the nongovernment organizations besides the Chairmen of Valley/Village Conservation Committees (VCCs). The DCC debates on the conservation agenda at district level and reviews and endorses the Valley/Village Conservation Plans to be forwarded to LMC for notification.

10.2.3 Valley/Village Conservation Committees (VCCs)

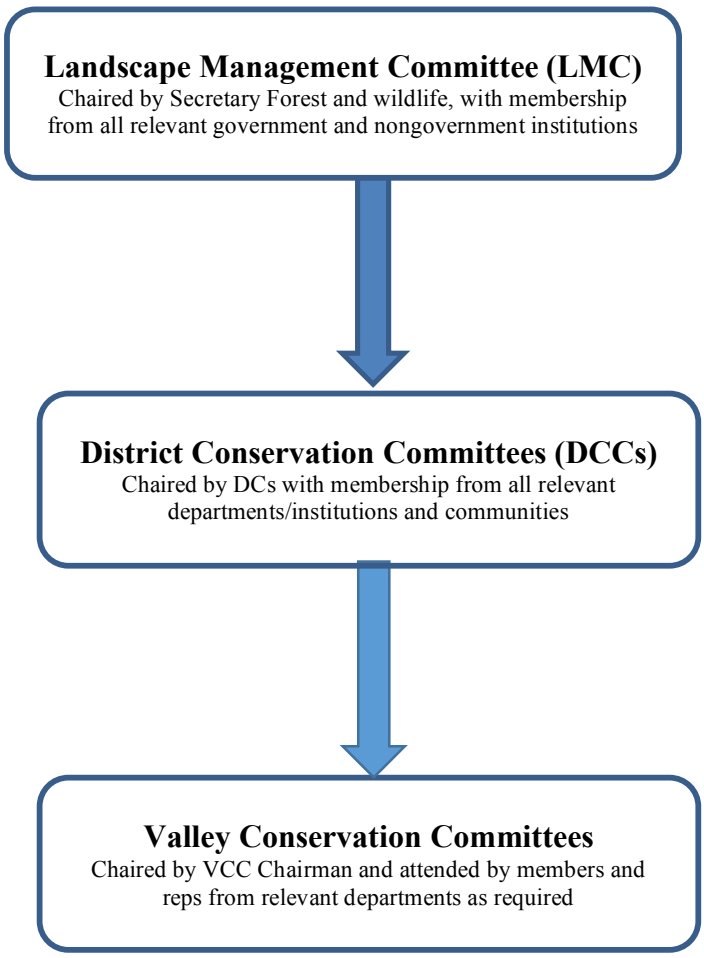
In most of the landscapes valleys, especially those falling in the periphery of the Nationals Parks, the VCCs are established and functional. The VCCs are headed by the elected Chairman and members selected from different clans of the community. The VCCs review the implementation of the valley conservation plan and share issues in the DCC forums. The VCCs from landscape units and all the unit-level wildlife conservation and community-based management initiatives will be undertaken and implemented by the Valley/Village Conservation Committees and their capacity enhancement will be one of the primary responsibilities of the larger landscape-level committee. The committees will participate integrally in developing landscape unit-level management micro-plans. The work of the VCCs will include but need not be restricted to community-based management of human-wildlife conflicts, incentive and alternate income generation programs, setting up of small 'core 'areas on traditionally used rangelands with community, participation in monitoring programs for wildlife habitats, populations and human socio-economy, and nomination of suitable members for community protection forces.

The Management Plan proposes, identification of new areas to be established as Community Managed Conservation Areas (CMCAs) and develop their conservation plans and micro plans to take them onboard in achieving the larger goal of conservation and management of the Landscape. The community members, firstly trained in participatory resource assessment and planning using tools like Resource Need Assessment (RNA) or Participatory Rural Appraisal (PRA). The trained community members then involved in the developing the conservation plans.

Key Actions:

1. Develop ToRs for the LMC and get them endorsed from the respective quarters.
2. Identify members and establish LMC
3. Strengthen existing DCCs and establish new DCCs where required
4. Review and update the conservation plans of the existing VCCs
5. Develop conservation plans for the new Community Managed Conservation Areas (CMCAs) and establish valley structures (VCCs)
6. Endorse and notify the CMCAs from DCC and LMC.

Figure 10-1. Schematic representation of governance structure for the Karakoram-Pamir Landscape



11. RESEARCH, MONITORING AND CAPACITY BUILDING IN THE LANDSCAPE

The mountain mammals in Pakistan (1976) and the Mountain Monarch (1977) by Schaller were probably among the first studies exploring the large mammals in the Karakoram Pamir region, in Northern Pakistan. Roberts (1997) provided more details about the distribution of mammals in the region. After these studies, other individual researchers from different national and international universities and other institutions initiated research work on different fields such as glaciology, wildlife, ecology, medicinal plants and floral diversity. Limited studies, mostly unpublished work, were carried out to develop baseline while establishing protected areas in the landscape. However, in some cases, for example establishment of the Central Karakoram National Park much more detailed study on distribution of mammals in the area were carried out (Lovari and Bocci, 2009). Other studies in different areas of the landscape focused on distribution of wolf (Abbas et al., 2013), distribution and population estimates ungulates species in the area (Khan et al., 2014a, b). In other studies focus has remained on the occurrence of different carnivores and mammals (Khan et al., 2012; Virk, 2003; Qureshi et al., 2011). Hussain (2003) worked on the distribution and human snow leopard conflict in the Baltistan region, leading to many conservation initiatives in the area. These efforts of individual researchers produced considerable understanding of the wildlife and their distribution in the area. However, these studies remained sporadic in time and limited in extent. The Snow Leopard Foundation (SLF), started systematic studies throughout the range in 2011 using latest techniques and equipment. Human-carnivore conflict studies were conducted in most parts of the range and conservation measures started. During the following years, camera traps, occupancy surveys, ungulate population census, human-wildlife conflict studies were carried out in many areas. Distribution, population estimates and abundance of carnivores and prey species were documented based on these studies.

Studies on geology of the Karakoram ranges probably started with the work of Hayden (1915) and a great amount of literature produced in the following years. The mountains of Karakoram remained a focus of geological expeditions after the inception of Pakistan. Some of the representative work in sixties and seventies include Desio, (1963); Desio & Martin, (1966); Talent and Mawson, (1979); Tahirkheli et al., (1979) and so many others. Research has remained continuous in the current decade and available in published form (Zanchi & Gaetani, 2011). Studies on the glaciers of the Karakoram increased during the past few decades. A number of studies have been conducted on the Batora, Biafo, Hisper glaciers in the landscape (Bishop et al., 2008; Bocchiola and Diolaiuti, 2012; Hewitt et al., 2005). During the establishment of the Central Karakoram National Park under the Ev-K2CNR, a number of studies conducted and inventories of the glaciers were developed (Minora et al., 2013). Under the same organization a Glacier Monitoring and Research Team undertook different studies on the major glaciers in the Karakoram Range. The changing climatic conditions also compelled national and international organizations to expand existing knowledge about these water reservoirs (Ahmad et al., 2012; Jilani et al., 2007). The water and power development authority (WAPDA) have installed meteorological stations in the landscape to monitor these glaciers (Hashmi, 2014).

Available information about exploration of floristic diversity and distribution in the landscape dates back to early Sixties by the work of H. HARTMANN on the flora of Braldu-Biafo area. Floral diversity of the landscape and distribution of different species in different areas is known from the work of (Ali and Qaiser, 1986; Abbas et al., 2013; Sheikh et al., 2002; Alam, 2009; Bano et al.,

2014). Investigation of the floral diversity and vegetation cover with the development of vegetation maps of certain area of the alpine range, dry temperate zone and some other areas (EBERHARDT et al., 2007; Wazir et al., 2008). These studies cover a major portion of the area. The identification of species recorded from the area has been done to the species level and in some cases remained to the genus level or family level. Identification up to sub-species level is necessary as there are many sub-species are exclusively endemic and restricted in distributions which need more conservation efforts.

11.1 RESEARCH GAPS

These studies have enabled to develop a baseline status of the landscape. These studies reflect the area has great potential for wildlife and a number of important animals exist in the landscape. At the same time, the communities residing in the landscape are dependent on the natural environment for their daily needs to a great extent. Activities and resource exploitation by the communities are a major threat to wildlife. New threats are emerging for both wildlife and human being in the landscape, such as from climate change.

Despite the efforts mentioned earlier, robust estimates for population of snow leopard and other carnivores are not available in the region. There is a need to estimate the populations of large carnivores in the area by disseminating the results of previous studies and conducting in areas not assessed previously.

Though some genetic studies have been conducted in past, but these studies are not representative of the entire range in the country. Inter breeding of population in different parts of the country and with populations in adjacent countries are not known. There is an urgent need to conduct studies assessing the genetic diversity and future viability of the populations in different parts of the country.

Human wildlife conflict in the area is predominant in the form of carnivore predation on domestic livestock. This phenomenon has several aspects which need to unfold in order to devise mitigation measures. Livestock are victim of predation and competitors with ungulates for food. The growing number of livestock and intrusions by the herder more and more into the wild habitats not only turning in the increased incidences of predation but the livestock also pushing the wild ungulates to more unfavorable habitats and forage. Studies on the impact of livestock on the high altitude pastures have not been studied in this region. Studies on competition between livestock and ungulates can help management of rangelands in a better way.

The landscape provides an array of important ecosystem services not only to the people in the landscape, but beyond the regional and national borders. Valuation of the ecosystem services highlights the importance of environment to the masses and can serve a better mean of awareness.

A research based approach is needed to understand the mechanism of existing and emerging threats in the landscape. To mitigate the negative impacts on human, wildlife and the habitat capacity of research is very important.

11.2 OBJECTIVES & KEY ACTIONS

Management of any protected area need specific research on the fauna and flora of the protected area. A landscape level management is even more difficult without thorough research and monitoring. Rare and cryptic species of animals and endemic species of plants, with the associated social and economic attributes of the landscape need continuous research program and monitoring to maintain the ecosystem health intact.

11.2.1 Population estimation of snow leopard and other carnivores, monitoring their movements and distribution

Population of snow leopard and other carnivores in its range in Pakistan has been estimated based on guess and expert opinions. Lack of a robust estimate has produced dire consequences for conservation and management of large carnivores and snow leopard in the range. With the development of advanced techniques such as camera traps estimation of populations and abundance has been produced with greater accuracy (Jackson et al., 2006). Using DNA samples collected from the feces of carnivores has proved an additional advanced tool to monitor populations (Janecka et al., 2008). These technological advancements have paved the road toward a more recent technique of eDNA (environmental DNA) technology using samples from the terrestrial and aquatic environment (Valentini et al., 2016; Taberlet et al. 2012). It has very recently developed to monitor movement corridors and distribution patterns of these elusive and rare species across landscapes.

11.2.2 Monitoring abundance of key ungulates species in the landscape

In the past years most of studies of ungulate population monitoring and census have been carried out through vantage point method. Most robust and statistically sound methods such as double observer methods (Magnusan et al., 1978) has been employed with some modifications (Khattak, 2015) in some studies where the SLF was involved. Expertise and skills in these survey protocols need to be developed in the wildlife department personnel's and community guards.

11.2.3 Understanding of human wildlife conflict in the landscape with the various aspects and finding measures to coexist in harmony

Trends in Human-Wildlife Conflic studies have focused on the reported data about incidences of previous year(s) which has remained subject to biasness. It is urgent to record these cases directly, sooner after the incident happens. Again there are factors contributing to the conflict situation which vary from area to area. There may be some areas where the degree of livestock predation is high, or it may change with time/season etc. Table 5-1 in Chapter 5 gives a summary of livestock predation in the Karakoram Pamir Landscape. All such aspects need to be documented with accuracy and ground realities. Community guards and other data collector need to be trained in the subject. Devising conservation measures to mitigate and manage Human Wildlife Conflict should be in accordance with the conclusions of a realistic research.

11.2.4 Research on the Socio-economic and ecological attributes of the landscape and the communities

To be able to live in harmony with the nature and wildlife in particular in a sustainable way it's important to have the socio-economic and ecological attributes measured. The landscape has enormous diversity in terms of biological, physical, social, cultural and economic features and conditions. These features and values, when interact at a large scale, produce greater impact on each other. Therefore it's necessary to study and understand the socio-economic and cultural settings within the landscape which have direct bearing on the nature. The dependency of the communities on the natural resources and available alternative opportunities of livelihood to lessen the burden on natural resources need to be studied.

11.2.5 Understanding the existing and emerging threats, devising mitigation measures

The high dependence of the communities on the natural resources of the landscape is a continuous threat across the landscape. Various threats (as mentioned in Chapter 5) exist in the landscape and these threats vary from valley to valley based on the type and degree of exploitation of natural resources. Additional threats are arising from increasing human pressure which is in the form of developmental and commercial practices. Increasing human intrusions into the wild habitats have additional consequences for wildlife and habitat. Understanding the types, degree, nature and the ways to address each threat differ considerably across the landscape. Therefore, subjective assessment of each threat in each valley is required to be able to respond them.

11.2.6 Predicting the climate change induced threats to human and wildlife with the development of best adaptation measures to be followed by the communities and wildlife

The landscape is severely impacted from climate change as the climatic conditions are rapidly changing. During the past several years there have been devastating floods from GLOFs which not only affected the nature of the landscape but the life style of the communities. The glaciers in the landscape are changing with the changing climate but this is not only in the form of glaciers retreat but some of them are expanding at the same time posing a threat to the existence of the whole valley and villages adjacent. Adaptation to the climate change can only be sought by predicting the future scenario. What could be the type of agriculture, growing season and what possible changes in the life style of the people can be, should be some of the points to focus through research.

11.2.7 Assess the status of rangelands and pastures and developing methods for sustainable use of the rangelands

Status of rangelands is thought to be degrading, but recently systematic research is negligible on the subject. Increasing numbers of livestock have an enormous pressure on the rangelands, in some areas livestock are grazed throughout the year and in most of the areas grazing stops for a very short time constricting the regeneration period. To use the pasture in a sustainable manner, studies on the impact of livestock on these pastures is necessary. Overgrazing by the livestock can have multiple consequences for the ungulate species. For example, besides limiting the space available for ungulates changing of the species composition with unpalatable or less palatable species of fodder can resultantly eliminate wildlife from the area. Change in vegetation communities across gradient of grazing pressure from livestock and their wild counterparts need monitoring for a long term. Development and improvement of the degraded rangelands can be achieved by having sound scientific knowledge.

11.2.8 Document the floristic diversity throughout the landscape with additional focus on value-chain development for medicinal plants and their sustainable harvest

In the landscape of Karakoram Pamir medicinal plants have remained and important part of life of the inhabitants being a mean of health and subsistence. Flora and medicinal plants of each valley should be documented with distribution maps for the landscape. There are many endemic plants which need specific attention for their conservation. Medicinal plants are collected by the communities for commercial purposes with a seemingly high rate of exploitation. A systematic

assessment of the status and current level of exploitation is needed before developing any sustainable harvest strategy.

11.2.9 Update and enhance the Wildlife Department's personnel's knowledge and capacity of wildlife management

Monitoring and surveillance of wildlife species including birds and flora can be done by wildlife staff and community members. For this purpose they need basic training in monitoring of wildlife. Training and capacity building of the staff and community member on annual basis can serve the purpose. Such training should be arranged on valley level as well as landscape level by identifying suitable candidates for the monitoring and surveillance. In other cases inadequate and poor knowledge of the wildlife staff on species and management need enhancement through comprehensive workshops and refresher courses. These can be offered at regional or national level.

11.3 AGENCIES WITH EXPERTISE

Researchers of high repute, academic institutes, professionals and the communities should be engaged in the research activities in a partnership to promote research based management in the landscape. To strengthen the existing higher education institutes in the landscape, participation in wildlife field research should be encouraged. To ensure judicial use of resources on research, the research should be focused on activities prioritized by gap analysis and peer review proposals and synopsis. Sometimes researchers do unnecessary repetition of the same work in a manner which is nothing more than picking up of the same protein from a new box thus wasting time and resources. To promote a research culture on the natural resources of the landscape and to benefit from them in the best possible way, the work should be published in journals of repute and should be available to benefit from them.

Current level of expertise and capacities are limited to a few organization and even fewer are actively involved in research based activities while most are engaged in limited activities or in a dormant stage. The Snow Leopard Foundation (SLF) is involved in conservation of snow leopard, other wildlife and associated mountain ecosystem through research, conservation and education programs. World Wide Fund for Nature Pakistan(WWF-Pakistan) has carried out a number of projects on research and conservation of natural resources and environment in many areas of the landscape. Wildlife Conservation Society (WCS) is actively involved in sustainable management of biodiversity with supporting the communities. The Agha Khan Development Network (AKDN) working in social, economic and cultural development. It has provided support for enhancing the socioeconomic status of the communities in the landscape. Some research work has been carried out by the Karakoram International University (KIU) on the natural resources and socio-cultural aspects of the landscape. Baltistan Wildlife Conservation and Development Organization (BWCDO) is helping the communities in some areas of the Baltistan division through wildlife conservation, research and community development works.

12. EDUCATION AND AWARENESS

12.1 ENVIRONMENTAL CONCERNS AND CHALLENGES

Our planet is currently facing a lot of environmental concerns. Over the last few decades, the exploitation of our planet and degradation of our environment have increased substantially. Several environmental challenges have been experienced in Karakorum-Pamir landscape mainly due to over-exploitation of natural resources and emission of wastes and pollutants into the environment leading to degradation. Some of the key Envirnmental Challenges include:

Pollution

Pollution of the environment especially related to land, water and air has led to adverse effects on animal and human health as well as the quality of the environment.

Deforestation

Extensive destruction of forests has been rampant in the past due to illegal logging and excisions among other threats. This has also led to the loss of forest cover and the subsequent destruction of water catchment areas.

Global warming and climate change

The earth's atmosphere is getting warmer due to global warming which is causing climate change. The change in climate has led to altered rainfall patterns, variability and extremes of weather

Land use

Poor land use has led to land degradation. Though caused by both natural and human activities, land degradation has led to desertification, loss of water, soil infertility, poor crop yields and loss of biodiversity.

Waste management

Waste management is a great challenge to the landscape due to the absence of appropriate technologies and modern facilities. Improper waste disposal has also enhanced land degradation and reduced the quality of the environment.

Loss of Biodiversity

Biodiversity is yet another casualty due to the impact of human beings on the environment. It is the result of 3.5 billion years of evolution. Habitat destruction is a major cause for biodiversity loss. Habitat loss is caused by deforestation, overpopulation, pollution and global warming.

Human Disturbance

Ecosystems in the Karakoram Pamir Landscape region are also under threat from human activities. In the last few decades, there has been a steady rise in both the human population and numbers of domestic livestock, leading to an increased demand for land and other resources. In many places, the demands have already exceeded the levels that the local ecosystems can sustain. Habitat destruction in this region results most frequently from the effects of overgrazing, excessive removal of sparse natural vegetation, unsustainable collection of bio resources, wildlife poaching outside the protected areas.

Loss of Endangered Species

Human overpopulation is prompting the elimination of species and environmental surroundings and the loss of various biomes. Environmental frameworks, which took a huge number of years to come into being, are in risk when any species populace is huge.

Human-wildlife conflict

The decline in wild ungulates, a key component of the snow leopard diet, due to extensive hunting practices has caused a significant shift in predation pressure towards domestic livestock in some areas of the KARAKORAM PAMIR LANDSCAPE . Snow leopard prey upon domestic livestock, mainly yak, goat, and sheep, causing economic damage and threatening village-level food security. For local people, livestock are an important component of their livelihoods, thus retaliatory killing has become one of the main threats to wildlife in the region.

12.2 NEED FOR ENVIRONMENTAL EDUCATION

Environmental education (EE) is a concept often adopted by people concerned with the protection of the environment and is seen as an important instrument for achieving Protected Area conservation. As early as 1978, Environment Education was defined in the Tbilisi Declaration as: "a learning process that increases people's knowledge and awareness about the environment and associated challenges, develops the necessary skills and expertise to address the challenges, and fosters attitudes, motivations, and commitments to make informed decisions and take responsible action. (UNESCO, Tbilisi Declaration, 1978). Prior to this definition, the IUCN described Environmental Education as: "... the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among men, his culture and his biophysical surroundings. EE also entails practice in decision-making and self-formulation of a code of behavior about issues concerning environmental quality" (UNESCO, Working Committee, 1970)

Thus the ultimate goal of Environment Education is to equip people with the knowledge and skills they need to be active and authoritative partners in managing the environment and to empower individuals to make effective changes in their lives to ensure that all species have a healthy environment. This can largely be achieved by Providing individuals with opportunities to acquire knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment. Encouraging individuals to examine and interpret the environment from a variety of perspectives by promoting interdisciplinary inquiries encompassing a broad spectrum of environmental, social, ethical, economic, and cultural dimensions in the decision-making process. Education and awareness, particularly at the local level, is a critical factor in generating support among local communities for conservation and management initiatives. In a natural environment the quality of life for local communities is dependent upon the resource generating ability of natural systems. The long- and short-term consumption choices of local communities can either enhance or compromise the ability of the natural systems to meet their needs, the needs of their neighbors, and the needs of their future generations. Education and awareness efforts can assist local communities to safeguard existing resources, improve the ecology, and mitigate the hardships caused by lack of awareness and know-how. Awareness regarding the Protected Areas (PA) and its significance may also mitigate potential conflict between PA staff and local communities required to live their lives by a specific set of ground rules. Thus, targeting local communities will ensure that conservation is not limited to protecting the PA in isolation, but extends to protecting the area as a place fit for human habitation as well. During conservation efforts, it is essential to recognize, utilize, and build the human capital of the management

organization of a PA in order to fulfill short- and long-term goals effectively. In combination with ecologically based land and resource management, targeting PA staff in education efforts can build the required foundation for managing PAs. Therefore, capacity building of PA staff is an important component of the overall awareness and education strategy. Potential and existing PA visitors also require information. This varies from simple information on park location, times of operation, and fees, to much more complex and targeted information regarding cultural history and local ecology. Effectively educating and raising the awareness of PA visitors as well as the general public goes beyond simply informing, towards developing an understanding and appreciation of the PA and the objectives of the conservation effort. The promotion of a PA plays an important role in its conservation: it helps gain public support by educating people about the area and its significance in addition to building a greater appreciation of PAs in general and the conservation of natural and cultural heritage. Launching education and awareness initiatives that cater to the local communities, staff of the PA, visitors, as well as the general public can bridge the knowledge gap and be vital to achieving synergy in conservation efforts. This document reviews the present status of awareness and education regarding the Central Karakoram Conservation Complex. Recommendations have been made for future awareness and education after defining the need for it and the appropriate approach. The strategy also recommends the development of resource persons, capacity building of stakeholders, and the development of materials to supplement the Environment Education activities.

12.3 OBJECTIVES OF EDUCATION & AWARENESS CAMPAIGN

The objective of Karakoram Pamir Landscape Management Plan is to provide a platform to inform, educate and engage various stakeholders. The goal is to enhance voluntary initiatives and participation in environmental conservation activities by local communities through education and awareness campaigns. This is expected to foster inclusiveness and partnerships in environmental conservation and management. The education and awareness campaign will ensure effective stakeholder involvement and resource mobilization in environmental management.

The awareness and education plan for the Karakorum Pamir Landscape is designed so that various population groups have access to education that provides a real understanding of the environment to equip them to participate actively and effectively in managing resources sustainably. The awareness and education strategy is designed to contribute to biodiversity conservation through information sharing, education, and capacity building. The purpose is to empower people to participate in conservation measures in an informed, committed, and skilled manner. It specifies the activities to be undertaken in the area, and provides guidelines so that the Karakoram Pamir Landscape can be managed more effectively

The Education and Awareness Campaign will focus on:

1. Increasing environmental awareness and participation in environmental activities.
2. Mobilizing the general public to get involved in the protection and conservation of environment.
3. Encouraging media to embrace effective, positive and informative environmental coverage in order to enhance awareness and prioritization of the environment.
4. Awareness regarding Littering and landfill.

12.4 FEATURES OF ENVIRONMENT EDUCATION

1. Environment Education Is a learning process that expands individuals' information and mindfulness about nature's domain and related difficulties, it creates the vital abilities and mastery to address the difficulties, instilled confidence and stewardship and cultivates demeanor, inspirations, and responsibilities to settle on educated choices and make dependable moves in the field that they are working with.
2. It is an inter-disciplinary field that integrates fields such as biology, ecology, earth science, geography, atmospheric science and mathematics because understanding how environment works and keeping it healthy require knowledge and skills from many disciplines.
3. It Includes all efforts to make general public aware of the knowledge of the environment and environmental challenges through print materials, media, brochures, bulletins, videos, or other media techniques.
4. Environment Education Provides information about specific environmental concerns or problems to the general public leading to responsible individual and group actions.
5. Environment Education is a process in which individuals gain information environmental awareness and acquire knowledge, skills, values, experiences, and determination which can help them to solve different environmental problems. It Works to help people think critically
6. Environment Education Involves students in different data-gathering techniques that help them to discuss, analyze, predict and interpret data about environmental issues. As it is study centered, it promotes higher level thinking skills and relevant to student's everyday lives

12.5 KEY STAKEHOLDERS

Following Stakeholders play a key role in Education and Awareness Campaign

12.5.1 Local Community

Being most important and active stakeholder, we would need to design the campaign in order to ensure maximum participation of local communities including women, elders and religious influential population. Local political leaders can also be involved to influence the locals and convince them to accept and adapt the conservation practices for their own benefit.

12.5.2 Youth

Youth represent a large proportion of the local population and the future generation of the community. As such the youth provide a great potential in environmental conservation activities due to their large numbers and energies. The campaign will ensure to provide a forum for youth to participate in environmental conservation activities. Youth partnerships will be through learning institutions such as schools, colleges and universities as well as organized groups. Involvement of youth will enhance environmental consciousness and encourage good environmental practices for the future generation.

12.5.3 Government Departments

Engaging key government stakeholders to support environmental sustainability is very important. Various Government Departments identified in Chapter 4 will need to be engaged

12.5.4 Private Sector

The public and private sector participation provides an opportunity for involvement, ownership and partnerships in environmental management. It will help enhance the potential to encourage a culture of corporate social responsibility towards the environment. In addition, it will encourage the private sector to increase its level of investments in environmental management.

12.5.5 General Public

General public contributes to a certain level in degradation and damage of landscape through littering. The campaign will surely focus to educate general public regarding the conservation and care of environment. Forming tourism policies with the help of government departments can be a productive step in this regard.

12.5.6 Media

The media is an important stakeholder in environmental education and awareness creation. The key advantage of the media is its' ability to reach different audiences simultaneously with uniform messages. As such, there is a need to work closely with the media to enhance coverage of accurate information in the news, events, programmes and documentaries on environmental issues. It is expected that this will help influence positive attitude and change of behaviour.

12.5.7 Research Teams

There is need to strengthen the link between research and environment. Our campaign will encourage universities to undertake research on priority environmental issues in Karakoram Pamir Landscape that will provide practical solutions and technologies. Other opportunities will be explored to identify potential areas of collaboration in both research and teaching. This will enhance the capacity in management of environmental issues.

12.5.8 Civil Society / NGOs

The civil society and general public comprise a major stakeholder in environmental management and governance. It can influence decision-making systems based on the level of understanding, physical location, knowledge, experience and presence. Working with CBOs will help to enhance environmental awareness.

12.6 PROPOSED IMPLEMENTATION STRATEGY & ACTIVITIES

12.6.1 Mobilization & Implementation Strategies & Guidelines

1. Preparation of campaign guidelines and strategy for production of resource material
2. Strategy for increasing awareness and support for the shared vision of Karakoram Pamir Landscape Management Plan and a conservation model which is more accommodating of people's needs
3. Strategy for improving awareness on the conservation of natural resources in the Karakoram Pamir Landscape Management Plan in general, and steps required to facilitate the education of various categories of the general public to achieve a better understanding of environment.

4. Identification of existing level of environmental knowledge and understanding of environmental issues by the stakeholders is critically important before designing the awareness campaign.
5. Guidelines for the development of educational and information materials for visitors, including documentary videos, brochures and guide books, maps etc.
6. Guidelines for the publicity of the campaign, including articles in newspapers and magazines
7. Guidelines for communication and presentations at the local and provincial level

12.6.2 Proposed Activities

Table 12-1 Proposed Activities and details of each Activity

Activity	Details
Public Awareness Campaigns	Meetings with community, departments, educational institutes. Seminars, conferences.
Outreach & Education	Education and Awareness campaigns to be conducted in Educational Institutes to spread awareness from grassroot level
Tree Plantation	Involve local community and all stakeholders
Clean-up campaign	Involve local community and all stakeholders in cleanup campaign to engage them and make them awares of the Environment
Dissemination of environmental messages	Press release, public service messages, posters, brochures, tourist guides
Promotion of Best Practices	Anti-littering campaign throughout the landscape. This campaign would target the visitors in particular.
Youth Activities	Youth activities will include poems, art/music, drama, debate on topical issues, establishment of tree nurseries, tree planting activities and clean-up campaigns among others.

12.7 EXPECTED OUTCOMES

After successfully implementing Education and Awareness Campaign we hope to see the following outcomes

Positive change of attitude and participation in environmental conservation among local communities

Local Community is a key stakeholder in this whole scenario. By successfully conducting Environmental Education and awareness Campaign, we hope to see a positive change in the attitude of the local community towards the Environment Challenges faced by the region and ways to mitigate them in general as well as specifically towards Snow Leopard conservation aswell. We hope to see their participation in playing a positive role towards nature conservation and spreading the awareness among their friends and families in the neighboring areas.

Enhanced prioritization of the environment among stakeholders

We expect the stakeholders to see a stronger value of the need for Nature Conservation in the region. After the Education and Awareness Campaign we expect the key stakeholders to be more aware of the environmental challenges and expect them to prioritize the Environment. We hope their active participation in ensuring environment is protected and they reduce activities that can harm the environment and the biodiversity of the Karakoram Pamir Landscape region.

Enhanced partnerships in environmental governance between government departments and stakeholders

One of the Key expected outcome of the Campaign is to have active engagement and partnership by the government department as well as other key stakeholders in Environmental Governance. We hope that by creating a strong awareness and Environment Education, The government department employees and stakeholders such as youth, communities and local NGOs would be participating actively in the mission to protect the environment as well as playing an active role in nature conservation.

13. PROMOTION OF ECOTOURISM

13.1 IMPORTANCE OF ECOTOURISM

In today's world, tourists have access of information about all parts of the world. Even the most remote and hardly travelled areas are in their reach. It is one of the reasons which had developed tourist industry as top revenue generating industry in most of the countries in the world. With the increase in tourism, the challenges of conserving environment and biodiversity have also increased due to rise in nature tourists. People like to travel away from populated cities and towns and explore the natural environment in mountain ranges, forests, meadows to feel purity in the climate and air, while many tourists travel this far to experience the signs of climate change taking place at an alarming speed.

Ecotourism is developed due to ironical behavior of tourists visiting most naturally gifted villages, valleys, lakes, rivers, mountains to admire the gifts of nature but at the same time leaves behind them the unforgiving signs in the form of trash. Sometimes their adventures give deep wounds to nature.

The reasons and facts mentioned above have compelled the conservationists to introduce a new travel ethic called ecotourism. Damage to nature and biodiversity has resulted in aggressive awareness campaigns on ecotourism, not only the tourists are educated on conservation practices but also the local communities are given trainings to build capacity to engage in saving their villages and valleys from damages done by the tourists. This all has raised importance level of ecotourism tremendously.

The Karakorum Pamir Landscape has maximum potential of attracting tourists and therefore, it has large possibilities of getting damaged through tourists. Although it may not be possible to control global climate change and its effects on our land but if serious efforts are not made towards well planned ecotourism policies, it will multiply the problems faced by the conservationists and other stakeholders.

13.2 OBJECTIVES OF ECOTOURISM IN KARAKORUM PAMIR LANDSCAPE

The Karakorum Pamir Landscape comprises an ecologically fragile, culturally unique, and biologically diverse region that assumes global conservation significance. The Karakorum Pamir Landscape, located along the ancient Silk Road, has been influenced by a variety of cultures and civilizations during its history. Given the region's rich cultural heritage, unique biodiversity, and dramatic landscapes, the Karakorum Pamir Landscape has immense tourism potential, which should be leveraged to create new livelihood and income options for local communities. Most tourism in natural areas today is not ecotourism and is not, therefore, sustainable. Ecotourism is distinguished by its emphasis on conservation, education, traveler responsibility and active community participation.

Ecotourism can provide a viable economic development alternative for local communities with few other income-generating options. Moreover, ecotourism can increase the level of education and activism among travelers, making them more enthusiastic and effective agents of conservation. Ecotourism creates significant opportunities for both conservation and local communities. It can become an additional source of revenue generation for the protection of national parks and other natural areas.

13.3 CAPACITY BUILDING FOR EFFECTIVE ECOTOURISM

CAPACITY BUILDING OF STAKEHOLDERS

Increased tourism to sensitive natural areas without appropriate planning and management can threaten the integrity of ecosystems and local cultures. The increase of visitors to ecologically sensitive areas can lead to significant environmental degradation. Likewise, local communities and indigenous cultures can be harmed in numerous ways by an influx of foreign visitors and wealth.

Capacity building of all stakeholders is necessary and beneficial in order to have positive and tangible effect of ecotourism on biodiversity and local community. No matter how well planned ecotourism activities are conducted or enforced, it will be fruitless without providing ample knowledge and training to stakeholders directly involved in ecotourism. Table

13.3.1 Forest, Wildlife, Tourism and Livestock departments Staff training

Field staff of relevant departments need specific trainings to understand the importance and impact of ecotourism on biodiversity. They have important role in sustainable biodiversity and implementation of laws and regulations to keep the wildlife and nature secure .

13.3.2 Local Community

Local community is most important stakeholder in ecotourism. Without appropriate capacity building the possibility of having negative impact of ecotourism is greater. The local community can extract substantial benefit from ecotourism in the form of additional revenue generation hence supporting their livelihood and sustaining the flora and fauna in their respective valleys. As most tourists interact with members of local community, if the locals are ambassadors of the cause for eco tourism, they can act as agents of change as well as disseminate relevant awareness to the tourists in the area.

13.3.3 Nature Tourists

Capacity building of tourists holds similar importance as of other stakeholders. The methods and approach for creating awareness in nature-tourists may be different. Distribution of informative materials in the form of printed flyers or brochures, public service messages on FM radio and infomercials on local cable networks. In fragile regions introduction of fines can also be imposed.

13.3.4 Private Sector and Tour Operators

Private Sector Partners who manage the tourist in the location such as hotels, resorts, Transport companies (air and land) as well as tour operators are also key stakeholders and influencers in the area. If properly managed they can have a a major role to play in ensuring ecotourism practices are followed in the area. A strong collaboration with Private Sector is vital in the area.

Table 13-1 Capacity Building for Successful Ecotourism

Stakeholder	Capacity building approach	Key Message
Departments & NGOs	Workshops, outdoor training sessions, language skills for guides and guards. Guidelines for implementation of ecotourism policies.	Department staff is face of provincial government, if they will show respect and friendly behavior towards tourists, it will send a positive message and create better image of departments resulting in increae in tourism in the region. They can also spread information to tourists on how to follow eco friendly practices and local law.
Local Community	Practical demonstrations, resource materials for language skills, hospitality, knowledge of ecosystem and biodiversity. Trainings for improvised techniques in production of poultry and dairy products.	Tourists like to see nature, if nature is conserved properly, ecotourism will flourish hence attracting more tourists every season which would result in opening opportunities for revenue generation. Knowledge of ecosystem and biodiversity will help in promoting their valleys.
Nature Tourists	Capacity building through public service message. Tourism department can make it mandatory for all hotels to handover the brochure while checking in the guests. The brochures can include general information of the area for tourism, important phone numbers and polite reminder that they are here to admire the nature not to destroy.	Tourists need to be made aware of ways they can enjoy their vacation while being respectful to the local area, culture, people and environment. Ecotourism requires heightened alertness to the consequences of harmful behavior. Tourists need to be made aware of how to preserve natural environment and not to litter or use harsh chemical products which can adversely affect the ecosystem. They should be discouraged from removing any flora or fauna or causing harm to the biodiversity.

13.4 PROMOTION OF ECOTOURISM

Mostly tourism in natural areas today is not ecotourism and is not, therefore, sustainable. Ecotourism is distinguished by its emphasis on conservation, education, traveler responsibility and active community participation. Specific participation and initiatives from stakeholders is important to promote ecotourism in Karakorum Pamir Landscape. Each Stakeholder can play a role in promotion of ecotourism.

13.4.1 Government Departments

As identified in this chapter, Government department have a large role to play in the ecotourism development in the region.

Following recommendations are made for the Government department to have a positive role in the region.

1. Establish Ecotourism Promotion Committee that can devise laws that would need to be implemented to ensure that local tourists and other stakeholders are implementing them. They should develop guidelines to regulate tourism in and outside of Karakoram Pamir Landscape.
2. Identify tourists appealing points and ensure those areas are properly managed and protected from negative impacts of tourism.
3. Conduct targeted surveys of protected areas travelers to find more information regarding them
4. Monitoring of protected areas with respect to ecotourism. Properly monitoring such areas will ensure that any damage or harmful activity being done can be identified.
5. Strengthening of department of Tourism with resources and funding. A strong Department with the finances needed to implement laws pertaining to following environment friendly practices. Proper promotional material to be distributed to all tourists. Tourism department should also develop guides and brochures which can be translated into various languages to ensure that local tourists are aware of the conservation efforts being made and respect the local laws.
6. Government Departments should ensure that there is Sustainable regional development of infrastructure such as roads, transport, markets etc
7. Develop mechanism to give maximum share to local community from ecotourism revenue generation
8. Government Departments should establish information centers, equipped with first aid kits and relevant information for tourist.

13.4.2 Local Community

Following Recommendations are made for Local community to have a positive role in the region

1. Locals in the Karakoram Pamir Landscape should Support conservation efforts by government and non-government organizations and understand that these conservation efforts are made for their own benefit.
2. Locals should engaging tourists in conservation activities by either informing them about the local environmental laws, or informing them to discourage activities such as littering etc

3. Community participation in policy making at department level is very important for promotion of ecotourism. Community members needs to raise their concerns aswell as be the voice of the local departments in order to create laws for ecotourism.
4. Locals should take part in meetings arranged by NGOs and departments to get updates on travelers information and data sharing so they can subsequently pass on that information to other community members as well as tourists
5. Showcase their products, handicrafts, dry fruits, herbs in local markets or other venues. This can be increase tourism provided that the products are sustainably and ethically sourced.
6. Locals should show willingness to plan and participate in cultural events which can promote ecotourism.

13.4.3 NGO and Others

Following recommendations are made for the NGOs and other development organisations working in the area to have a positive role in the region.

1. Create programs to support ecotourism and local communities. They should focus on research as well as raising funds for supporting ecotourism activities and supporting the locals.
2. Development sector organizations and media agencies can conduct Nationwide public relation, awareness campaigns targeting potential eco tourists
3. Development organizations should Monitoring the landscape to notify any damage being done to the land by harmful activity so that it can be stopped and healthier ecotourism be supported.
4. Promotional activities should be carried out by them in coordination with local communities. They should engage the local communities in order to spread the word regarding the tourism aspects of the region
5. Development organisations can conduct training for local communities for guided tours, basic first aid knowledge and other skills that may help them in securing potential work with tourists coming in the region and thus promoting ecotourism.
6. Develop educational component for both the traveler and local communities either through promotional material or introducing values for eco friendly tourism in the education system so the tourists are informed of the need for protection of the area.
7. Partnership with private sector for developing infrastructure, conducting awareness campaigns, developing promotional materials
8. Conduct surveys with focus on; what the visitor would like to experience; what the visitor enjoy/values most about the area; types of activities visitors are most interested in; types of accommodation visitors prefer

13.4.4 Private Sector & Tour Operators

Following Recommendations are made for Private Sector and Tour Operators to have a positive role in the region

1. Tour Operators should ensure that all their clients(tourists) travelling to the area are informed of the local laws and sensitized towards the need for conserving the local environment. They should send out information in either email or written material to the travellers so they do not harm the environment and thus promote ecotourism.
2. Tour operators can create packages that promote ecotorusim such as including activities in tour packages where tourists can work with local community for helping the environment such as tree planations and clean up drives.
3. Private sector companies involved in tourism activity such as hotels, resorts and large restaurants should ensure that their staff are trained about the local laws and can inform tourists who inquire regarding them.
4. Private sector companies involved in tourism activity such as hotels, resorts and large restaurants should place promotional material such as flyers/posters on their premises to inform the visitors regarding ways to reduce damage to the environment.
5. Tour Operators should ensure the vehicles they are using meet the environment standard and do not result in causing harm to the area.
6. Private Sector should work closely with local government and departments aswell as NGOs to ensure that they work together to promote ecotourism.

13.5 IMPACT OF ECOTOURISM

Generally, the ecotourism creates positive impact on the landscape as well as on local community through environmental, social and economic perspective. However, it has tendency of creating negative impact also which needs to be monitored and control through effective awareness and legislative reforms.

13.5.1 Environmental Impact of Ecotourism

Ecotourism helps promote conservation of wildlife and natural resources such as lakes, glaciers, national parks and mountains as these are regarded as tourism attraction in Karakorum-Pamir Landscape. By creating effective awareness among tourists, many productive participatory conservation activities can be arranged and managed at village and valley level. Diversified professional backgrounds of tourists can be combined with ongoing conservation and environmental development activities.

Ecotourism also poses a threat to region's natural and cultural resources, such as water supply, forests, grazing areas and heritage sites, through overuse and littering hence causing pollution. Due to increase in numbers of tourists every season/year, conservation laws and regulations must be implemented in the form of warnings and fines to keep the biodiversity and natural resources intact in the region.

13.5.2 Social Impact of Ecotourism

The improvements in infrastructure, knowledge base and means of transport has resulted in increase of ecotourism which has also provided benefit to the local community. Ecotourism encourages the preservation of traditional customs, handicrafts and festivals that might otherwise have been allowed to wane, and it creates civic pride. Interchanges between hosts and guests create a better cultural understanding and can also help raise global awareness of issues such as poverty, health, education and human animal conflicts.

Visitor behavior can have a detrimental effect on the quality of life of the host community. Tourism can even infringe on human rights, with locals being displaced from their land to make

way for new hotels or poorly managed recreational activities which may also lead to an erosion of traditional cultures and values. It is the responsibility of government departments and NGOs working in these areas to ensure the privacy and respect of the local community is kept intact.
Corporate sector and NGOs can collectively plan combined CSR activities that can play an important role in building good, friendly, social and mutually beneficial relationship between local communities and the eco tourists.

13.5.3 Economic Impact of Ecotourism

Tourism creates jobs, both through direct employment within the tourism industry and indirectly in sectors such as retail and transportation. When these people spend their wages on goods and services, it leads to what is known as the "multiplier effect," creating more jobs. The tourism industry also provides opportunities for small-scale business enterprises, which is especially important in rural communities, and generates extra tax revenues, which can be used for schools, housing and hospitals. It can also help to generate revenues for local communities. By enforcing and regulating ecotourism management policies the local communities can take advantage by securing employment on contractual or permanent basis. Being employed in their own region, they will ensure conservation in the area and take pride in sustaining the natural resources and biodiversity.
Improvement in livelihood of local community through guided tours, handicrafts sales, basic food supply such as poultry and dairy products is also based on ecotourism as it will provide them additional earnings.

14. FUNDING MECHANISM

Funding is bloodline for any non-profit organization. Mostly the NGOs work on project to project basis. A successful completion of project increases the credibility of an organization and elevates trust in donors. Fundraising holds a key position in the list of project components. NGOs often get lost when they have to start planning to raise funds for their projects and programs. As soon as one project ends, they quickly need to look around for more funding to sustain their work. But funding may not be immediately available for them to grab it.

A well planned and strategically developed fundraising campaign would be the first step of starting a project or program for a cause. Funding mechanism for Karakorum Pamir Landscape Management Plan is not only challenging but also include variable dimensions.

14.1 COMPONENTS OF FUNDRAISING

When Creating a Funding Proposal following element require careful deliberation

Why funding is required?

In order to conduct a fundraising activity, it is very important to identify why the said activity is being carried out. Focus needs to be placed on what parts of the project will require funding such as contract for consulting and facilitating services or to cover logistical expenses. This information needs to be properly gathered before undertaking fundraising activity

Developing a Project budget

Keeping in mind the size and complexity of the project a detailed project budget needs to be established. The budget should mention the exact areas where funding is required and will provide a guidelines for the financial aspect of the project. It will also need to check how many human resource are involved in the project as well as the geographic spread of the project.

Monitoring and Evaluation

Monitoring and Evaluation strategy needs to be clearly identified when creating a funding proposal so that the donors can be informed of how the project will be evaluated.

14.2 FUNDS GENERATION

Fundraising is simple in design and concept, but it needs a lot of hard work. It requires planning, executing, and assessing as well as paying attention to detail. It involves knowing your organization and what it needs. It also involves knowing who has the money, and how much they can give.

No matter how good an organization is or how valuable and efficient its services are, people will not give money unless they are convinced to do so. Fund-raisers function much as sales and marketing people do in the commercial world. Generating funds for this plan is very essential and this chapter explains various fundraising aspects we will be focusing on.

14.3 CONNECTING WITH DONORS

To start implementing our fundraising strategy we will be identifying potential donor agencies and making a thorough list of point of contacts for all such donors. We must remember that

different donor agencies have different causes and issues to fund. So we cannot contact all of them with funding requests. We need to identify those who are either engaged in funding similar projects as SLF or whose mission alligns with ours

We will be engaging Donor Agencies and informing them about the Project. This will be done via face-to-face meetings, sending out concept notes and sending out information regarding the project and making sure that Donors understand the scope of the project and the need for funds as well as clarifying exactly where their funds will be used. Since fundraising is a long-term activity, we cannot expect immediate response from donor agencies. It's a continuous process that requires careful follow ups.

14.4 FOCAL AREAS OF GENERATING FUNDS FOR KARAKORUM PAMIR LANDSCAPE MANAGEMENT PLAN

A comprehensive project plan needs to include the targeted activities and projected outcomes which can be monitored and evaluated in terms of allocated funds and its distribution. A donor agency or corporate institution would only be interested to fund our project/program if it is designed to bring noticeable changes in the lives of the community or the biodiversity of region or landscape. Table 15-2 highlights the focal areas of funds generation and the rationale for choosing them.

Table 14-1 Focal Areas of Funds Generation

Focal Area	Rationale
Community oriented projects	One of the most important area for generating funds is to design community oriented projects. All the social work done for a cause includes individual as well as community welfare programs. This would attract the donor agencies' interest of donating funds for giving their money for the welfare of a community.
Service providing	In many areas in Karakorum Pamir locals are not provided with some of the necessary services due to lack of management and poor planning of distribution of funds. If proper funds are generated these services can be provided to improve the livestyle of the local community hence fundraising can go beyond just providing monetory funding but towards services aswell

Focal Area	Rationale
Schematic projects	It is most important aspect of fundraising on the basis of a systematic schedule to be followed annually in which we can plan different projects regarding community welfare. The SLF team can work in groups and visit different unprivileged areas providing basic facilities to the natives of that area. Different social upgrading projects include the sectors like education, environmental awareness, capacity building of women in household and livestock care, providing health facilities and different hygiene programs, human and animal conflicts. If we can create an impact by implementing and introducing these initiatives then it may be worth more than raising funds for the betterment of local communities in the landscape.
Mass media campaigns	Different campaigns can be developed and done in collaboration with different media partners for welfare of society. The interface between media and society gives the best combination to boost up the progressive planning and economic growth of funds and finance. It can also enhance the image of our organization through media projection.
Disasters rescue and relief projects	Some special projects are developed on urgent basis at the time of natural disasters or calamities like earthquakes and floods. The role of any organization at this time is one of the most significant contribution in providing services and facilities for betterment. These special projects become an eye catcher of the donor agencies and a high rate of fund raising is achieved according to the performance of organization.
Collaboration with public sectors	Working in collaboration with different public sectors is one of the easiest and oldest ways of raising funds for a project or activity. The aim of organization should only be to facilitate local community by providing welfare support and basic facilities to improve their living conditions. Awareness campaigns and public service messages for ecotourism can also be considered through these collaborations.

Focal Area	Rationale
Training and Awareness Campaign	Providing training and educating the staff of various public departments working for Environment and wildlife is very important. We may try to collaborate with the relevant government and provincial authority to provide seminars and training to sensitize their staff regarding the environmental issues. Funds will be needed to conduct such trainings by experts.

14.5 PLANNING AND IMPLEMENTING A SUCCESSFUL FUNDRAISING CAMPAIGN

For implementing a successful project it is important to determine the financial need for the project and how to create the capacity to design and manage a fundraising campaign. A clear budget needs to be created with a financial plan detailing all the finances that will incur in the course of the project and avenues where funds will need to be generated to meet the financial requirements.

The fundraising campaign must be managed thoughtfully so that the benefits continue after the campaign is formally over. This involves setting u proper budgets, forecasting and auditing to ensure that the funds generated are used for the sole purpose they were raised.

In order to generate funds, we will be focusing on a strong communication strategy. Our main aim will be to Communicate our goals in the campaign to the general public. If the public is aware of our needs for fund generation and the reason for these funds they will be more inclined to help the cause. Thus we need to craft the message carefully. The campaign goal(s) should be communicated in clear, simple language, realistic and measurable manner.

There will be a strong focus on creating a detailed budget. A good budget will work as a framework for the financial plan of the project as well as guide the direction and feasibility of various campaigns undertaken.

Planning is the key step for creating a fundraising campaign. With any project, taking the time to plan well and anticipate our expenses and revenue is time worth invested. The types of expenses our organization can anticipate include (but not limited to): Personnel, services such as public relations, graphic design, printing, social media, promotional products, travel, events and administration

14.6 RESOURCE MOBILIZATION

Fundraising and Resource Mobilization may be different from their definitions but in technical terms they can be interlinked for running the project successfully. Resources can include many different things, not just money, for the project or organization. Apart from money, we can also raise support from volunteers; can also receive material donations for our project; or can get in-kind contribution from the local community. So, in order to put all these sources of support in place (including cash support), we refer to them collectively as 'resource mobilization.'
To further understand what this process Table 15-3 explains the different types of support and the approach for each mode of fundraising

Table 14-1 Fundraising modes & approaches

Mode	Approach
Funding in the form of cash	Submission of proposal to a registered donor organization for obtain financial support for the project
Fundraising events	Collection of donation by organizing fundraising events at national level. At times, getting media partnerships in such events can help in generating more funds due to promotion and publicity of the cause and project and the stakeholders who would benefit directly through the project activities
Collecting in-kind contribution	In-kind contributions are equally and very important component of funding process. It can be in the form of clothes, furniture, books, vehicles or even buildings.
Crowd funding	The project/program includes various activities for local communities. Crowd funding works great for such short term capacity building or awareness activities in the project areas
Volunteer Support	Time and resources of individuals also contributes in the support of the project
Micro-enterprise based activities	The Karakorum Pamir landscape is full of potential for micro enterprise based activities. We can follow the SLE operational pattern and develop such activities for support of the local community

All the above listed types of support are essential for a project though all of them do not contribute equally to its funding needs. Yet, a good fundraising strategy will consider all these

PART THREE
SUMMARY AND REFERENCES

15. SUMMARY OF PRESCRIPTIONS AND BUDGETS

This chapter summarizes major prescriptions identified in earlier chapters and budgets these for the five years (2018-2023) as part of the implementation of the management plan. Table 15-1 shows a brief work plan with effect from 2018 to 2023 for the implementation of the Karakoram-Pamir Landscape Management Plan along with the budget required for the activities.

As mentioned in Chapter 8 in details, the first important aspect of Karakoram Pamir Landscape Management Plan will be to conduct landscape zonation . Two Major Landscape units identified are Priority Wildlife Area and Multiple Use Area based on their wildlife values and socioeconomic feasibility. For Establishing of Zonation, We will be Conducting meetings with relevant stakeholders to develop and implement agreements for the designation of the Core Landscape Units identified in this plan. This would require coordination with Local communities, Wildlife and Forest Department and NGOs. 25 meetings will be conducted

At present, both flora and fauna diversity of the landscape is poorly understood. We will need to conduct studies to document landscape patches having high endemism or having significant concentration of important flora and fauna for possible inclusion in the network of cores in the landscape. 20 such studies will be conducted.

The plan prescribes to develop monitoring protocols for the socioeconomic and ecological attributes in the landscape units starting with baseline estimates. Outlines for monitoring wildlife such as snow leopard, other species and vegetation are provided in this plan. Our target is to develop 10 such protocols. These need to be implemented by the Wildlife and Forest Departments in collaboration with the Valley Conservation Committees and other conservation partners in the core landscape units to establish baseline for at least large mammals, medicinal plants and forests.

There are various threats to Snow Leopard and their prey specie in Karakoram Pamir Landscape. These threats have been analyzed into four broad categories and the threats have been ranked in detail in Chapter 5. In order to understand and combat such threats, we need to Conduct targeted and action research to enlist emerging threats in the landscape units with the help of Conservation NGOs, Govt. depts. And VCCs. 15 such studies need to be conducted. Extensive training sessions, meetings as well as campaigns need to be launched in order to mediate the threats identified in this year. This would require Building capacity of the grass root structures and communities , increasing awareness of the communities about conservation and management of biodiversity, Capacity building of Wildlife and Forest staff and communities in detecting and combating crimes related to wildlife and environment. Besides these trainings and workshops, we will need to develop a plan to reduce dependency of local people on natural resources by providing economic incentives aswell as conducting Conservation incentives to mitigate human-wildlife conflict.

Another key prescription of this management plan is to create collaborative landscape based conservation mechanisms. This can be possible through developing cooperation and coordination among Wildlife and forest departments so that their staff and resources can be utilized more judiciously and effectively. The Management Plan hopes to set up mechanisms that enable this to happen in the Karakoram-Pamir Landscape. For this, we need to Identify, establish and strengthen Valley Conservation Committee (VCC)s and District Conservation Committee (DCC) in the landscape as well as Constitute Landscape Conservation Committee . There is a need to Equip field staff in terms of field gears, surveillance tools, and providing accommodation and camping facilities. The Management Plan also prescribes to boost convergence activities, especially in the fields of agriculture, animal husbandry, education and tourism that can help people's livelihoods

The Management Plan prescribes spread and promotion of environment education in the region. A package of awareness and education activities for youth and schools children are to developed and implemented in the landscape. This would involve working in collaboration with local education institutes, Forest/Wildlife Depts and Conservation NGOs. The plan aims to target 100 schools in the area to spread the message.

Ecotourism also needs to be developed and promoted in the landscape. The Management Plan prescribes Developing and implement tourism strategy for the landscape. To develop such strategy we will work with Tourism, Wildlife and Forest Depts and Conservation NGOs

Table 15-1 A brief work plan with effect from 2018 to 2023 for the implementation of the Karakoram-Pamir Landscape Management Plan

Broad Activity	Targets	Timeline	Lead role	Budget in in million PKR
Landscape Zonation				
Conduct meetings with relevant stakeholders to develop and implement agreements for the designation of the Core Landscape Units identified in this plan (8.9)	25 meetings	5 per year	Local communities, Wildlife and Forest Dept. and NGOs	0.625 (25k/meeting)
Document key flora and fauna of the main landscape patches having high endemism or having significant concertation of important flora and fauna for possible inclusion in the network of cores in the landscape (8.9).	20 studies conducted	5 studies per year starting from year 2	Wildlife and Forest Dept. and other Conservation Organizations	10.0 (0.5/study)
Develop monitoring protocols for the socioeconomic and ecological attributes in the landscape units starting with baseline estimates (8.9).	10 protocols developed	3 per year starting from year 1	Wildlife and Forest Dept. and Park Management. Leading NGOs	3.0 (0.3/activity)
Tackling threats				
Conduct targeted and action research to enlist emerging threats in the landscape units (9.2)	15 studies conducted	3 per year starting from year 1	Conservation NGOs, Govt. depts. And VCCs	4.5 (0.3/study)

Broad Activity	Targets	Timeline	Lead role	Budget in in million PKR
Build capacity of the grass root structures and communities (9.2).	20 trainings	4 per year	..do…	4.0 (0.2/training)
Raise awareness of the communities about conservation and management of biodiversity (9.2).	50 campaigns	10 per year	Wildlife and Forest Dept., NGOs and Education Dept.	2.5 (0.05/event)
Capacity building of Wildlife and Forest staff and communities in detecting and combating crimes.	5 workshops	1 per year	Conservation NGOs, Wildlife and Forest Dept.	2.5 (0.5/workshop)
Reduce dependency of local people on natural resources by providing economic incentives.	15 micro plans in tandem with Valley Plans	3/year	..do..	7.5 (0.5/micro plan)
Conservation incentives to mitigate human-wildlife conflict and compensate losses implemented.	Conservation package in 15 valleys	3/year	..do..	30.0 (2.0/site)
Collaborative Landscape Based Conservation Mechanisms				

Broad Activity	Targets	Timeline	Lead role	Budget in in million PKR
Identify, establish and strengthen Valley Conservation Committees in the landscape (10.1.2).	15 Valleys	3/Year	..do..	9.0 (0.6/valley)
Establish and strengthen District Conservation Committees (DCCs) [10.1.2]	8 DCCs	At least two meetings per year	Wildlife and Forest Dept.	1.6 (0.1/meeting)
Constitute Landscape Conservation Committee (10.1.2)	1	Committee established and meets twice a year	..do..	1.0
Boost convergence activities, especially in the fields of agriculture, animal husbandry, education and tourism that can help people's livelihoods and also in conservation goals (10.1.2)	5 meetings	1 meeting/year	..do..	0.5 (0.1/meeting)
Equip field staff in terms of field gears, surveillance tools, and providing accommodation and camping facilities (10.1.2.)	200 kits/equipment 10 camping facilitates developed	20% per year	..do..	6.0 (30k/set) 5.0 (0.5/site)
Conservation Education				

Broad Activity	Targets	Timeline	Lead role	Budget in in million PKR
A package of awareness and education activities for youth and schools children developed and implemented in the landscape	100 schools equipped with resource material	20 per year	Education/Forest/Wildlife Depts. And Conservation NGOs	10.0 (01/school)
Tourism development				
Develop and implement tourism strategy for the landscape	1 strategy developed	2nd Year	Tourism, Wildlife and Forest Depts. And Conservation NGOs	1.0

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