

Valley Conservation and Sustainable
Development Plans
Central Karakorum National Park
2016-2026
Gilgit Baltistan
District Ghanche



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Central Karakoram National Park
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CONTENTS

Abbreviations.....	i
1. Overview Of CKNP	1
1.1. Localization and access.....	1
1.2. Local Climate.....	3
1.3. Ecological Profile	3
2. Management of CKNP.....	4
3. Need of Revised operation plan/Seed phase extension.....	5
4. Scope of the VCSDP	6
4.1. Objectives of VCSDPS.....	7
4.2. Structure and Composition of the VCSDP Plan	7
4.3. Process of VCSDP Development	8
4.3.1 Development procedure of Questionnaire	8
4.3.2 Design of Questionnaire.....	8
4.3.3 Pre-testing of Questionnaire and pilot survey	9
4.3.4 Sample Size and Interviewee classification	9
4.3.5 Data collection, Compilation and Analysis	10
4.3.6 Ethical Consideration	11
5. Overview of CKNP Valleys.....	15
6. Management issues and problems	23
6.1. Agriculture	23
6.2. Pasture.....	24
6.3. Water.....	25
6.4. Forest and NTFP Issues	26
6.5. Eco-tourism.....	26
6.6. Mining.....	27
6.7. Wildlife and Protected areas	27
7. Proposed Management Interventions.....	31
7.1 Agriculture	31
7.2 Pasture.....	33
7.3 Water.....	35
7.4 Forest and NTFP	35
7.5 Eco-tourism.....	36

7.6	Mining.....	36
7.7	Wildlife and Protected areas	37
	List of VCSDPS	38

List Of Exhibits

Exhibit 1: Landscapes of CKNP	1
Exhibit 2: Protected areas of Gilgit-Baltistan	2
Exhibit 3: K2, CKNP	3
Exhibit 4: Vegetation of CKNP	3
Exhibit 5: North East face of CKNP	4
Exhibit 6: Meeting with community representatives	8
Exhibit 7: Presentation about VCSDP	9
Exhibit 8: Meeting with Enumerators.....	9
Exhibit 9: FGD with local community	10
Exhibit 10: Female Enumerator interviewing local representative of Danyore Valley	10
Exhibit 11: Training of enumerators for Data Punching	11
Exhibit 12: Socio-Demographic Information of CKNP valleys	14
Exhibit 13: Valleys of CKNP	15
Exhibit 14: Status of Natural Resource Harvest in CKNP valleys.....	16
Exhibit 15: Assessment of validity of customary and statutory rules in CKNP valleys for Park resources.....	17
Exhibit 16: Impact of Climate Change on Local Community	19

Abbreviations

°C	Celsius
ABG	Annual Biomass Growth
CAI	Current Annual Growth
CKNP	Central Karakoram National Park
CPEC	China Pakistan Economic Corridor
E	East
EIA	Environmental Impact Assessment
FGD	Focus Group Discussion
GB	Gilgit-Baltistan
GLOF	Glacier lake outburst flood
HH	Households
INGO	International Nongovernmental Organization
Kg	Kilograms
KIU	Karakorum International University
LSO	Local Support Organization
m a.s.l.	Meter above sea level
Mg	Mega grams
MP	Management Plan
N	North
N/A	Not Applicable
NGO	Non-governmental Organization
NTFP	Non-Timber Forest Product
OP	Operational Plan
S	Summer
SEED	Social Economic Environmental Development
UC	Union Council
VCC	Valley Conservation Committee
VCF	Valley Conservation Fund
VCSDP	Valley Conservation and Sustainable Development Plan
VCSP	Valley Conservation Sustainable Plan
VO	Village Organization
W	Winter
WO	Women organization
Yr	Year

1. OVERVIEW OF CKNP

1.1. Localization and access

The Central Karakoram National Park (CKNP), officially gazette as National Park in 1993, is situated within geographical limits of Gilgit-Baltistan. It is the largest national park in Pakistan, placed in category-II. This consists of two main zones, the Buffer Zone and the Core Zone, for a total of 10,557.73 Km². According to new administrative divisions, park spans on five of the ten districts of Gilgit-Baltistan¹. These districts are Gilgit, Skardu, Nagar, Ghanche and Shigar.

CKNP presents variety of landscapes attitudinally ranging from 2000 - 8,000 m asl including world's second highest peak K2 (8,611 m asl), as its center piece and number of largest glaciers outside the polar regions. Land cover map of the area indicates that a major part (66.5%) is covered by snow and glaciers. Bare rocks and bare soils also represent a substantial part (15.4%) of CKNP whereas vegetation base classes

CKNP is the largest national park of Pakistan CKNP having an area of 10,557.73 Km²



Exhibit 1: Landscapes of CKNP

represents about more than 14.7% of the area. Besides this, several other high altitude peaks and glaciers, provides world class tourism and mountaineering opportunities for tourists, trekkers and several others.

¹Khan, B. (2011). Field Guide to the Central Karakoram National Park, Pakistan. CESVI, Pakistan, Islamabad, pp. 45

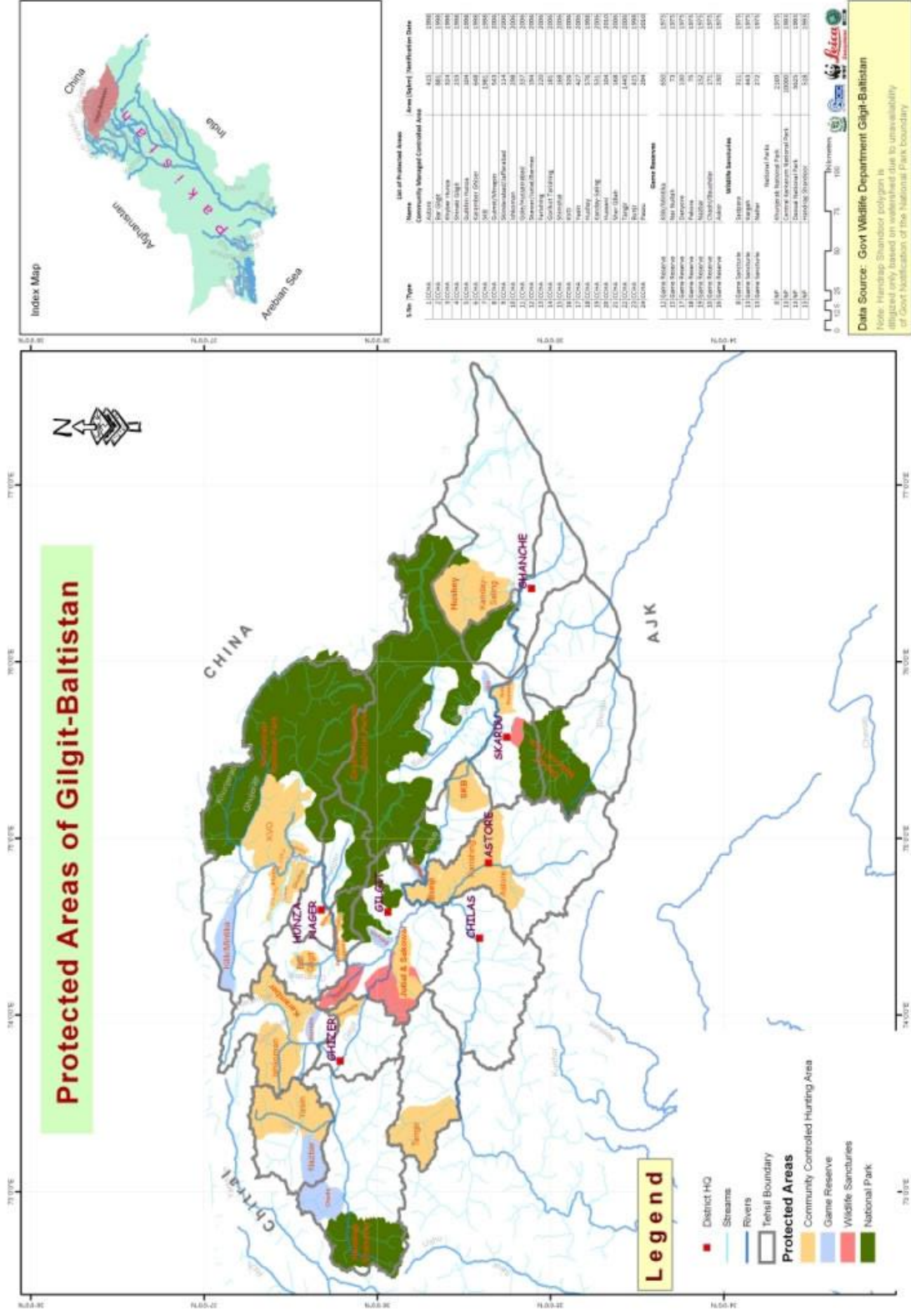


Exhibit 2: Protected areas of Gilgit-Baltistan

1.2. Local Climate

CKNP is part of the “transitional zone” between arid Central Asia and semi-humid subtropics of the South Asia. Local climate is characterized by greater precipitation in winter and spring and by the effects of arid continental climate in summer with sudden onsets of cold weather in early autumn. Average rainfall in the valleys is 100-300mm throughout the year².

1.3. Ecological Profile

Diversity and distribution of natural vegetation and associated fauna is closely linked to climatic and topographic conditions. It declines northwards of the park and increases in south-western regions of CKNP. Owing to the diverse micro-climatic, geographic and environmental conditions. The area is rich in biological diversity and a great source of freshwater and



Exhibit 3: K2, CKNP



Exhibit 4: Vegetation of CKNP

other services of highly aesthetic, ecological and socio-economic significance, for millions of people in Gilgit-Baltistan, as well as for those living downstream of the River Indus in Pakistan, and elsewhere in the world who like to venture through the rugged mountainous and glaciated landscape of Karakoram³. The dry alpine vegetation, comprising the species of *Artemesia*, *Juniper*, *Polygonum* and *Wild Rose* on slopes, whereas, *Myricaria* and sea buckthorn bushes along riverbanks and streambeds characterize most of the CKNP areas. Broadleaves mainly consist of scattered patches of *Betula utilis* and *Salix* spp., found in humid places. Conifers, comprising mainly of *Pinus wallichiana*, predominantly occur at lower altitudes in the western ends of the Park including Roundu Skardu, Haramosh, Bagrote and adjacent valleys of Gilgit

² Mari, F., Gallo, M., Vuillermoz, E., Milanesi, D., Dece, L., Burashchi, E., Hassan, R., Central Karakoram National Park Management Plan. Ev-K2-CNR, Pakistan, Islamabad, pp. 323.

³ IUCN, Pakistan. (2009). Central Karakoram Conservation Complex. Draft Management Plan. Sub plan: Species Management, IUCN Pakistan, Karachi. Pages 24.



Exhibit 5: North East face of CKNP

and Hunza and Nagar⁴. Large mammals are a key resource and important conservation focus in CKNP (IUCN, 2009a). The Park is a refuge area not only for threatened species, such as markhor, musk deer, Ladakh urial, Marco Polo sheep (presence to be confirmed in CKNP) and snow leopard, but also for non-threatened but important “flagship” species, such as blue sheep, Siberian ibex, lynx and grey wolf.

2. MANAGEMENT OF CKNP

The management of national park has been governed by its management plan developed in 2014. CKNP is surrounded by 230 villages, inhabited by over 115,000 people living in about 13,000 households, which have access rights upon resources.

Majority of the local communities live an agro-pastoral life depending upon the Parks resources such as rangelands, forests, wildlife, medicinal flora, etc. Moreover, a considerable number of local people are also engaged in tourism and mining industry in and around CKNP. Thus, the local communities around CKNP are major stakeholders and systematic community involvement in Park management is highly desirable to foster a positive relationship between people’s needs and Park ecology, which has been emphasized in Integrated Park Management Plan (IPMP) for CKNP⁵ for the following major reasons:

One of the National Park’s goals is to preserve and promote, in a sustainable way, local cultural heritage which is widely distributed in the valley adjoined CKNP; the CKNP management process is based on a “participatory development and implementation strategy”. Considering the large extent of the park and the socio-economic and ecological diversity in the surrounding areas, the resources of the Park management office are limited and will have to rely on a large extent on communities living around CKNP for successful park management. For these reasons the park management office aims at committing community-based organizations to collaboration for management of the park⁶.

⁴ Ferrari, E. (2014). Methodological issues in implementing a Sustainable Forest Management Plan in remote mountain areas: the Karakorum (Pakistan). Ph.D. Thesis. University of Padova, Italy.

⁵ Integrated Park Management Plan (IPMP) for Central Karakoram National Park. 2014. Developed by Ev-K2-CNR, Islamabad, Pakistan.

⁶ Flury, B. 2012. Livelihoods and natural resource management in Central Karakoram National Park Areas – Braldo and Basha valleys. Research Report Developed for SEED Project. 46 pp.

However, illegal activities (e.g. wood collection, grazing and tourism) are conducted inside the Park borders. The natural resources in CKNP are subjected to pressure due to traditional rights of the local inhabitants and tourism practices⁷. In addition, other activities not directly related with resource use could affect the Park integrity; and the local communities have some expectations from the Park as a relevant tool to improve their living standards and socio-economic conditions. In CKNP areas, community participation in co-management of natural resources starts from 1990's with establishment of Village and Valley Conservation Committees (VCCs) by INGOs such as IUCN and WWF. The initiative was based on Community-based Natural Resource Management (CBNRM) approach, which was first implemented in Africa and then adapted and applied in some areas of Gilgit-Baltistan, including an adjacent village of CKNP namely Hushey⁸. The initiative primarily aimed at development of community-based trophy hunting program. By 2013 more than 30 community-based organizations namely VCCs, LSOs and other local NGOs were formed by organizations like AKRSP, GBFWED, Ev-K2-CNR and WWF to facilitate CBNRM around CKNP with a view to have protect the Park resources.

Management plan for CKNP has already been developed by EVK2CNR and implemented by CKNP directorate; in response to which certain management gaps have ascended and create difficulty in the park management. To address this issue new and detailed operational plan on the basis of VCSDPS have to be developed for revised management plan of CKNP.

3. NEED OF REVISED OPERATION PLAN/SEED PHASE EXTENSION

The CKNP management plan has already been translated to an operational plan, making it easier for the park staff to understand and implement the plan. The operational plan is based on the data that was available through earlier surveys and reports on the socio-economic and environmental status of selected valleys, just 4 in numbers. Although most of the information, collected earlier were applicable to rest of the park valleys, but there were some obvious gaps that were identified through subsequent evaluation with some as follows:

- a) Assessment of Customary Practices
- b) Assessment of Climate Change impact on natural resources
- c) Valley specific action plan

Besides, this was realized that since the implementation of the CKNP management plan is the basic objective that has been made easier through the formulation of an operational plan but since there were gaps in information from the valleys, reflecting in the management, and subsequently in the operational plan, the consequent implementation of the plan may not yield the desirable results.

⁷ Panzeri, D & M. Khan. 2009. Livelihoods in Central Karakoram National Park. Socioeconomic baseline data survey. HKKH Technical Report, 77 pp.

⁸ IPMP for CKNP. 2014. Developed by Ev-K2-CNR, Bergamo, Italy

4. SCOPE OF THE VCSDP

Villages surrounding the buffer area of CKNP have been defined into 15 distinct valleys. These valleys have been defined by same watersheds, considering some geographical analogies, district appurtenance and other proximity relations. For each valley around CKNP a specific Valley Conservation and Sustainable Development Plan (VCSDP) needs to be prepared and implemented to manage core, transition and buffer zone related conservation issues. CKNP VCSDP deals with the integrated conservation and sustainable development matters of its 15 valleys namely Danyore, Haramosh, Upper Braldu, Lower Braldu, Shigar, Astak, Tormik, Thalay, Ghulmat, Nagar, Bagrot, Basha, Hoper-Hispar, Nagar and Hushey that fall within CKNP buffer zone and depends upon park resources for subsistence. Integrated Park Management Plan (IPMP) for CKNP (2014)⁹ emphasizes to strengthen the community-based organizations (VCCs and LSOs) around CKNP to make them integrated conservation and development bodies, with a view to:

- a) Institutionalize an integrated conservation and development approach at the community level;
- b) Increase effectiveness of project implementation
- c) Empower women and strength representation of communities into the CKNP management process.

Valley Conservation planning process has been a valuable and important part of the CKNP management in engaging local communities. However, the CKNP Management Plan (2014) while evaluating the existing VCPs around CKNP has identified some gaps to improve this process. Those gaps include several factors such as lack of consistency between various components of the plans, lack of conceptual clarity, and lack of a monitoring mechanism, less clear role, responsibilities, and inappropriate information about resources required to undertake the desirable actions.

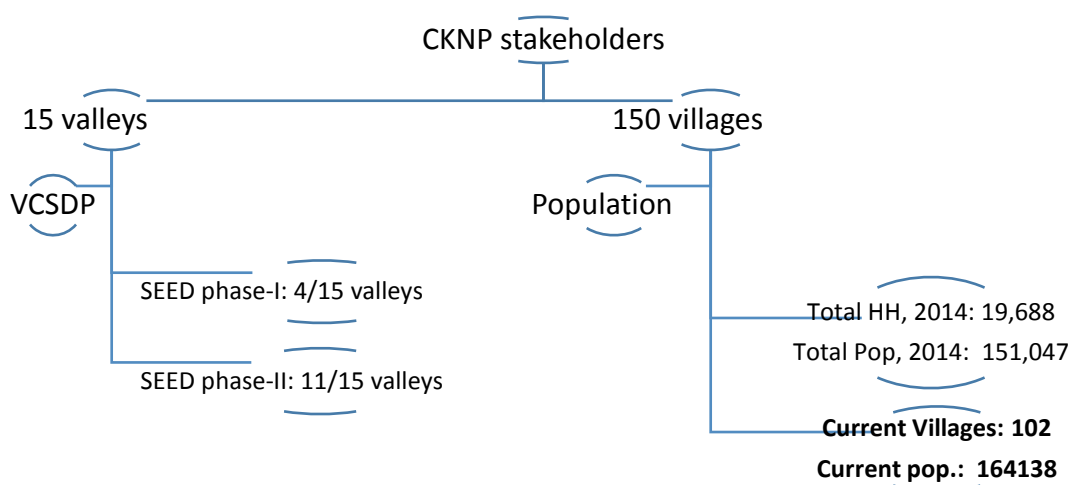
Based on this evaluation, the CKNP Management Plan (2014) has recommended to “revise and amend the VCPs according to a tested and universally acknowledged planning instrument, such as the logical framework approach, for example if they are to fulfill their functions as an instrument for grass-roots planning and implementation within the CKNP management process”.

Development and approval of VCPs involve four steps including:

- a) Resource Need Assessment (RNA)
- b) Participatory Conservation Planning (PCP)
- c) Approval of VCP from District Conservation Committees (DCCs)

⁹Integrated Park Management Plan (IPMP) for CKNP. 2014. Developed by Ev-K2-CNR, Country Office, Islamabad, Pakistan

d) Implementation of VCP through VCCs and other stakeholders.



4.1. Objectives of VCSDPS

One of the steps of CBNRM was to develop Conservation Plans at village or valley level, aimed to provide guidelines for participatory natural resource management. The revised VCPs, keeping in view the integration approach have been termed as Valley Conservation and Sustainable Development Plans (VCSDPs) aimed at the following specific objectives:

- Promote participatory NRM in CKNP buffer zone villages and valleys to ameliorate environmental conservation of the park.
- Create synergies among park stakeholder to promote community-based conservation in CKNP buffer zone.

4.2. Structure and Composition of the VCSDP Plan

The plan comprises of the following ten segments:

- Socio-economic and Ecological profile of valley
- Assessment of Customary Practices
- Assessment of Climate Change impact on natural resources
- Management issues and problems;
- Proposed management interventions
- Management actions
- Indicators of process and progress
- Implementation mechanisms/Available capacities for the implementation of the Valley Conservation Plans: Social organizations - CKNP Directorate - Facilitating NGOs/CBOs - Others
- Expected outputs
- Visible bottlenecks in realizing the expected outputs, and arrangements (available and potential both) to overcome the bottlenecks
- Monitoring mechanism

4.3. Process of VCSDP Development

The VCSDP development process included following stages.

- a) Designing of Questionnaire
- b) Training of Enumerators
- c) Pre-testing of Questionnaire and pilot survey
- d) Sample Size and Interviewee classification
- e) Compilation and Analysis of Data
- f) Write up of VCSDP

4.3.1 Development procedure of Questionnaire

As a result of CKNP management and operational plan, it became essential to develop the VCSDP's to address the climate change adaptations and assessment of validity of statutory and customary laws in each valley for the conservation of ecosystem. To ensure the successful ecosystem planning community based approach was employed for which development of detailed questionnaire was recommended by the technical experts. Owing to the need of improvement in previously developed questionnaire (developed by WWF and Ev-K2-CNR) and VCSDP's of



Exhibit 6: Meeting with community representatives before Questionnaire Development

four valleys (namely Hooper-Hisper, Basha, Hushey, Bagrot) frequent sessions with technical experts from relevant departments, CKNP directorate and representative from local communities were held. The amended questionnaire was semi-structured and involves the research to analyze the attitudes and adaptation practices (customary/statutory) of the local community towards natural resources management in response to changing climate.

4.3.2 Design of Questionnaire

The questionnaire consists of following sections

- a. Basic facilities in the village
- b. Statutory vs. Customary Laws/Practices
- c. Climate Change Impacts on Natural Resources
- d. Assessment of current customary practices in response to climate change
- e. Management Issues/Problems

Design of all sections is based on analysis of past, current and future time scenarios, based on available projections and excavation of indigenous knowledge.

4.3.3 Pre-testing of Questionnaire and pilot survey

Enumerators have been trained by technical personnel about the interview methodology and information probing through relevant follow up questions from the community. Representatives of the target groups have been identified and a pilot survey was conducted to give the enumerators a real time experience along with the assessment of difficulties that can be encountered during the field survey.



**Exhibit 7: Presentation about VCSDP
Questionnaire to enumerators**

4.3.4 Sample Size and Interviewee classification

The 10% of local community in each valley has been interviewed as sample population which responded with almost same type of answers. This repetition of responses shows that enough sample size has been taken. Interviewees were selected randomly but above the age of 40. The minimum scale for age of the interviewee was 40 years because of the enough acquaintance to the nature based on their life experiences as compared to young generation. To ensure accuracy and resolution of conflict in the information, individual interviews were supplemented with FGDs were conducted. The group comprised of 6-12 persons from local community for each focused discussion. Local community and professionals from relevant departments from both genders has been appointed to interview the semi-structured questionnaires.



Exhibit 8: Meeting with Enumerators

Information for socio-economic and ecological profile of the valley, management issues and problems and proposed interventions were obtained with the help of Focused Group Discussion (FGDs); and interviews with household heads.

4.3.5 Data collection, Compilation and Analysis

Both the quantitative and qualitative type of information has been obtained by the questionnaire. The quantitative data in terms of economic benefits has been expressed in relation to customary practices and climate change. The qualitative information will help to design local-level plans or policies may be important in shaping adaptive capacity of vulnerable households and individuals. Regional or district plans and/or sector strategies can give helpful information on priorities of local governments.

By combining local knowledge with scientific data obtained via secondary resources including review articles, this document addresses the people's understanding about climate risks and adaptation strategies and validity of customary rules in consumption of natural resources.

Best natural resource management practices from other PAs such as KNP in Gilgit-Baltistan and lessons of CBNRM from



Exhibit 9: FGD session at Upper Braldo



Exhibit 10: Female Enumerator interviewing local representative of Danyore Valley



Exhibit 11: Training of Enumerators for Data Punching

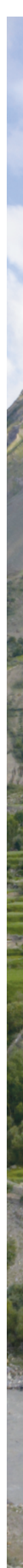
various valleys of GB were also reviewed for extracting proposed management interventions and actions. A meeting was conducted with CKNP management in Skardu to obtain their opinion on management issues, innervations and appropriate actions.

CKNP Management Plan (2014) and SEED Project Technical Report were also consulted for relevant recommendations. Lessons learned by CKNP partners under SEED Project were reviewed from various documents available with WWF-Pakistan. Previously developed VCSDP

of Basha, Bagrot and Hisper/Hoper were also reviewed to obtain useful information.

4.3.6 Ethical Consideration

As the interviews, being done was the research for VCSDPs development, therefore ethical issues were considered. Interviewee were informed about the purpose of the interview and the way this information will be used. Moreover, female interviewers were appointed to conduct the interviews from female representative of local communities to respect their culture and conflict resolution.



OVERVIEW OF CKNP VALLEYS



5. OVERVIEW OF CKNP VALLEYS

Indigenous communities are vulnerable to displacement face the difficult task of ensuring that their communities will be able to stay in place for as long as possible. Indigenous communities while interacting and surviving in nature have collected tremendous information on the ways of adaptability and sustainability. This traditional knowledge is complete resource of culture, experiences, natural resources, climate, and sustainable ways to thrive. These are accumulated through experience, relationships, and upheld responsibilities towards themselves and other living beings and places and are passed down generationally through oral histories, stories, ceremonies, and resource use practices. This traditional knowledge is a knack of local communities and come with certain responsibilities, such as determining when and with whom they should be shared.

Presented below is the assessment of customary practices and adaptation to climate change as a tool of sustainable management of CKNP.

Exhibit 12: Socio-Demographic Information of CKNP valleys

Name of Valley	No. of Villages	Total population		Distance to access road	No. of Schools	No. of Health centers	No. of Vet. centers
		Human	Livestock				
Nagar	7	28716	34250	Connected through link roads	16	6	4
Ghulmat	7	16896	19867	Lies along KKH	15	6	3
Danyore	5	41200	51530	-do-	5	4	2
Haramosh	7	9846	98763	Lies along KKH-Skardu road	6	5	2
Astak	16	6827	24808	45 min drive to main Skardu road.	10	3	1
Tormik	15	8533	16522	Located away from main road	11	3	1
Lower Braldo	8	5952	12263	-do-	7	1	1
Upper Braldo	9	3557	28440	-do-	10	4	0
Shigar	16	20295	15099	-do-	15	10	3
Thalay	10	9116	6220	-do-	8	7	2
Daghoni	2	13200	17600	-do-	2	2	0
Total	102	164138	325362	--	89	45	15

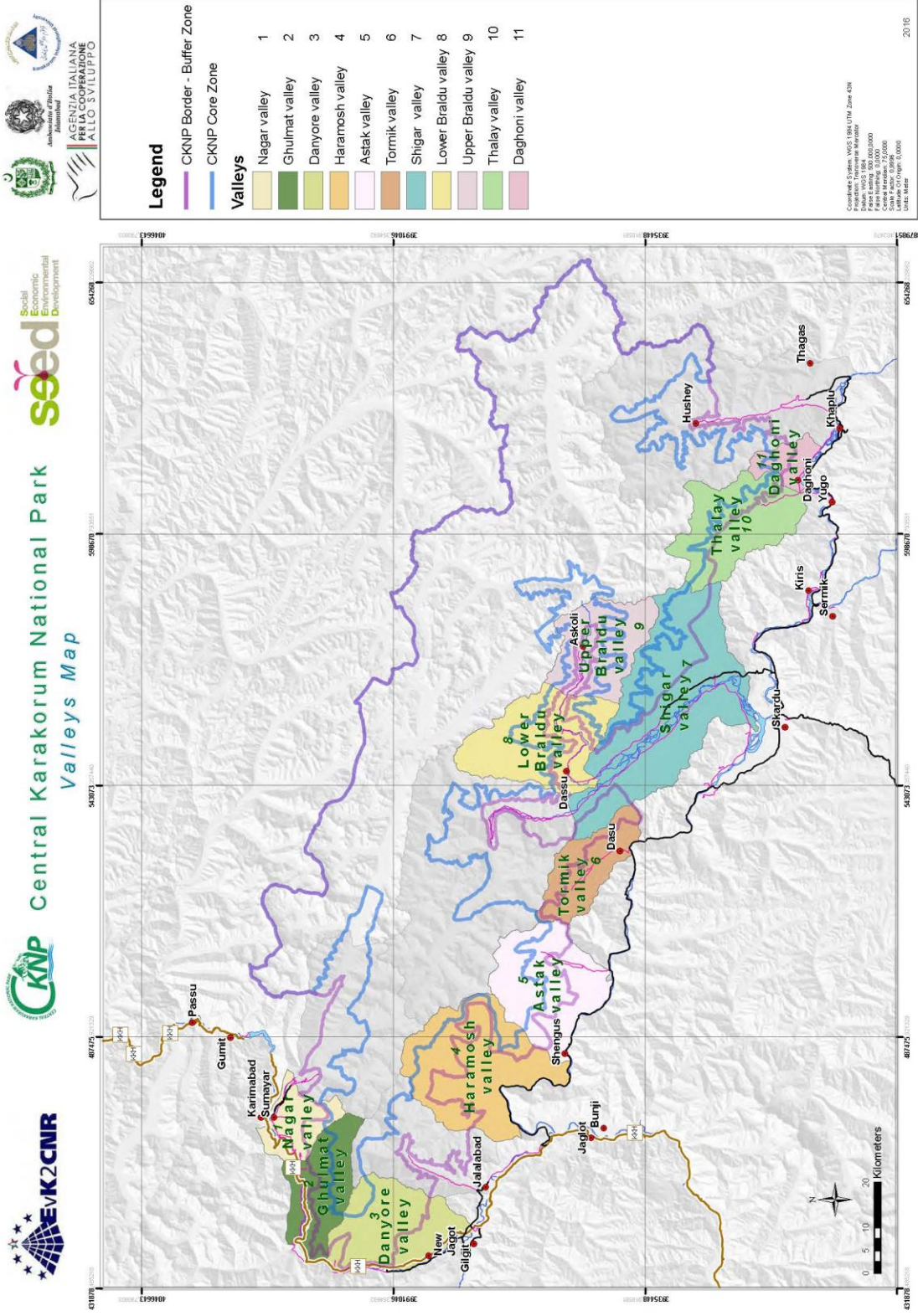


Exhibit 13: Valleys of CKNP

Exhibit 14: Status of Natural Resource Harvest in CKNP valleys

Name of Valley	Water			Forest			Pastures			Medicinal Plants			Wildlife Hunting			
	Sustain able	Unsustainable		Sustaina ble	Unsustainable		Sustaina ble	Unsustainable		Sustaina ble	Unsustainable		Sustaina ble	Unsustainable		
		L	M		H	L		M	H		L	M		H	L	M
Nagar	✓	-	-	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-
Ghulmat	✓	-	-	-	-	✓	-	✓	-	-	✓	-	-	-	✓	-
Danyore	-	✓	-	-	✓	-	-	✓	-	-	✓	-	-	-	✓	-
Haramosh	-	✓	-	-	✓	-	-	✓	-	-	-	-	-	-	✓	-
Astak	✓	-	-	-	-	✓	-	-	-	-	✓	-	-	-	✓	-
Tormik	✓	-	-	-	✓	-	-	-	-	-	✓	-	-	-	✓	-
Lower Braldo	✓	-	-	-	-	✓	-	✓	-	-	✓	-	-	-	✓	-
Upper Braldo	✓	-	-	-	-	✓	-	-	-	-	✓	-	-	-	✓	-
Shigar	✓	-	-	-	-	✓	-	✓	-	-	✓	-	-	-	✓	-
Thalay	✓	-	-	-	-	✓	-	✓	-	-	✓	-	-	-	✓	-
Daghoni	✓	-	-	-	✓	-	-	✓	-	-	✓	-	-	-	✓	-

- Nil, L = Low, M = Medium, H = High

Exhibit 15: Assessment of validity of customary and statutory rules in CKNP valleys for Park resources

S. No.	Consumptive uses of Park Resources.	Community practices	CKNP MP/OP rules	Recommendation
1.	Harvest of Forest and other natural vegetation	Juniper trees are cut and used as fuel wood and timber	Harvest of Juniper is banned; if harvest is necessary than only braches should be removed instead of whole tree	Awareness of community is required
		Riparian vegetation e.g. Sea-buckthorn and Willows, community usually remove the whole plant/tree from soil	Cut single basal shoots from each plant to preserve in its root system. By doing so, new shoots can re-grow rapidly producing new biomass to be harvested	-do-
		Community harvests wood at unsustainable level both from buffer and core zone	Wood and shrub collection is allowed only in the buffer zone up to sustainable level	Afforestation, alternative fuel options and sustainable forest management areas are need to be designated. Along with this harvest rate compatible to annual growth of forest should be determined
2.	Medicinal Plants	Community harvests local medicinal herbs and aromatic plants from park for household purpose	Harvest is completely banned in core zone and allowed at sustainable level from buffer areas under license.	Community must be awarded the license and concerned department restrict the harvest without license.
3.	Livestock Grazing	Herd grazing is allowed only in buffer zone and tourism focused zones of the park.	Community graze their livestock in packs along with dogs inside core zone. Dogs and packs are not allowed inside parks	Improvement in watch and ward mechanism along with community awareness is necessary at urgency
		Equines (horses, mules, donkey) occasionally found in core zone of the park	Equines are allowed only in tourism focused zone	--

S. No.	Consumptive uses of Park Resources.	Community practices	CKNP MP/OP rules	Recommendation
		Yaks and its hybrids freely graze in the park	Grazing of traditional free roaming yaks and yak-cow breeds is buffer and core zone is acceptable	--
		Herders graze livestock in pasture and core zones dispose plastic bags, bottles in nearby streams and also use burn wood from forest	Use of plastic bottles, glass bottles, plastic bags and match box is not allowed inside parks.	Movement must be restricted for the grazers.
4.	Pastures	Community graze livestock in the pastures, which are located in and around buffer zones. Indigenous system of grazing was sustainable. During previous times herders ensured to take livestock into the pastures, when vegetation becomes knee-length. Currently, herders have abandoned this practice and take their livestock to pastures even before its sprouting.	Grazing is allowed only in buffer zone Indigenous grazing system should be revived	-- Awareness and training of herders is important
5.	Wildlife hunting	Community take advantage of inaccurate population counts of wildlife and poach/hunt wildlife at family gatherings, holy occasions and on other such events	Reliable wildlife count by DNA analysis is recommended and also to track poaching for core zone management. Hunting except for “trophy hunting” is banned both for buffer zone and core zone.	Community awareness can serve the purpose. Moreover genetic approach should be employed for accurate population counts and tracking of poaching

Exhibit 16: Impact of Climate Change on Local Community

Valley	Status	Visible Changes	Adaptations to CC by local community
Nagar	Changing	Recession of Glaciers	Dyke buildings of water channels
Ghulmat	-do-	Increased pest infection on crops	No adaptation
Danyore	-do-	Drought during late summer and early winter	-do-
Haramosh	-do-	Emerging Livestock diseases	-do-
Astak	-do-	Drying pastures	Dig creeks to hold snow and rain water in pastures
Tormik	-do-	Occurrence of medicinal herbs is declined	Community prefer allopathic ways
Lower Braldo	-do-	Extreme winter temperature	Harvest increased quantity of fuel wood
Upper Braldo	-do-	Rapid Snow melt	No adaptation
Shigar	-do-	Increased Floods	-do-
Thalay	-do-	Landslides	-do-
Daghoni	-do-	Low agriculture productivity	Abandoning agriculture



CONSERVATION MANAGEMENT ISSUES & PROBLEMS OF CKNP VALLEY



6. MANAGEMENT ISSUES AND PROBLEMS

Current surveys of CKNP valleys for VCSDP development has reflected several conservation issues in customary practices halting their development and making them more vulnerable to climate change. Therefore, in order to develop an effective strategy for adaptation, it is necessary to identify issues and develop capacity of local community to develop in a way that reduces their dependency on natural resources. These adaptation approaches must then be disseminated to the communities and relevant laws up-gradation.

6.1. Agriculture

Arable lands are mostly small piece of land terraced by reclamation and cultivated by traditional methods. However, villages which lies close to road employ modern machinery for farming. Agriculture productivity is low and highlights food insecurity. Farmers usually accomplish required food from markets. Following issues are being reported by the local community. These issues although belongs to several sectors but all are aiding in decline of agriculture production.

1. **Land holding size:** Average land holding of farmers around CKNP valleys is 0.2 hectare per household seems to shrink further in size due to increasing population and conversion of arable land to more houses and settlements.
2. **Irrigation and Water Rights:** Water is frequently supplied by snow fed springs, river and its tributaries but supply is blocked during mid-summer and winter because of water shortage. Water become a problem in disaster prone areas, which damages the irrigation channels, and cause water blockage. Moreover, customary rights about water sharing between villages and among the households is not documented anywhere. This generates confusion and rivalry among the landholders for water during peak season.
3. **Traditional practices and non-certified seed varieties:** Local farmers rely upon the traditional farming and cultivation methods. Farmers prefer this practice due to several reasons, which includes certainty of quality, convenience, timeliness/availability, and cost. They also prefer this practice because farmers don't want to take risk on their productions. However, with the progress of time keeping though cultivar performance remained same but productivity declined which demands the practices of modern farming techniques and new seed varieties.
4. **Weeds and Pest:** Organic farming is an important aspect that is valued all over the world for healthy food. Local farmers are lucky enough to manage the crops and fruit production without using pesticides, insecticides and inorganic fertilizers. Animal manure and ash is used to enrich the soil with minerals. Despite of these, farmers are facing difficulties now a days due to several insect and pest species which feed on the grains, fruits and other such products. Indigenous people and their knowledge is blaming climate change for increasing pest infection on fresh as well as dry seeds and fruits.
5. **Climate Change:** Climate change is exacerbating the challenges faced by the agriculture sector, negatively affecting both crop and livestock systems in CKNP valleys. Intensity and

rapidly varied climatic events have added pressure on the local agriculture system – which is already struggling to thrive in rising pathogenic infections. The changing climate is also contributing to resource problems beyond food security, such as water scarcity, pollution and soil degradation. As resource scarcity and environmental quality problems emerge, so does the urgency of addressing these challenges. During FGDs farmers depicted inability to mitigate such issues and thinking to abandon the cultivation of cereal crops and altering them with cash crops.

6.2. Pasture

Majority of the pastures of CKNP valley are degrading at rapid rates. Pastures have pressure from excessive livestock, medicinal plants extraction, landslides and floods. Another prevailing issue since last ten years is infrequent and declined rate of snow fall leading to drying pastures.

1. **Baseline of flora and Phenological Shift:** There is no documented baseline data or inventory about the floral species of the pastures, their status and use. So it is the need of time to develop such basic dataset which prioritize the species for conservation actions to mitigate the socioeconomic and environmental pressures. Only medicinal plants are explored and listed but there is no information on the predicted impacts of climate change over these medicinal plants and their adaptations. It is therefore especially recommended on priority basis to monitor and conserve the floral species and medicinal plants affecting by climate change and showing phenological shifts.
2. **Gaps in customary practices:** Livestock grazing is an ecosystem service provided by the pastures. Pastures of CKNP valleys are showing decline in productivity due to unsustainable livestock grazing practices. There are no established rules about the maximum number of livestock heads in the customary rules. Carrying capacity of these pastures have never been estimated and that's why unsustainable pressures are fueling the degradation. Diseased animals are advised to keep away from the pastures but their water points are shared which can induce the infection in whole herds and there is a chance of disease transmissions.
3. **Grazing Timing:** Lasting pastures can be improved only when herders understand plants' recovery needs and practice good grazing land husbandry to maintain plant health. The local community around CKNP reported the problems like weed invasion, less productivity and weakened soil health. All these issues are indicators of impatient grazing by the herders i.e. they start to graze their animals before pastures are fully grown. Herders do so to provide animals with a high-quality diet but they are unaware that short plant growth reduces bite size and the nutrient intake. Moreover, it contributes to decline in pasture productivity, which is lose-lose situation only.
4. **Livestock insurance scheme:** Livestock insurance scheme is an incentive equal to the loss for the herders if their livestock get killed or attacked by the wildlife. The scheme was introduced in CKNP valley but currently it is non-functional. Though very few livestock kills by predators were reported during the survey and no retaliatory killing reported by the community, but in the absence of insurance scheme retaliatory killing of wildlife is expected.

5. **Lack of Zonation:** Pastures are degrading continuously but the customary laws don't have any hint of abandoning such pasture areas which hastens its decline. It is essential that grazing on pastures in the buffer area of CKNP should be controlled to maintain adequate vegetative cover that reduces erosion and permits adequate regrowth after each grazing period to ensure the health of grazed plants.
6. **Harvest of Medicinal plants:** CKNP valleys pastures and forest areas the rich sources of these medicinal herbs. Local community uses them for disease cure. These drugs have anti-pyretic, analgesic, anti-cancerous, anti-diabetic and several other uses. Local community is fully aware of their uses but they don't have any understanding of ways of its extraction without damaging the whole herb. Training of local community for collection, drying and usage is important.

6.3. Water

Water is the key ingredient and symbol of life. All the changes in climate pattern are directly and indirectly playing with water quantity and quality. Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community in CKNP valley depends directly upon the rain and indirectly upon annual snowfall. Due to delayed rain timings and less annual snowfall local community is frequently facing the drought and water shortage due to increasing glacier melting and flood causing blockage of irrigation system. Moreover, torrential rains are now more frequent which on one hand increases water quantity but also cause floods and landslides in disaster prone areas thereby creating socio-ecological stress. Water pollution is increasing due to lack of sanitation /drainage system and animal sheds nearby water channels and drinking water sources. Grey water from the local community is also getting mixed in to fresh water and degrading its quality.

1. **Drinking Water:** Local community depends on fresh water supplies from glaciers and springs for drinking purposes. Sediments are continuously increasing in the water supply due to weathering of rocks and mixing of soil and grit in the area. High mineral content can induce disease in local community and their livestock. The water testing facility already established at Karakoram International University provides the free testing but local community is not very interested in the procedure due to lack of awareness.
2. **Irrigation Deficit:** Local community reported poor structure of irrigation channels or insufficient irrigation channels is the prime reason for irrigation deficit. "Either lot of water or no water" in the water sources, the communities cannot fully utilize it for irrigation purpose. The communities in the villages have constructed irrigation channels but with increasing land fragmentation and demand for water those irrigation channels have proven insufficient. The communities cannot construction of more irrigation channels due to lack of financial resources.
3. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water ensuring that it do not mix into the fresh water streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.

4. **Disaster Management:** Climate change is deeply reshaping the landscape of disaster risk. Weather extremes such as drought, flood and landslides cause the huge economic depressions in all sectors ranging from transport to land farms. No protocols are developed yet for the villages in the surrounding of CKNP. It is very necessary to take action because dependence of poor people on natural resources increases dramatically.

6.4. Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other is and therefore, there is strong need to assess and enhance the adaptive capacity of the forest and biodiversity.

1. **Mortality:** Drought has increased tree mortality, resulted degradation, and reduced distribution of entire forest ecosystem. It increased the wood harvesting opportunity for the local community for subsistence purposes at the cost of degenerating forest.
2. **Harvest Pressure:** Heavy collection of timber and non-timber products from the forests allows the community to fulfill their needs. With continuously increasing population dependence of local community is also increasing on these natural resources. Fuel wood harvest of CKNP valleys has showed an unsustainable approach. This harvesting is not limited to here only but includes the removal of foliage, branches and plants cutting for livestock forage as well. Unsustainable practices and unguided approaches towards harvesting leads the ecosystem imbalance.
3. **Forest Regeneration:** Climate change has shown differential approaches for the propagation dependent upon the species ecology. Warmer temperatures and increased CO₂ increased the rate of photosynthesis and thus growth but increased the pest attack is seriously stressing the forest regeneration.

6.5. Eco-tourism

Ecotourism is nature based tourism that fosters environmental appreciation and awareness. Gilgit-Baltistan, which is considered as the hub of eco-tourism, incorporates a considerable number of tourists every year to generate the huge amount of revenues and alternative livelihood opportunities.

The local community is reporting following issues.

1. **Tourist Accommodation:** Limited accommodation facilities compel the tourists to opt for camping in open areas. This option become unsuitable during the adverse weather.
2. **Visitor facilities:** Site maps, information boards, sign board and other facilities are not available for tourists. However, open camping areas are the only option for the tourists stay in the valley due to lack of hotels.
3. **Climate Change:** Climate is a key resource for tourism and the sector is highly sensitive to the impacts of climate change and global warming, many elements of which are already being felt. Climate change is having adverse impacts on the number of tourists especially for the treks, which CKNP valleys offer.

6.6. Mining

In and around CKNP in the sedimentary rocks of the mountains, huge reservoirs of gemstones and precious rocks are deposited. Local level mining is being carried out in and around CKNP. Mining area can be identified by having the holes in its mountains just like bee web.

“About 30,000 people associated with the mining sector are carrying out activities inside the Central Karakoram National park territory, adding that the act may result in the loss of habitat for various species” (Express tribune: June 27th, 2012).

This mining provides some of the valleys around CKNP with a good opportunity to earn livelihood. In CKNP valleys, mining opportunities are available but a small portion of the entire population is associated with it. On other hand people associated with mining cannot get maximum benefit out of it due to the following reason.

“Lack of alternative livelihood opportunities for communities and uncontrolled mining in mountains are some of the issues that require attention” (Express tribune: June 27th, 2012).

1. **Lack of Modern tools and Practices:** Local miners are not trained for mining. They use iron rods for excavation and mostly end up in the damaging the stones. It leads to loss of revenue not only on personal level but also on the regional and ultimately at national level.
2. **Lack of training:** Local miners have learned the methods of mining by hit and trial approach and succeeded somewhat. Nevertheless, due to lack of training they are unable to extract pure and high quality rock. They accidently break these gemstones and thus lose the amount of profit.
3. **Value addition of Gemstones:** Gemstones are sold in raw form by the local community to the dealers on low cost due to improper cutting and polishing. Therefore, local miners lose their chance to earn huge revenues and only get a minor share.

6.7. Wildlife and Protected areas

Institutional structures to manage wildlife and protected areas experience lot of issues due to increasing urbanization, degrading forest and natural areas. The biodiversity of CKNP and its buffer zones has the species, which are of international and national importance. Wildlife plays an important role in both ecosystem sustainability and community economics. Although trophy hunting is a controversial subject, yet it enabled the community to earn millions of dollars since its start and contributed to conservation as well.

1. **Population trends:** The investigation of issues related to wildlife and protected areas normally consider the number of heads of animals irrespective of their health, annul recruitment. The overall trend of two trophy species; i.e. Markhor and Ibex seems to increase in their population according to the relevant government departments but there is no assessment on the reproductive output. There is chance of reproductive deficit in mountain ungulates such as Ibex and other species due to the history of population surge.

2. **Population Surge:** During the recent years of conservation, wild species has increased considerably. The sudden increase from small population are often culprits of inbreeding depression, which is most expected in the case of mountain ungulates and birds which are decreasing continuously.
3. **Unidentified Species:** GB hosts the diversity of wild fauna and flora most of which are unidentified and even un-discovered yet. The rapid environmental degradation is causing the extermination and extinction of the specialist species. It shows that biodiversity of the species is declining without recognizing their ecological and economic roles.
4. **Habitat degradation and Isolation:** Population is continuously increasing in CKNP and encroaching into the natural areas for settlements and agriculture. This land use change affected wildlife both positively and negatively depending upon the species ecology. Habitat degradation has also pushed the species to isolated and low quality habitats that caused additive stress on the wildlife health, reproductive potential and genetic health and so on. There is no assessment for the impact of habitat degradation on genetic health of wildlife species.
5. **Genetic reserves of wildlife species:** Most wildlife surveys are based on the numerical assessment of the animals and do not account for their genetic viability. Designated areas such as national parks and sanctuaries are notified irrespective of the idea that particular area is either genetic bank of the particular species or not. Genetic reserves of forests and wild species are not identified and protected yet.

PROPOSED MANAGEMENT INTERVENTIONS FOR CKNP VALLEYS



7. PROPOSED MANAGEMENT INTERVENTIONS

7.1 Agriculture

In particular, there are different adaptation options in agriculture according to the involvement of different agents (producers, industries, governments); the intent, timing and duration of employment of the adaptation; the form and type of the adaptive measure; and the relationship to processes already in place to cope with risks associated with climate stresses finally the development of provincial climate change policy.

The adaptation options required for the local community needs four tiers. (i) Technological developments, (ii) government programs and insurance (iii) farm production practices, (iv) farm financial management.

1. **Population expansions:** Similar to other areas of GB, with increasing population construction is rapidly increasing and mostly houses, cattle shed and other required constructions are being built around the settlement and agriculture area, which is continuously shrinking arable land. To avoid these issue new settlements must be built on barren or abandoned parts of the land. This will keep the arable land available for cultivation.
2. **Certified seed varieties and crop insurance:** Certified seed is the only input that can get farmer more than just higher yields. Such varieties are resistant to climate related and pesticide issues. To introduce the concept and usage of certified seed varieties, relevant stakeholders must provide them on subsidized rates and premium insurance packages. Along with this one time, training of farmers of each village around CKNP is recommended to increase the agriculture production per unit area.
3. **Integrated farming and agriculture products:** Farmers are traditionally inclined to mono-cropping systems and earn the revenues from raw products. In CKNP valleys the farmers do not sale both fresh and dried fruits due lack of awareness on post harvesting techniques, processing techniques and proper storage facilities. The little economic innovation lies in the sale of potato only, while million rupees worth of fruit is being wasted annually due to lack of awareness, and skill for value addition and facilities for storage. Many end-users require specifically processed products such as Marmalades, Jams, Vinegar and Honey. Farmers need guidance on the value addition of products in order to be economically stable.
4. **Soil Analysis:** It was unanimously reported by all the communities that land they are cultivating is never tested in the laboratory and scientifically they don't know which crop and fruit varieties are best for their soil type. Each crop is sensitive to soil type and productivity heavily depends upon the suitable soil. Practically there is requirement of soil testing facility within each agriculture information cell. This facility will provide information about several structures especially addressing the common question of farmers such as suitable seed varieties, microbiota of soil and it's capacity of crop growth and several others.

5. **Secure water availability:** Water is central to agriculture productivity. Adaptation of climate-smart inputs and shifting to irrigation that is more efficient methods will help local farmers to maintain productivity levels. Water tanks for the storage purpose of agriculture are required to reduce the drought effects at some village.
6. **Training on climate friendly agriculture practices:** Farmers should be trained with the emphasis on targeted ingenuities such as outcome-based farmer incentives and knowledge transfer systems – that enhance farmer capacity to achieve sustainable productivity growth through mitigating and adaptive practices keeping the pace with climate change. These climate friendly and climate proof practices particular to each valley must be incorporated into the operational plan. As there are no previously approved practices so, they are needed to be designed by methodically modelling the practices with climate change models.
7. **Introduction of climate resistant seed varieties:** Farm decision-making is seen as an on-going process, whereby producers/farmers are continually making short-term and long-term decisions to manage risks emanating from a variety of climatic and non-climatic sources. In this sense, adaptation is the result of individual decisions influenced by forces internal to the farm household (i.e. risk of income loss, environmental perception) will become reasonable and let them earn revenue to decrease pressure of local community on natural resources. To resist or at least minimize the pressure of ever changing climate patterns and issues in relation to climate change, there is a need to develop an agriculture information cell for the farmers in each village. This information cell will raise the job opportunities for local community and will guide them about the climate resistant breeds, ways of cultivation, harvesting in detail. This information cell must have the tested varieties of climate resistant seeds and seedlings. Seed storage for potato in the harsh climatic condition is a challenge in the CKNP area, therefore input store for seed must be provided at least among every three villages.
8. **Spread of infestation to the wildlife:** Buffer area of CKNP harbor 230 villages. All of these villages have agriculture crops and tress, which are getting infected manifolds since last decade. These pest species have the chance of transmission towards the wild medicinal herbs, forests, nests of birds and ultimately enter in fauna. This pathogenic transmission can induce infections in the flora and fauna and has a considerable potential to depress the specialist species. However, this issue has not yet been explored and needs a well prepared monitoring procedure to estimate the estimate the annual economic laws.
9. **Research Projects:** Without research, adaptation to climate change is generally problematic for agricultural production and for agricultural economies and communities; but with adaptation, vulnerability can be reduced and there are numerous opportunities to be realized. Adaptation must be supported by the research of relevant components. Productivity is declining at a rapid pace due to some known and unknown reasons. Apparently, climate change seems responsible for this decline aided with ever-increasing pest attacks during last 10 years. The recent changes in the climate are so unpredictable that it is becoming impossible for the farmers to work in agriculture farms for profit. Customary practices for agriculture sustainability are losing their functionality. These practices must be updated by designating specific studies of seed variety, soil analysis, crop suitability analysis,

bio-control of pests, projected impact of climate change on the crop's productivity and transport, optimum economic benefits from every suitable crop and several other inter-related components. As it is evident that the impacts of climate change on agriculture will vary depending on precipitation changes, soil conditions, and land use, therefore these impacts are required to be evaluated independently for each valley in the buffer zone of CKNP. This vast research is possible if included in the operational plan of the CKNP to provide support for updated management plan of CKNP.

10. **Key Policy Reforms:** Key policy reforms across three pillars are needed to strengthen farmer incentives to achieve productivity growth sustainably, and without sacrificing climate change mitigation and adaptation objectives. These three pillars are i) Farmer level, ii) Agriculture sector level, iii) Provincial level. The agriculture policy needs an up gradation to mitigate the effects of changing climate and devising the climate friendly strategies at an urgency to minimize the agriculture induced impacts on climate ultimately to protect the protected areas of GB, particularly its largest park the CKNP. The management plan, which is already established, has a huge gap about the laws of employing climate friendly approaches in villages residing in buffer areas for agriculture. Moreover, the climate is not only changing but it is also on stationary, which means old knowledge can't be the thing to rely upon. Therefore, gap of climate friendly approaches must be assessed via operation plan for CKNP and then addressed in to the revised version of CKNP management plan.

7.2 Pasture

1. **Upgradation of customary laws:** Customary practices should be amended in such a way that ensures sustainable use of pastures.
2. Diseased animals must be kept away from the pastures to avoid the zoonosis and must be vaccinated.
3. Extraction/cultivation of medicinal plants by the local community must account only for household purpose and should be cultivated in the amount equal to its removal.
4. Encourage stall feeding/minimize grazing till the improvement of pastures.
5. These strategies must be field tested and then included in the customary and statutory laws and CKNP revised management plan.
8. **Grazing Management:** To enhance pasture productivity timing of grazing and grazing sites in each pasture are need to be designated to develop holistic grazing strategies with farmers/herders that include rotational grazing or intensively managed grazing as a regular grazing routine.
9. **Fodder Cultivation:** Regionally adapted and high nutrition value fodder crops should be cultivated for fodder instead of traditional species. This will remove the stress of early grazing from the pastures and allow them to grow.
10. **Training of herders:** Herders have no information about the sustainable practices of livestock grazing. They just sent their livestock with guards to feed upon the pastures. Timing of grazing is integral for livestock. Several other factors need to be cared for the sustainable livestock grazing.

11. **Seeding of local flora and training of Farmers:** Local flora should be collected and cultivated on the barren patches among the pastures. This will increase the pasture areas and productivity. Research on cultivating these species is required. After it dissemination of knowledge through training sessions, manuals and brochures will convince the farmers about the re-seeding of pastures.
12. **Local botanical garden to ensure existence of local flora:** Adaptable plants should be identified among the plants. These plants should be kept in botanical gardens to provide backup in case of avalanches, landslides, floods and barren land cultivations.
13. **Encourage the pasture extension services by other line departments:** Many forestry and livestock enterprises run by private farmers and the government depend on efficient, economical, and environmentally beneficial pasture use. Farmers need technically competent advisors to help them accomplish their objectives. Unfortunately, no advisory services for the pastures exist in the villages because of lack of pasture specialist technical advisor. Therefore, there is strong need to train the forest relevant personnel from each village or valley as a pasture specialist. CKNP biodiversity directorate staff can be a potential candidate for this training as they are both aware of natural resource use in and around CKNP.
14. **Cultivation and marketing of medicinal herbs:** Cultivation of these herbs should be promoted as an alternative economic resource with appropriate site assessment and training on its cultivation, harvesting marketing and utilization. Economic uplift of the community will actually decrease their dependence on CKNP resources and allow them to grow.
15. **Ethno-botanical Database:** Development of consumer linked ethno-botanical databases of each village will not only enhance the market for the local farmer but also fosters the direct link to the consumer.
16. **Pasture awareness programs:** Hands-on training and field experience are two of the best, most rapid ways to increase farmer's/shepherd's awareness and local university students about the optimum pasture use for healthy livestock. Outcomes will be best when technically competent professionals who can accurately answer questions and help solve problems guide this training. This training will allow the local community to employ sustainable practices and secure these resources for their future generations.
17. **Research Problems:** Phenological shift of floral species and their impact on biodiversity must be assessed on priority basis so that extirpations can be avoided. Ecological baseline of the pastures to keep the biodiversity of the area must be developed. Similarly, potential farming sites for each medicinal plant should be identified. The predicted impacts of climate change on the pasture productivity are not known and need to be evaluated due to their high valued ecosystem services. Most utilizable and ecologically resilient entry points are needed to be identified and designated.

7.3 Water

People living in CKNP buffer zone afflict with different kinds of water contagious diseases because of the scarce access to clean drinking water. Even though glacier water is present in many areas however easy, access to clean water is very difficult for most of the population.

1. **Quality of drinking water:** The water testing facility already established at Karakoram International University provides the free testing but local community is not very interested in the procedure due to lack of awareness.
2. **Construction of small and medium sized reservoirs:** Construction of small or medium-sized reservoirs in the foothills and plains are quite necessary, so that water from streams can be harvested for use during the dry season and the winter, both for farming and domestic purposes.
3. **Common drinking water storage tank:** Shared water storage tanks should be built upon among the households to help them adapting drought conditions.
4. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water ensuring that it do not mix into the fresh water streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.
5. **Early warning system:** But to give relief to the local community of CKNP valleys there must be system to give them timely alerts about their crops and livestock protection. This will accentuate the economic resilience of the community and natural resilience of the buffer area.

7.4 Forest and NTFP

1. **Up gradation and regulation of Forest laws:** Customary laws allow the fuel wood collection, timber and non-timber forest products unlike statutory laws, which increase their favor towards the customary laws. These customary laws don't address the conservation needs and allow harvesting at an unknown level. If this practice is continued, then community will shortly run out of their forest reserves. To ensure sustainability, an up-gradation of customary rules is recommended. Otherwise, implementation of statutory laws is integral.
2. **Promotion of farm forestry:** Local farmers should be trained to have small-scale farm forests, which along with revenue generation allow them to be independent of forests. This practice exists in a valley but very limited. Training will allow the farmers to take self-initiatives and entrepreneurship in forestry sector.
3. **Climate Change and Conservation Friendly Forestry projects:** To generate credible forestry and conservation offsets, projects must be additional to what would have occurred without the incentive supplied by the carbon market; they must be verifiable (i.e., measurable and enforceable); they must control or adjust for leakage; and they must address the issue of permanence. Forward crediting is proposed by some to accommodate the long period of carbon accumulation in forests, but others are concerned about assuring payments only for actual carbon sequestration.

4. **Restoration cum conservation:** Several sustainability practices are being carried out in CKNP but any of them hardly meet the conservation targets. Keeping in view the present environment sustainability changes, restoration is required along with conservation. Therefore, the upcoming forestry projects must come up with the forward crediting instead of required crediting.
5. **Research Projects:** Projected annual greenhouse gas emission counts provide baseline to identify required CO₂ sequestration offset. On the basis of this, it will be identified that which species is required and in how much amount to keep climate stable for each valley in the buffer zone of CKNP and its surrounding areas. Remote sensing to monitor the land use changes is very essential because of the location of valley around CKNP. In future due to CPEC, land use is expected to be altered and its environmental consequences seem negative. To neutralize these expected issues baseline data about land use will quantify the environmental impacts and truly determine the required type of actions with high accuracy.

7.5 Eco-tourism

Following interventions are recommended on the basis of the survey conducted for VCSDPs development.

1. **Interpretation of Resources:** In order to increase the revenues by tourism there is need to provide interpretation programs that are relevant to the public, further information is required. This information can be obtained through visitor surveys.
2. **Destination vulnerability hotspots:** The integrated effects of climate change will have far-reaching consequences for tourism businesses and destinations. Importantly, climate change will generate both negative and positive impacts in the tourism sector and these impacts will vary substantially by market segment and geographic region. There are disaster prone areas in and around CKNP, which are not mapped and disseminated to the tour operators. This inventory should be developed along with measured risks and challenges that tourist can face.
3. **Infrastructure:** Surge in tourist flow has been reported recently but related infrastructure such as accommodation, ecotourism facilities, are very short and needed to be developed to ensure the provision of facilities for tourist influx by public and private department.

7.6 Mining

Following interventions are recommended on the basis of the survey conducted for VCSDPs development.

1. **Training of Miners:** It is important for the miners to have hand on training on modern tools and techniques for quality mining. It is especially important for the valleys, which lie near mining deposits of Gemstones and other minerals.
2. **Entrepreneurship opportunities:** Small-scale business related to gemstones and its products will provide the local community an opportunity to earn good profit.

7.7 Wildlife and Protected areas

1. **Population assessment:** Database should be established to keep the systematic annual population assessment of all the near threatened and endangered animals. The protocols for population assessment of each species should be determined on ecological basis and kept same every year.
2. **Wildlife health:** There is some baseline data about the health of animals. Nevertheless, all such studies are either short term or based on only few components. Moreover, genetic health of the species have never been accounted which can be the culminating factor in the reproduction of the animals in addition to other stresses.
3. **Species Recovery Plan:** There is a growing consensus that habitat fragmentation has caused wildlife decline. However, what is the impact of this fragmentation is still unknown. There is need to study to study how the urbanization, habitat isolation, decline in vegetation has stressed the wildlife. How these impacts can be mitigated, which habitat areas need priority conservation actions such as habitat connectivity? All this information is possible from the properly designed studies unique to each class of wildlife based on which species recovery plan will be designed.
4. **Genetic Reserves:** Genetic reserves inside the protected areas of the threatened and endangered species are needed to be identified for their restoration. If the designated protected areas do not have by chance these genetically healthy populations then their boundaries should be adjusted according to these reserves.
5. **Climate change Indicators:** Several fungi and amphibian species are considered as an indicator of climate change. These species are experiencing decline in the population such as Deosai toad, which was once abundant in clean waters of the area. This species is now hard to find because of water pollution. These indicators are needed to be identified and used as climate change detection for the areas. This research will provide the real assessment unlike models, which sometimes fails to give real estimate.

LIST OF VCSDPS

Volume A: Gilgit region

1. Conservation and Sustainable Development Plan 2016-2026 Nagar valley Central Karakoram National Park Gilgit-Baltistan
2. Conservation and Sustainable Development Plan 2016-2026 Ghulmat valley Central Karakoram National Park Gilgit-Baltistan
3. Conservation and Sustainable Development Plan 2016-2026 Danyore valley Central Karakoram National Park Gilgit-Baltistan
4. Conservation and Sustainable Development Plan 2016-2026 Haramosh valley Central Karakoram National Park Gilgit-Baltistan

Volume B: Baltistan Region

1. Conservation and Sustainable Development Plan 2016-2026 Astak valley Central Karakoram National Park Gilgit-Baltistan
2. Conservation and Sustainable Development Plan 2016-2026 Tormik valley Central Karakoram National Park Gilgit-Baltistan
3. Conservation and Sustainable Development Plan 2016-2026 Shigar valley Central Karakoram National Park Gilgit-Baltistan
4. Conservation and Sustainable Development Plan 2016-2026 Lower Braldo valley Central Karakoram National Park Gilgit-Baltistan
5. Conservation and Sustainable Development Plan 2016-2026 Upper Braldo valley Central Karakoram National Park Gilgit-Baltistan
6. Conservation and Sustainable Development Plan 2016-2026 Daghoni valley Central Karakoram National Park Gilgit-Baltistan
7. Conservation and Sustainable Development Plan 2016-2026 Thalay valley Central Karakoram National Park Gilgit-Baltistan

Conservation and Sustainable Development Plan 2016 – 2026
Hushey Valley
Central Karakorum National Park
Gilgit Baltistan



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Gilgit-Baltistan, Pakistan
www.wwfpak.org

Directorate of the CKNP
Sadpara Road, Skardu
Gilgit-Baltistan, Pakistan
www.cknp.org.pk

PLAN EDORSEMENT

Signed by President CBCSDO Hushey

Signed by President CBCSDO Kaday

Signed by President CBCSDO Marzigond

Signed by President CBCSDO Tallis

Endorsed Director CKNP

Approved by Deputy Commissioner/
Chairman DCC Ghanche in meeting
of the District Conservation Committee for
Ghanche held on

Dated.....

TABLE OF CONTENTS

Abbreviations.....	i
About the Plan.....	1
Background and objectives	1
Scope of the Plan	4
Structure and Composition of the Plan	4
Process of Plan Development	5
1. Socio-economic and Ecological Profile of Hushey Valley	6
1.1.Geographic location of villages	6
1.2.Demographic profile of villages	9
1.3.Education.....	9
1.4.Health.....	11
1.5.Agriculture.....	11
1.6.Water resources and irrigation infrastructure.....	14
1.7.Livestock herding.....	19
1.7.1. Livestock holding and herd composition	19
1.7.2. Seasonality, feeding and grazing pattern.....	22
1.7.3. Status of livestock vaccination in Hushey valley.....	27
1.8.Pastures of the Valley.....	27
1.8.1. Name, location, surface area, facilities and use of pastures	28
1.8.2. Pastures Grazing Fee	32
1.8.3. Grazing Cycle in Hushey valley of CKNP	33
1.9.Wildlife	35
1.9.1. Numbers and status.....	35
1.9.2. Trophy hunting of Himalayan ibex in Hushey valley of CKNP	36
1.10.Forests and forestry.....	38
1.11.Mining Sector.....	45
1.12.Tourism	45
1.13.Local Management Institutions (LMIs) in the Valley	46
1.14.Role of LMIs in managing natural resources	49
1.15.Use rights of natural resources and associated customary laws	50
1.16.Local NGOs and CBOs in the target villages.....	54
2. Management issues and problems	57
2.1.Traditional low yielding agro-practices	57
2.2.Pastures degradation.....	57

2.3.Traditional animal husbandry and associated problems.....	59
2.3.1. Livestock mortality.....	59
2.3.2. Lack of Veterinary Facilities	61
2.3.3. Lack of a permanent vaccination Programme for livestock	62
2.3.4. Traditional cattlesheds with poor sanitary measures.....	62
2.3.5. Inadequate grazing practices.....	63
2.4.Forests and forestry related issues	63
2.4.1. Depletion of plant biomass due to firewood collection.....	63
2.4.2. Free grazing, a challenge for afforestation and social forestry	65
2.4.3. Lack of alternatives of domestic energy	66
2.4.4. Insect Pests on Forest Trees	67
2.5.Challenges for wildlife conservation	68
2.5.1. Illegal hunting and poaching	68
2.5.2. Retaliatory killing of mammalian predators	68
2.5.3. Mortality of overwintering ibex kids	69
2.5.4. Chance of disease transmission between livestock and wildlife.....	69
2.5.5. Gaps in wildlife monitoring and trophy hunting procedures.....	70
2.5.6. Challenges in running livestock Insurance scheme	70
2.6.Problems associated with irrigation water supply.....	71
2.7.Lack of VCCs/CBOs role in tourism management.....	72
2.8.Lack of planning and facilities for mining sector	72
2.9.Problems associated with Human and Institutional Development	72
2.9.1. Alienation from traditional governance systems.....	72
2.9.2. Community mobilization and management issues.....	73
3. Proposed management interventions.....	74
3.1.Sustainable mountain agriculture.....	74
3.2.Pasture management and improvement measures.....	74
3.2.1. Creation of Sustainably Managed Pasture Area (SMPA).....	74
3.2.2. Grazing management	74
3.2.3. Pasture Improvement Measures	76
3.3.Livestock management	77
3.3.1.Improvement of veterinary services in the valley	77
3.3.2.Livestock Vaccination Programme	77
3.3.3.Improvement of cattlesheds for improved sanitation and predator avoidance	78
3.3.4.Livestock breed improvement	78

3.4.Afforestation and forest conservation	79
3.4.1. Ban on timber harvesting from natural forests.....	79
3.4.2. Regulate use of firewood from natural forests.....	79
3.4.3. Firwood plantation	80
3.4.4. Promotion of energy efficient technologies and alternative energy options.....	81
3.4.5. Control of insect pests on forest trees	82
3.5.Wildlife Conservation.....	82
3.5.1. Community-based watch and ward and monitoring of wildlife populations	82
3.5.2. Trophy hunting management	83
3.5.3. Livestock Insurance Schemes to promote positive human-carnivore interaction	84
3.5.4. Take measures to reduce mortality of overwintering ibex kids.....	84
3.6.Improvement of water courses.....	84
3.7.Ecotourism promotion with community-participation	86
3.8.Institutional Strengthening of Community Organizations	86
3.8.1. Integration of LMIs and other CBOs	86
3.8.2. Capacity-building of CBCSDOs	87
3.8.3. Financial Management and Sustainability of CBCSDOs.....	88
4. Management actions.....	89
4.1.Sustainable mountain agriculture	89
4.2.Pasture management	89
4.3.Livestock management.....	90
4.4.Afforestation and sustainable forest management	90
4.5.Wildlife Conservation.....	91
4.6.Improvement for water courses	91
4.7.Community-based ecotourism	91
4.8.Institutional Strengthening of Community Organizations	92
5. Indicators of process and progress.....	93
6. Implementation mechanisms.....	98
6.1.Implementation Mechanism.....	98
6.2.Available Capacities	100
7. Expected outputs.....	101
7.1.Sustainable mountain agriculture	101
7.2.Pasture Management	101
7.3.Improved Livestock management	101
7.4.Sustainable forest management	101
7.5.Wildlife Conservation and management	101

7.6.Efficient uses of water resources	101
7.7.Sustainable mountain ecotourism	101
7.8.Institutional Strengthening of Community Organizations.....	101
8. Visible bottlenecks in realizing the expected outputs, and arrangements (available and potential both) to overcome the bottlenecks	102
9. Monitoring mechanism	103
9.1.CKNP Directorate.....	103
9.2.District Conservation Committee Meetings	103
9.3.Community Agreements	103
9.4.CBCSDOs Audit and Record Keeping	103
9.5.CBCSDO Visitors Diary	103
10. Proposed budget for implementation	105
11. Appendices.....	108
Appendix-A Sampling plan for household surveys.....	108
Appendix-B Participants of FGDs in Huhey Valley.....	110
Appendix-c Template for Monthly Report by VWGs	111
Appendix D. Position paper on trophy hunting developed by CKNP wildlife experts from UNISI duly endorsed by Caprinae Specialist Group of the Species Survival Commission of IUCN.....	112
Appendix E. Wildlife Survey/Monitoring Protocols in CKNP	113

Abbreviations

AKPBS.....	Aga Khan Planning & Building Services
AKRSP.....	Aga Khan Rural Support Program
BWCDO.....	Baltistan Wildlife Conservation and Development Organization
CBCSDO.....	Community-based Conservation and Sustainable Development Organization
CCHA.....	Community-controlled Hunting Area
CI.....	Confidence Interval
CL.....	Confidence Level
CKNP.....	Central Karakoram National Park
CMCA.....	Community-managed Conservation Areas
CO.....	Community Organization
CSDF.....	Conservation and Sustainable Development Fund
CSDP.....	Conservation and Sustainable Development Plan
DC.....	District Conservation Committee
E	East
HH	Households
IUCN	International Union for Conservation of Nature
IPMP	Integrated Park Management Plan
KNP.....	Khunjerab National Park
KVO	Khunjerab Villagers Organization
LIF	Livestock Insurance Fund
LIMC	Livestock Insurance Management Committee
LIS	Livestock Insurance Scheme
LS&DD	Livestock and Dairy Development Department
LSO	Local Support Organization
MH	Micro-hydel
M	metre
N	North
SKB	Skoyo-Karabathang-Basingo
SUI	Sustainable Use Initiatives
VCC	Valley Conservation Committee
VCF	Valley Conservation Fund
WWF	World Wide Fund for Nature

ABOUT THE PLAN

Background and Objectives

The Central Karakoram National Park (CKNP), officially gazette as national park in 1993, is situated in northern Pakistan (**Figure 1**), within geographical limits of Gilgit-Baltistan. It is the largest protected area in Pakistan, spanning over 10,000 km², attitudinally ranging from 2000 m asl to 8,000 m asl and partly covering four of the seven districts of Gilgit-Baltistan¹. With K2 (8,611 m asl.), the world's second highest peak as its centerpiece, CKNP holds greatest concentration of high altitude peaks and glaciers, providing world class tourism and mountaineering opportunities. Establishment of this park by the Government of Gilgit-Baltistan was primarily to conserve the unique geographic and ecological features in the central portion of Karakoram Mountains². Owing to the diverse micro-climatic, geographic and environmental conditions, the area is rich in biological diversity and a great source of freshwater and other services of highly aesthetic, ecological and socioeconomic significance, for million of people in Gilgit-Baltistan as well as living downstream the River Indus in Pakistan, and

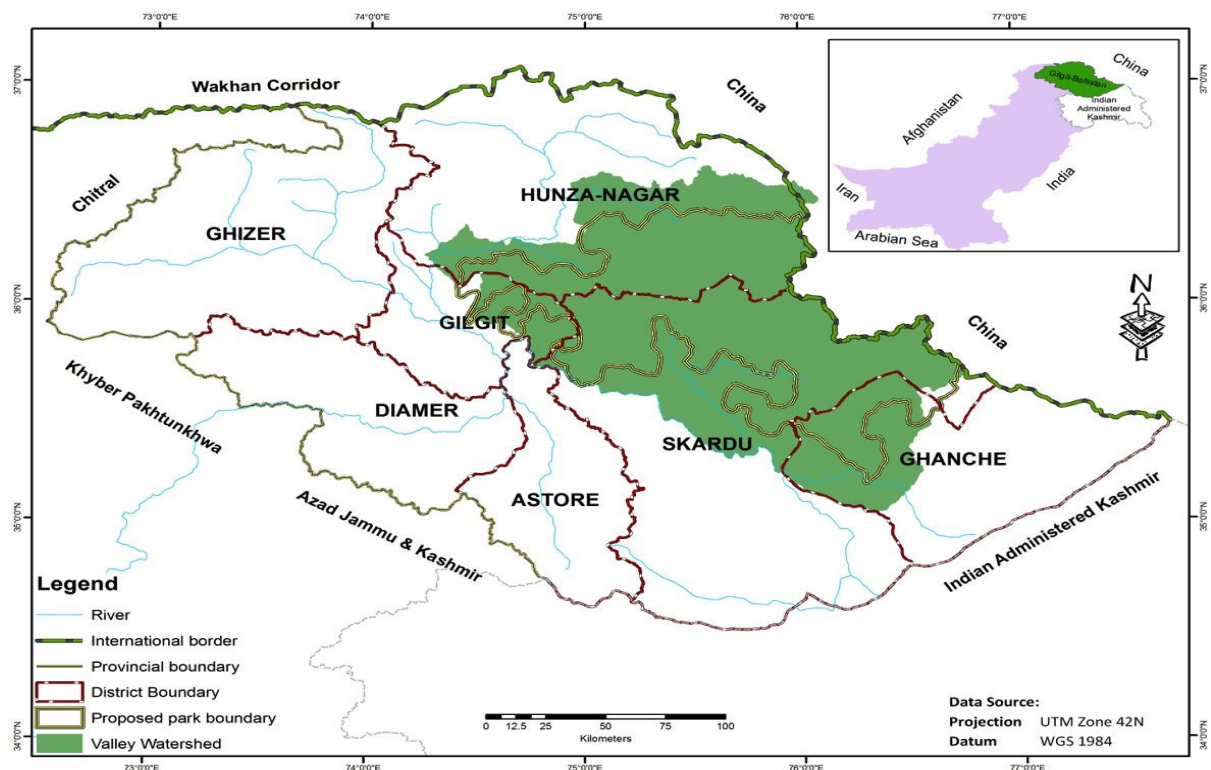


Figure 1 Location map of CKNP (Source: WWF-Pakistan)

¹ Khan, B. 2011. Field Guide to the Central Karakoram National Park, Pakistan. CESVI, Pakistan, Islamabad, pp. 45

² Hagler Bailly Pakistan (2005a). Central Karakoram Protected Area. Volume I: Studies and Recommendations for Preparation of a Management Plan. IUCN Pakistan, Karachi, HBP Ref.: D5MP2CKP.

elsewhere in the world who like to venture through the rugged mountainous and glaciated landscape of Karakoram³.

Most of the CKNP areas are characterized by the dry alpine vegetation, comprising species of *Artemesia*, *Juniperus*, *Polygoum* and *Rosa* on slopes, whereas *Myricaria* and sea buckthorn bushes along riverbanks and streambeds. Broadleaves mainly consist of scattered patches of *Betula utilis* and *Salix* species, found in humid places. Conifers, comprising mainly of *Pinus wallichiana*, predominantly occur at lower altitudes in the western ends of the Park including Roundu Skardu, Haramosh, Bagrote and adjacent valleys of Gilgit and Hunza-Nagar^{4,5}. Large mammals are a key resource and important conservation focus in CKNP (IUCN, 2009a). The Park is a refuge area not only for threatened species, such as markhor, musk deer, Ladakh urial, Marco Polo sheep (presence to be confirmed in CKNP) and snow leopard, but also for not threatened but important “flagship” species, such as blue sheep, Siberian ibex, lynx and grey wolf⁶.

Some 230 villages, inhabited by over 115,000 people living in about 13,000 households, surround CKNP. Majority of the local communities live an agro-pastoral life depending upon the Parks resources such as rangelands, forests, wildlife, medicinal flora, etc. Moreover, a considerable number of local people are also engaged in tourism and mining industry in and around CKNP. Thus the local communities around CKNP are major stakeholders and systematic community involvement in Park management is highly desirable to foster a positive relationship between people’s needs and Park ecology, which has been emphasised in Integrated Park Management Plan (IPMP) for CKNP⁷ for the following major reasons:

- i. One of the National Park’s goals is to preserve and promote, in a sustainable way, local cultural heritage which is which is widely distributed in the valley adjoined CKNP;
- ii. The CKNP management process is based on a “participatory development and implementation strategy”. Considering the large extent of the park and the socio-economic and ecological diversity in the surrounding areas, the resources of the Park management office are limited and will have to rely on a large extent on communities living around CKNP for successful park management. For these reasons the park management office aims

³ IUCN, Pakistan. (2009). Central Karakoram Conservation Complex. Draft Management Plan. Sub plan: Species Management, IUCN Pakistan, Karachi. Pages 24.

⁴ WWF-Pakistan, 2008a. Land Cover Mapping of the Central Karakoram National Park, WWF – Pakistan, Lahore. Pages 39.

⁵ Ferrari, E. (2014). Methodological issues in implementing a Sustainable Forest Management Plan in remote mountain areas: the Karakorum (Pakistan). Ph.D. Thesis. University of Padova, Italy.

⁶ Lovari, S. & Bocci, A. 2009. An evaluation of large mammal distribution on the CKNP. (pp126-144) Integrated case study of a selected valley in the Central Karakoram National Park. The Bargot valley (HKKH Partnership Project) Ev-K2-CNR, Italy.

⁷ Integrated Park Management Plan (IPMP) for Central Karakoram National Park. 2014. Developed by Ev-K2-CNR, Bergamo, Italy.

- at committing community-based organizations to collaboration for management of the park⁸;
- iii. However, difficult activities (e.g wood collection, grazing, tourism) are conducted inside the Park borders. The natural resources in CKNP are subjected to pressure due to traditional rights of the local inhabitants and tourism practices⁹. Also other activities not directly related with resource use could affect the Park integrity; and
- iv. The local communities have some expectations for the Park as a relevant tool to improve their living standards and socio-economic conditions

In CKNP areas, community participation in co-management of natural resources starts from 1990s with establishment of Village and Valley Conservation Committees (VCCs) by INGOs such as IUCN and WWF. The initiative was based on Community-based Natural Resource Management (CBNRM) approach, which was first implemented in Africa and then adapted and applied in some areas of Gilgit-Baltistan, including an adjacent village of CKNP namely Hushey¹⁰. The initiative primarily aimed at development of community-based trophy hunting programme. By 2013 more than 30 community-based organizations namely VCCs, LSOs and other local NGOs were formed by organizations like AKRSP, GBFWED, Ev-K2-CNR and WWF to facilitate CBNRM around CKNP with a view to have protect the Park resources. One of the steps of CBNRM was to develop Conservation Plans at village or valley level, aimed to provide guidelines for participatory natural resource management. Development and approval of VCPs involve four steps including: Resource Need Assessment (RNA) → Participatory Conservation Planning (PCP) → Approval of VCP from District Conservation Committees (DCCs) → Implementation of VCP through VCCs and other stakeholders.

CKNP Management Plan (2014) emphasize to strengthen the community-based organizations (VCCs and LSOs) around CKNP to make them integrated conservation and development bodies, with a view to:

- a) institutionalize an integrated conservation and development approach at the community level;
- b) increase effectiveness of project implementation; and
- c) empower rural women and strengthen participation of local communities in CKNP management planning process.

Valley Conservation Planning process has been a valuable and important part of the CKNP management in engaging local communities, however, the CKNP Management Plan (2014)

8 Flury, B. 2012. Livelihoods and natural resource management in Central Karakoram National Park Areas – Braldo and Basha valleys. Research Report Developed for SEED Project. 46 pp.

9 Panzeri, D & M. Khan. 2009. Livelihoods in Central Karakoram National Park. Socioeconomic baseline data survey. HKKH Technical Report, 77 pp.

10 IPMP for CKNP. 2014. Developed by Ev-K2-CNR

while evaluating the existing VCPs around CKNP, has identified some gaps to improve this process. Those gaps include various factors such as lack of consistency between various components of the plans, lack of conceptual clarity, lack of a monitoring mechanism, less clear role and responsibilities and inappropriate information about resources required to undertake the desirable actions.

Based on this evaluation the CKNP Management Plan (2014) has recommended to “revise and amend the VCPs according to a tested and universally acknowledged planning instrument, such as the logical framework approach, for example if they are to fulfill their functions as a instrument for grass-roots planning and implementation within the CKNP management process”.

The revised VCPs, keeping in view the integration approach have been termed as Valley Conservation and Sustainable Development Plans (VCSDPs) aimed at the following specific objectives:

- Promote participatory NRM in CKNP buffer zone villages and valleys to ameliorate environmental conservation of the park
- Create synergies among park stakeholder to promote community-based conservation in CKNP buffer zone

Scope of the Plan

Hushey valley forms the south-eastern part of CKNP. Hushey CSDP deals with the integrated conservation and sustainable development matters of Hushey, Kanday, Marzigond and Tallis villages that partly fall within CKNP boundaries the local people therefrom use Park resources through grazing, fuel wood collection, tourism and mountaineering. The upper reaches of the four villages falling within core zone and buffer zone of the Park are characterized by famous peaks like Mashabrum, K-6, K7, Laila peak and passes like Ghondoghoru La. The area below snowline is home to the endangered snow leopard sharing habitat with grey wolf and Himalayan ibex.

Structure and Composition of the Plan

The plan comprises of the following ten segments:

- i) Socio-economic and ecological profile of Hushey valley
- ii) Management issues and problems;
- iii) Proposed management interventions;
- iv) Management actions
- v) Indicators of process and progress
- vi) Implementation mechanisms/Available capacities for the implementation of the Valley Conservation Plans: Social organizations - CKNP Directorate - Facilitating NGOs/CBOs – Others
- vii) Expected outputs

- viii) Visible bottlenecks in realizing the expected outputs, and arrangements (available and potential both) to overcome the bottlenecks
- ix) Monitoring mechanism
- x) Proposed budget for implementation

Process of Plan Development

Information for socio-economic and ecological profile of four villages of the valley, management issues and problems and proposed interventions was obtained with the help of four Focused Group Discussion (FGDs); one in each village and interviews with household heads, covering 233 household out of 588 (40% of the total households of the valley, calculated based on CI 5 and CL 95%). Sampling plan for household interviews and participants of FGD is given in the *appendix-A*. Participant of FGs is given in *appendix-B*. Best natural resource management practices from other PAs such as KNP in Gilgit-Baltistan and lessons of CBNRM from various valley of GB were also reviewed for extracting proposed management interventions and actions. A meeting was conducted with CKNP management in Skardu to obtain their opinion on management issues, innervations and appropriate actions. CKNP Management Plan (2014) was also consulted relevant recommendations. Lessons learned by CKNP partners under SEED Project were reviewed from various documents available with WWF-Pakistan. Previous VCPs of Hushey and Kanday villages were reviewed to obtain useful information.

1. Socio-economic and Ecological Profile of Hushey Valley

Hushey valley is located at 20 kilometer northwest of Khapulu, the administrative centre of District Ghanche. It is part of the Tehsil Mashabrum and UC Machulo and could be reached through a bumpy and dusty jeep road after crossing a hanging bridge at Sailing near Khaplu, going upward along the Hushey River towards the landmarks like Mashabrum Peak or Ghondoghor La.

1.1. Geographic location of villages

Location of four of the seven villages of Hushey valley which fall in the buffer zone of CKNP including Hushey, Kanday, Marzigond and Tallis is given in the following table:

Villages	Settlements	Coordinates		Elevation (m)
		E	N	
Hushey	Hushey	76°21'29.53"	35°27'2.42"	3176
Kanday	Mehdiabad (new Kanday)	76°22'9.40"	35°23'13.25"	2917
	Ehltep (old Kanday)	76°22'2.46"	35°22'6.66"	2877
	Thamakhor (old Kanday)	76°22'5.84"	35°21'45.51"	2835
Marzigond	Marzigond	76°23'17.26"	35°17'33.11"	2663
Tallis	Ghomskit, Walichar, Baishu Gapkhor, Baishu Gainkhor	76°23'29.26"	35°15'55.39"	2645

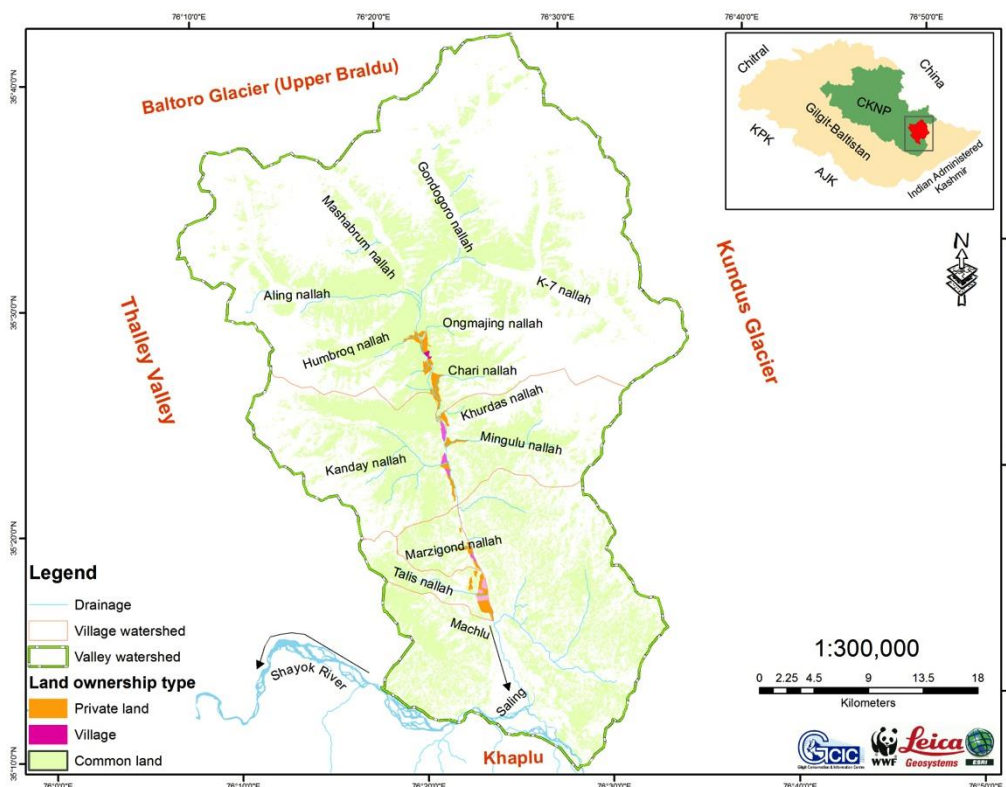


Figure 2 Map of Hushey valley (village locations and territory use)

Territory use (limit of private properties land and the limit of the village common use right land)

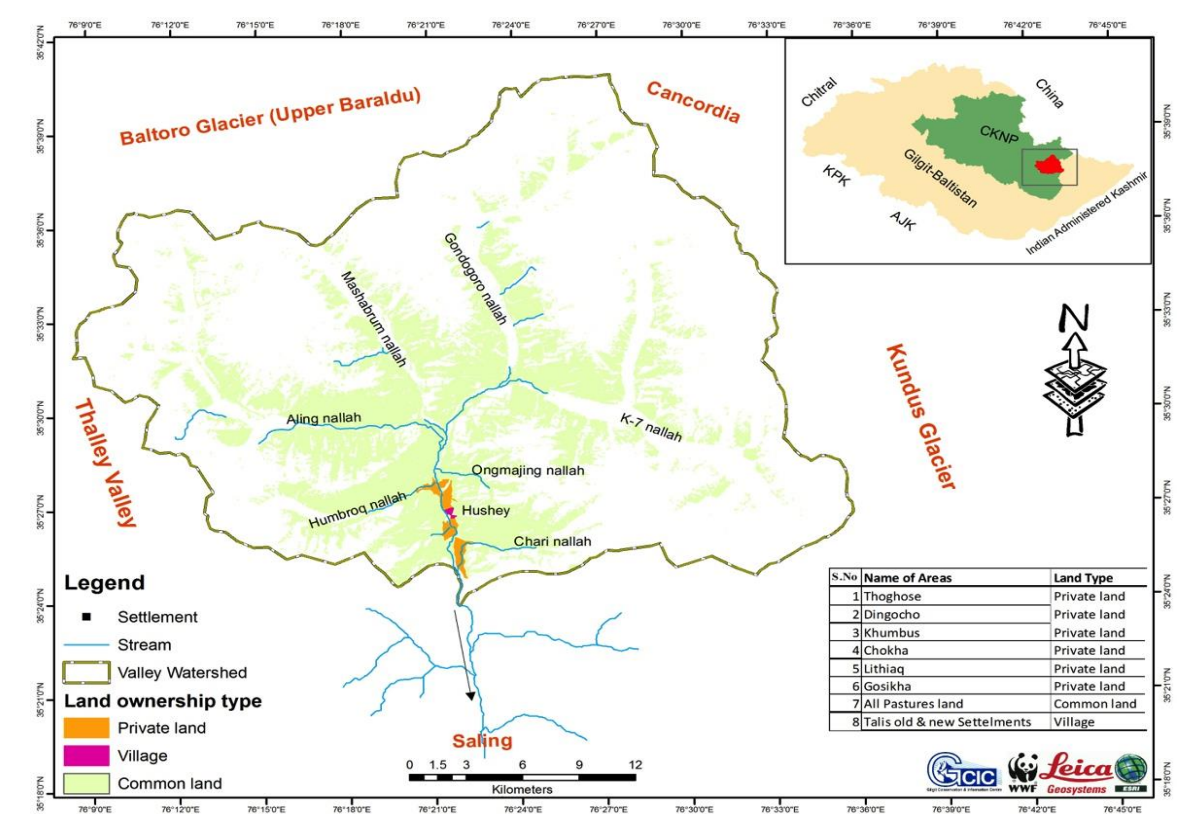


Figure 3 Territory use Hushey village

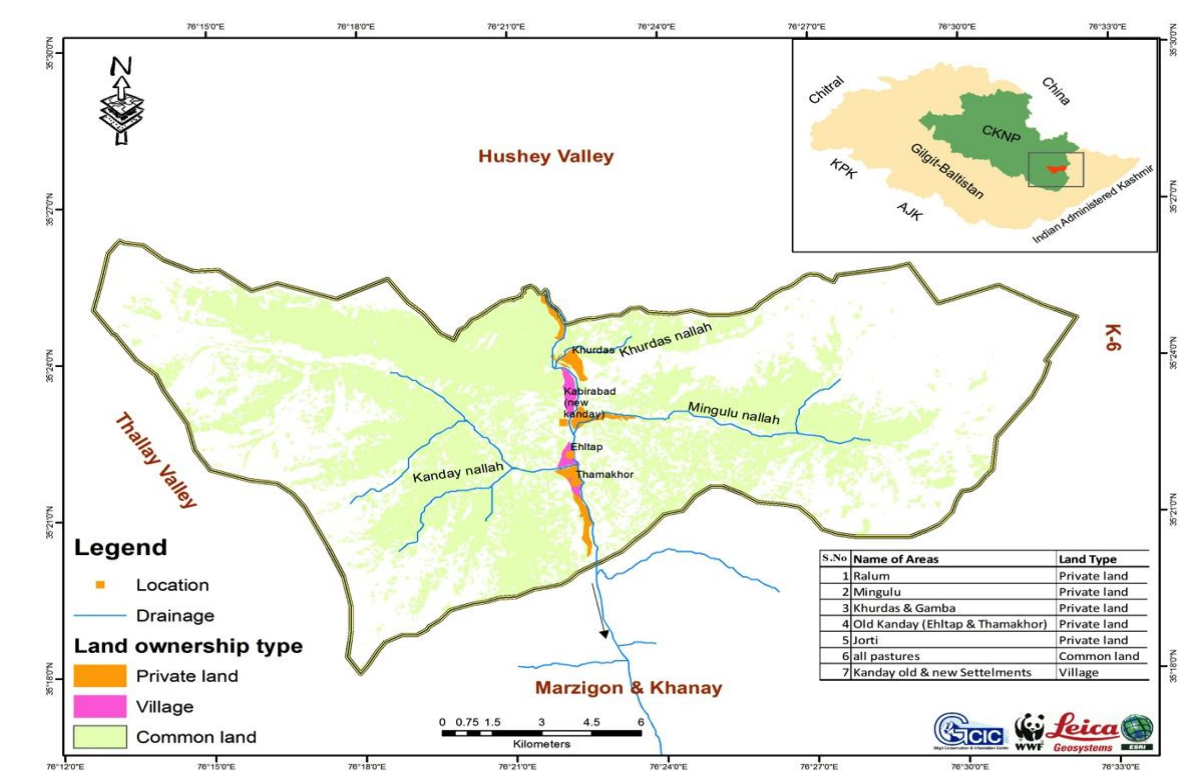


Figure 4 Territory use Kanday village

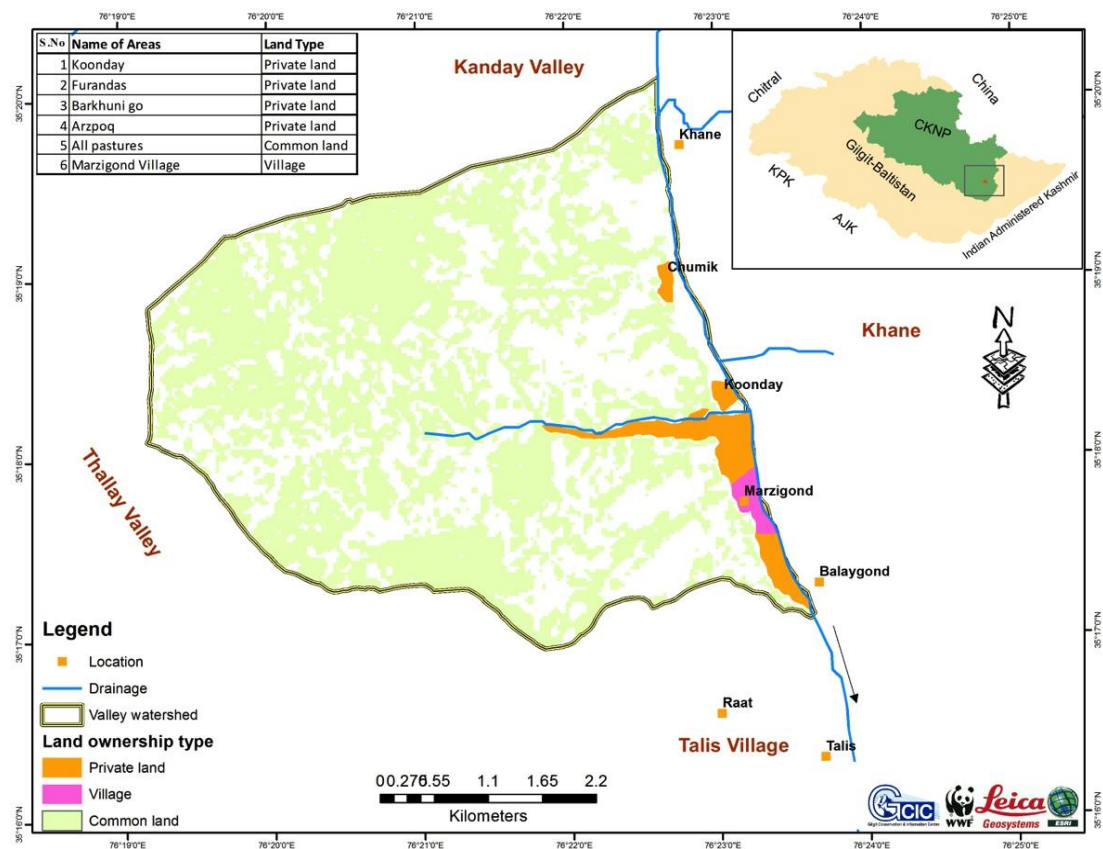


Figure 5 Territory use Marzigond village

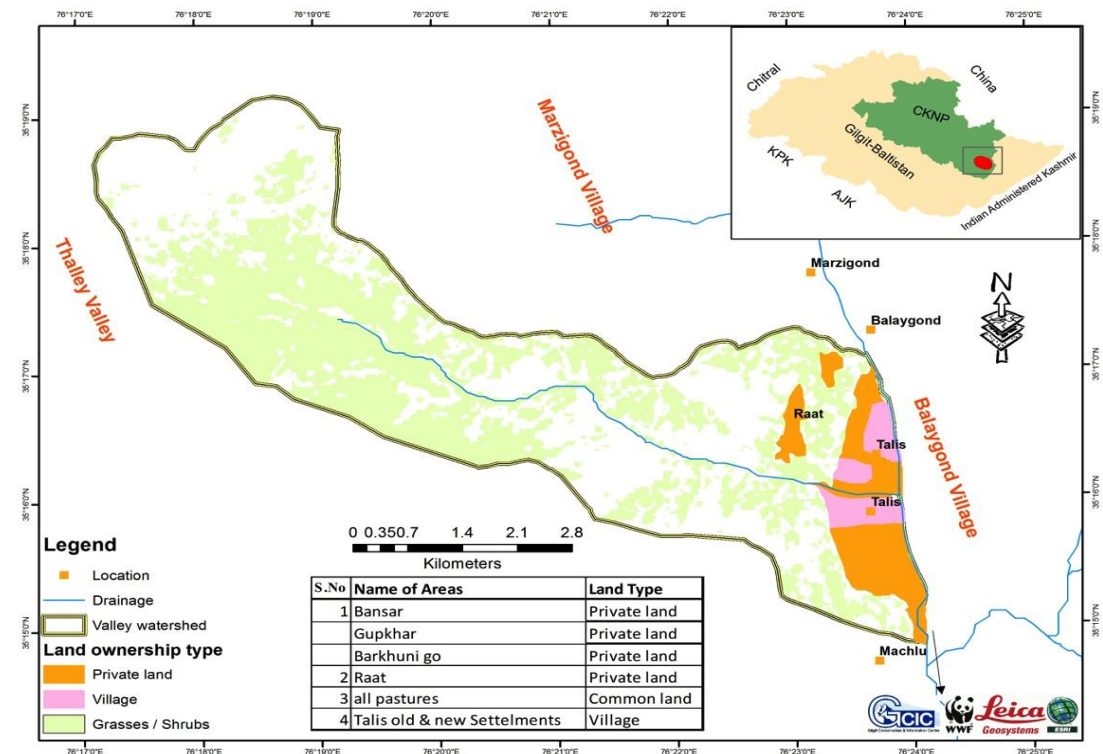


Figure 6 Territory use Talis village

1.2. Demographic profile of villages

Village	No of Households	Population	Average household size	Agricultural land per household (Ha)	Yearly Cash Income/household (PKR)
Hushey	155	1219	8.38	0.608	123,147
Kanday	160	1272	7.95	0.535	165,086
Marzigond	80	720	9	0.32	173,962
Tallis	234	2030	7.42	0.295	187,224

Kanday: The major sources of income include agriculture (contributing 74.1%, n=58 of the total annual cash income), government jobs (22.4%), tourism (8.6%), labor (6.8%), , and private jobs (5.2%).

Tallis: The major sources of income include Agriculture (contributing 69%, n=98 of the total annual cash income), labor (5%) and government jobs (29%, n=98).

1.3. Education

On average literacy among adult population (n=xx respondents) in the valley is 45%, Hushey (44%), Kanday (64%), Marzigond (42%) and Tallis (29%).

In Hushey village only small proportion of the total population (8%) is graduate, while only 2% of the population has received post graduate level education. As a general perception, male populace is more literate than their female counterparts.

In Kanday as well a small proportion of the total population (10%, n=58) is graduate while there was not a single post graduate in the valley. 6.9% (n=58) of the population appeared to have primary education while the figures obtained for the people with secondary and higher secondary education are 10.3% and 18.9% respectively.

In Marzigond, only 11.54 percent of the total population appeared having primary while 15.38% has acquired secondary and higher secondary level education respectively in the village. As a general perception, male populace is more literate than their female counterparts.

In Tallis a very small proportion of the total population (4%, n=98) is graduate while 3% (n=98) were reported to be post graduate in the valley. 13% (n=98) of the population appeared to have secondary education.

Education facilities in the Valley

Village	Name of school	Level/ Grade	Target group (Boys, Girls/Mix	Government/ Private	If private, name of supporting Institution/ individual
Hushey	Federal Government Middle School Hushey	8 th	Mix	Government	-
	Mashabrum Public School, Hushey	7 th	Mix	Private	Hushey Welfare & Development Organization through Central Asia Institute and Iqra Fund.
	Primary School Hushey (Through National Education Foundation)	5 th	Mix	Government	-
Kanday	Federal Government High School	10 th	Mix	Government	-
	Primary School Kanday (Through National Education Foundation)	5 th	Mix	Government	-
	Amin Buraq Public School	6 th	Mix	Private	Village Development Organization, Ibrahim Khalil, Iqbal, Ali
	Sun Valley School	5 th	Mix	Private	Sun Valley Organization, Akhun Alika
Marzigond	Federal Government Primary School	5 th	Mix	Government	-
	Mir Aliwa Public Public School	5 th	Mix	Private	Mir Aliwa Welfare and Development Society, Haji Mohammad Ali
	Madrassa Zia ul Uloom	Religious*	Mix	Private	-
Tallis	Federal Government Middle School	8 th	Mix	Government	-
	Primary School Ghomskit	5 th	Mix	Government	-
	Maktab Gongkhar	Religious	Mix	Private	Tallis Students Federation
	Maktab Ghomskit	Religious	Mix	Private	Tallis Students Federation

* Qaida – Quran Shareef- Dawat-e-Sofia Noor Bakhshia-Fiqa-ul-Akhwat

1.4. Health

Hushey: The only health facility is a C-Class Civil Dispensary managed by Health Directorate of Baltistan with staff comprising of a Dispenser, two Traditional Birth Attendants (TBAs), one Ward Servant, one Chowkidar and one Sweeper. A position of Nursing Assistant exists in the dispensary but someone is yet to be hired for. According to the Dispenser on duty (Mr. Ghulam Hussain) daily average attendance of patients is 8-10 persons with ailments like pneumonia and bronchitis in cold season and diahorea and abdominal disorders in warm season while body ache and stress or hypertension are common diseases in the village. The patients with serious ailments have to seek treatment in Khaplu or Skardu in government, military or private hospitals, according to their affordability.

Kanday: The only health facility in Kanday is A-Class Civil Dispensary managed by Health Directorate of Baltistan with staff comprising of a Dispenser, three Lady Health Workers (LHVs) and one Traditional Birth Attendants (TBAs). The patients with serious ailments have to seek treatment in Khaplu or Skardu in government, military or private hospital, keeping in view their financial positions.

Marzigond: The only health facility is a First Aid post managed by Health Directorate of Baltistan with staff comprising of a paramedic staff, one Lady Health Visitor (LHV) and one Traditional Birth Attendant (TBA). Quite often people travel to Machulo (3-5 km) for treatments. The patients with serious ailments have to seek treatment in Khaplu or Skardu in government, military or private hospital, keeping in view their financial positions.

Tallis: The only health facility is an A-Class Civil Dispensary managed by Health Directorate of Baltistan with staff comprising of a Dispenser, three Lady Health Visitors and one Traditional Birth Attendants (TBAs). The patients with serious ailments have to seek treatment in Khaplu or Skardu in government, military or private hospital, keeping in view their financial positions.

1.5. Agriculture

The area falls under single cropping zone with wheat as major cereal crop, followed by buckwheat while potatoes and peas as main vegetables. Having a short and specific growing season, both the cereal (wheat) and vegetables (potato, peas and turnip, and some other vegetables in rare cases) are grown at the same time (April-May), and harvested before inception of winter season (September-October).

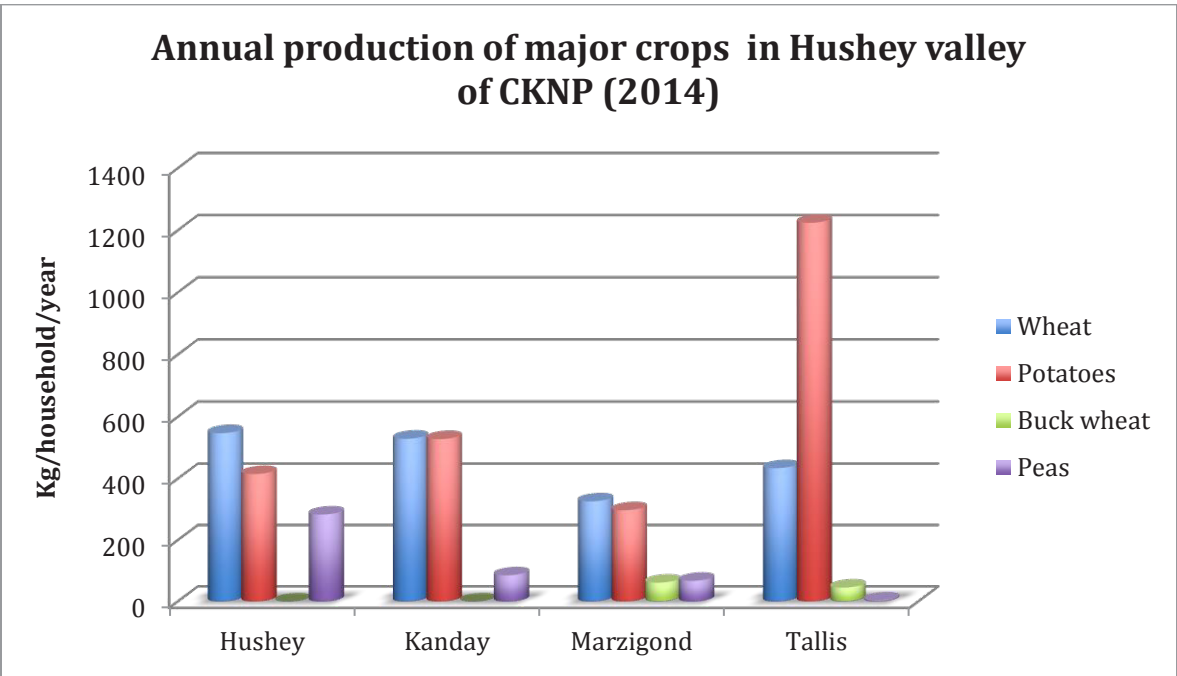
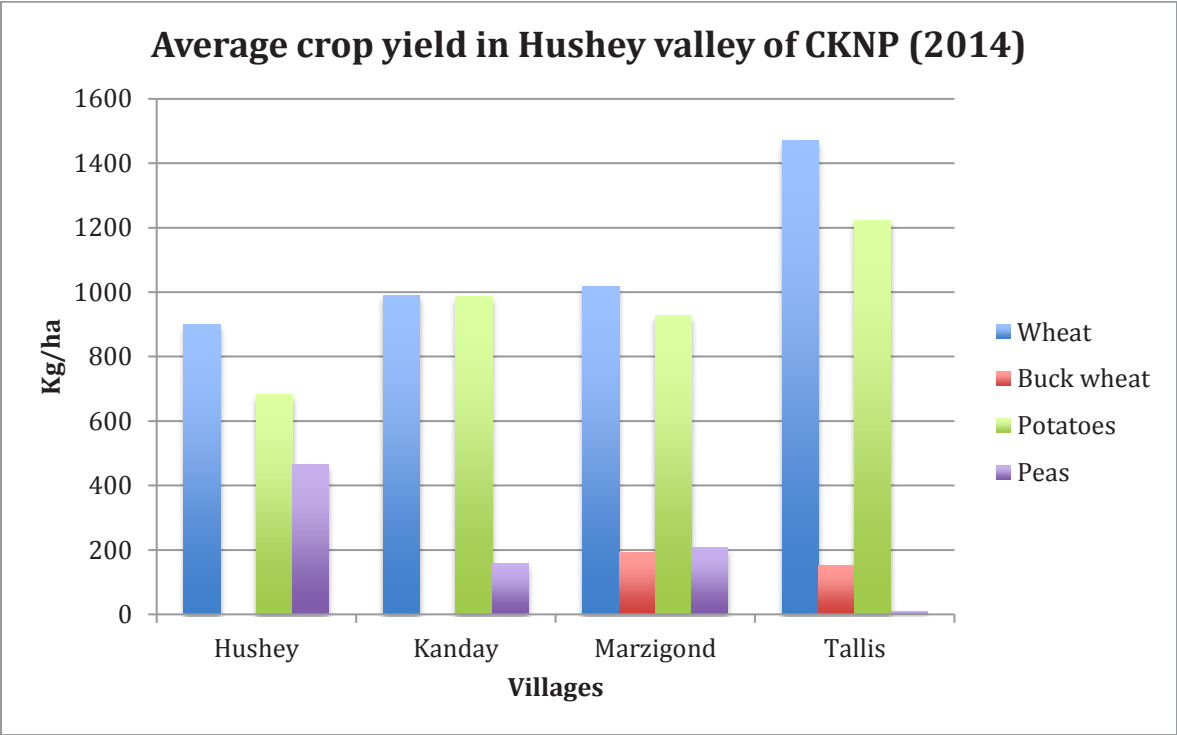
A summary of major crops, their yield, average production per household per year and utilization of major crops is given in the following table:

Village	Major crops	Average Yields (production per Ha)	Average production per household (Kg/year)	Consumption (%)	
				Domestic	Sale
Hushey	Wheat	900	547	100	0
	Potatoes	683	415	74	26 @ Rs. 35/kg (2014)
	Peas	465	283	70	30 @ Rs. 75/kg (2014)
Kanday	Wheat	989	529	100	0
	Potatoes	987	528	85	15 @ Rs. 35/kg (2014)
	Peas	159	85	50	50 @ Rs. 75/kg (2014)
Marzigond	Wheat	1019	326	100	0
	Barley	331	106	100	0
	Buck wheat	191	61	100	0
	Potatoes	928	297	87	13 @ Rs. 35/kg (2014)
	Other vegetable	209	67	85	
	Fruits	375	120	93	
Tallis	Wheat	1471	434	100	0
	Buck wehat	153	45	100	0
	Potatoes	1224	361	97	3 @ Rs. 35/kg (2014)
	Peas	10	3		0

Average Crop Yield (kg/ha) in Hushey valley of CKNP

Wheat and potato production is higher in low-lying villages (Tallis) while peas production is comparatively higher in villages situated at higher altitudes (Hushey). Most of the products are locally consumed except potatoes and peas of which 15-50% of the total produce is sold to buyers in the village or in the nearest town, i.e. Khaplu.

Average crop yield and annual production per household is given in the following figures.



1.6. Water resources and irrigation infrastructure

The drinking water supply to the villages is from natural springs, while irrigation water is mostly from streams flowing down from the mountains. Water resource in different villages of the valley are summarized in the following tables and figures:

Hushey village

Source/Facilities	Name of Location	GPS Coordinate	Elevation (m a.s.l.)	No of beneficiary households	Type of water source	Water condition
Reservoir	Goma Changian	76°20'20.14"E 35°27'30.35"N	3544	155	Spring	Clear
Pipe line		76°20'20.14"E 35°27'30.35"N start End (76°21'30.92"E, 35°27'2.93"N)	Start 3544 End 3160	155	Spring	Clear
Water tap		76°21'30.92"E, 35°27'2.93"N	3155		Spring	Clear
Main Reservoir	Humbroq (tank1) (main tank)	76°20'41.23"E, 35°27'44.40"N	3413	155	Spring	Clear

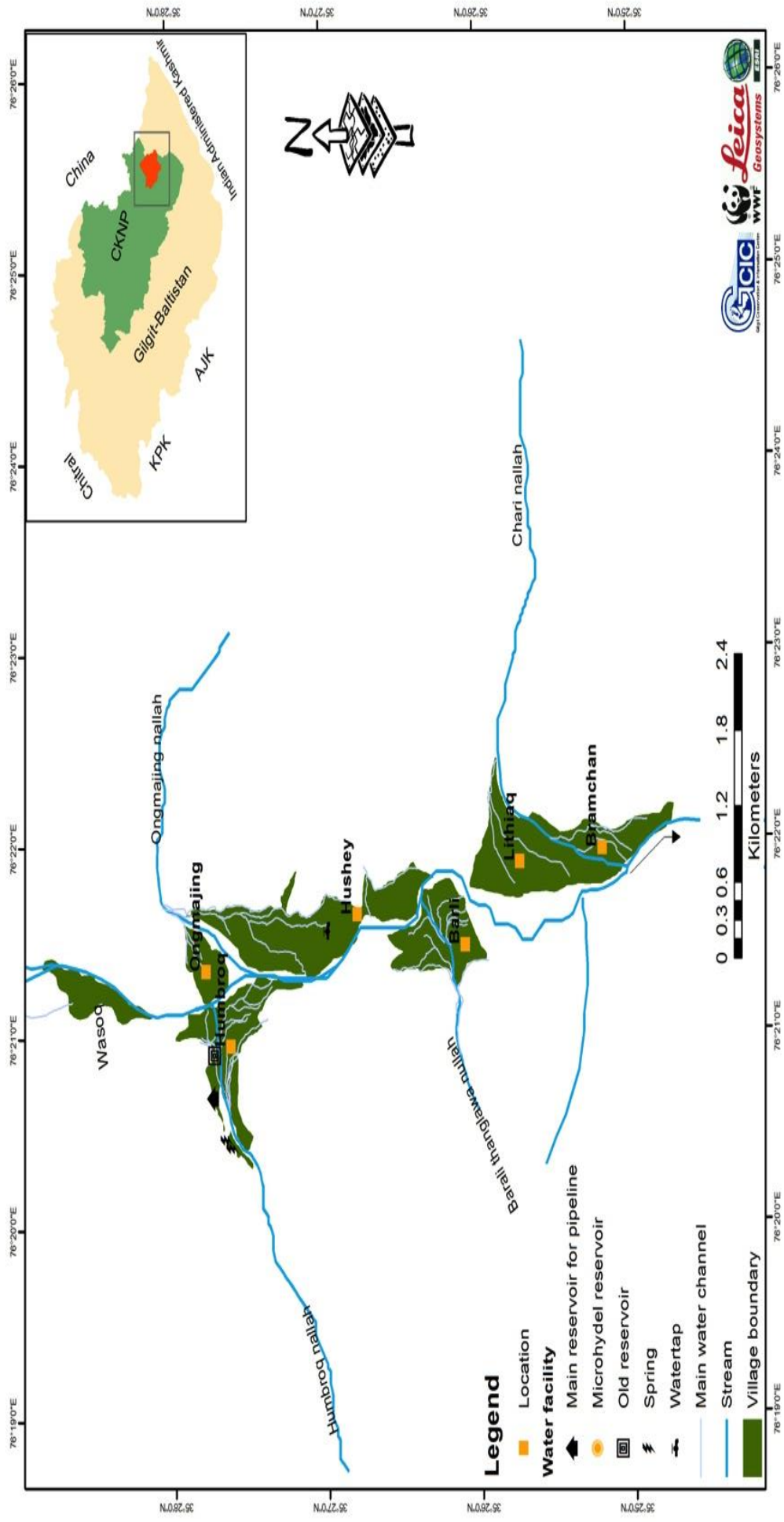


Figure 7 Water resources and facilities in Hushey village

Kandy

Source/Facilities	Name of Location	GPS Coordinate (UTM WGS84)	Elevation (m a.s.l.)	No of beneficiary households	Type of water source	Water conditions
Spring	Chalay	76°23'20.88"E, 5°22'54.23"N	3096	80-85	Spring	Clear
Pipe line		76°23'20.88"E, 5°22'54.23"N	3096	85	Spring	Clear
Water tap	Kabirabad (new kandy)	76°22'9.06"E, 35°23'9.53"N	2945	85	Spring	Clear
Reservoir	kabirabad	76°21'58.22"E,35°23'23.40"N	3010	85	Spring	Clear
Reservoir & Pipe line	Ehltep (old Kandy),	76°21'58.13"E, 35°22'1.82"N	2900	7	Glacier water	Muddy
Water tap	Ehltep (old Kandy),	76°22'2.50"E, 35°22'6.64"N	2885	7	Glacier water	Muddy
Reservoir & Pipe line	Thamakhor (old Kandy)	76°21'52.56"E,35°21'51.61"N	2925	7	Glacier water	Muddy
Water tap	Thamakhor (old Kandy)	76°22'5.07"E, 35°21'46.15"N	2895	7	Glacier water	Muddy

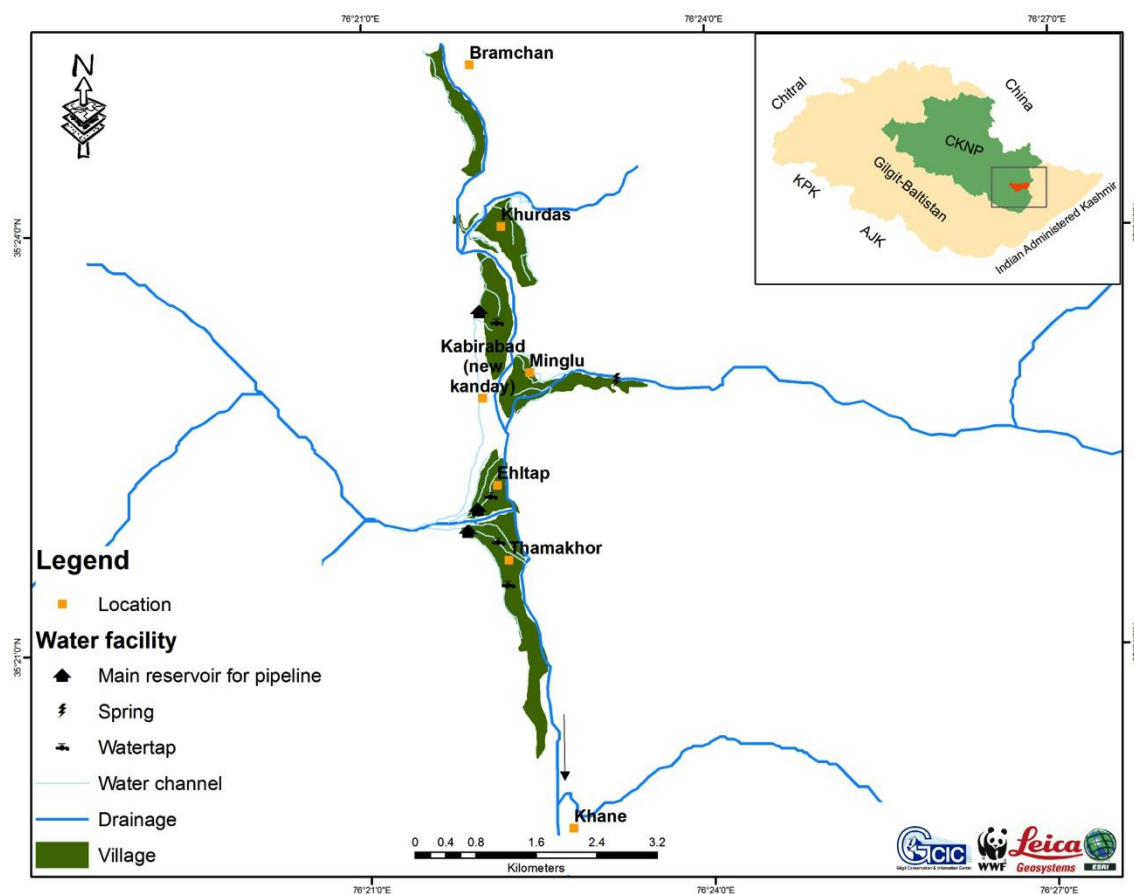


Figure 8 Water resources and facilities in Kandy village

Marzigond

Source / Facilities	Name of Location	GPS Coordinate (UTM WGS84)	Elevation (m a.s.l.)	No beneficiary households	Type of water source	Water condition
Spring	Koonday chumik	76°22'37.58"E, 35°19'2.61"N	2890		Spring	Clear
Pipe line	Koonday chumik	76°22'38.39"E, 35°19'0.12"N	2873	80	Spring	Clear
Reservoir	Koonday chumik	76°22'38.39"E, 35°19'0.12"N	2873	80	Spring	Clear
Water tap	Marzigon	76°23'16.16"E, 35°17'34.47"N	2662	80	Spring	Clear

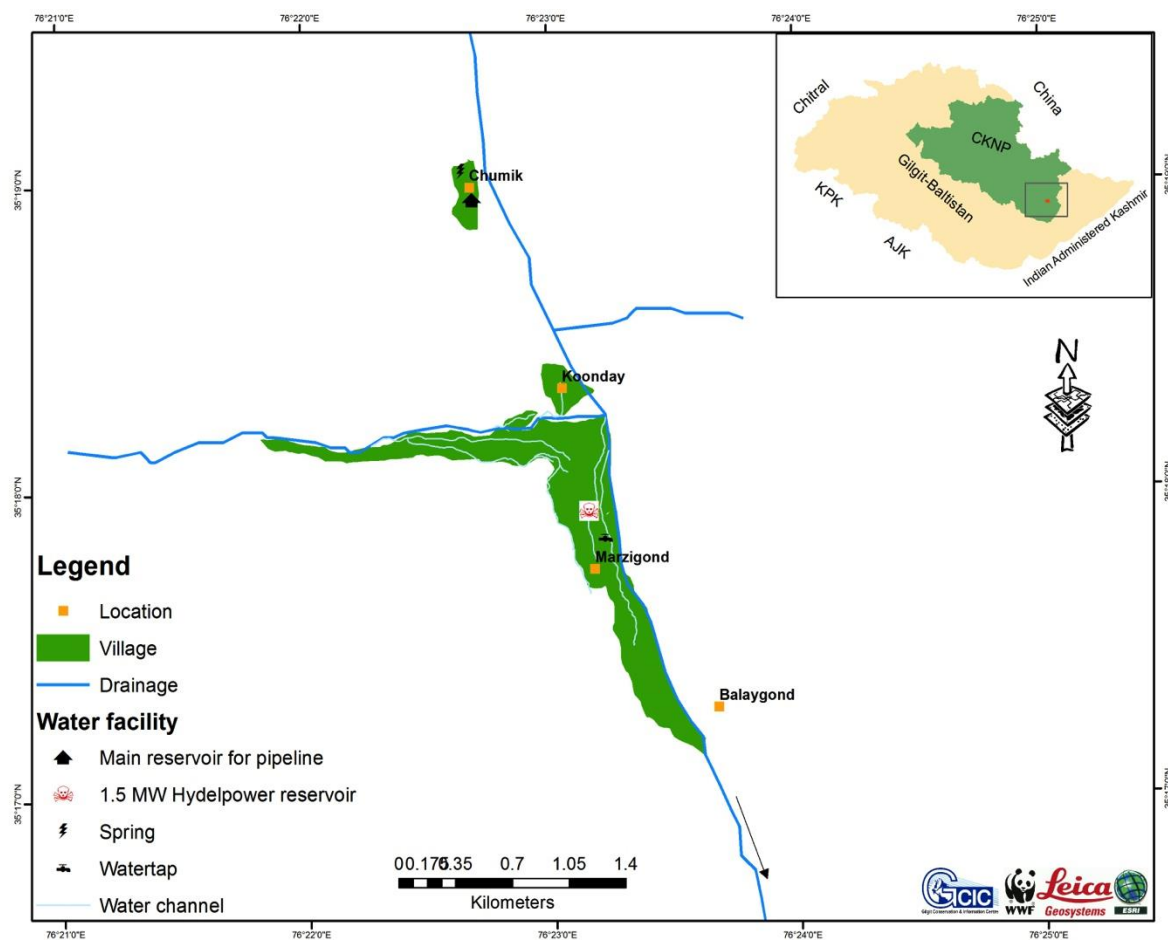


Figure 9 Water resources and facilities in Marzigond village

Tallis

Source/Facilities	Name of Location	GPS Coordinate (UTM WGS84)	Elevation (m a.s.l.)	No of beneficiary households	Type of water source	Water condition
Spring	Alqoor Chuli	76°22'22.28"E, 35°16'16.92"N	3160	234	Spring	Clear
Pipe line	Jung	76°23'17.43"E, 35°15'59.28"N	2695	234	Spring	Clear
Water tap	Talis	76°23'25.36"E, 35°15'57.86"N	2652	234	Spring	Clear
Reservoir	Jung	76°23'17.43"E, 35°15'59.28"N	2695	234	Spring	Clear

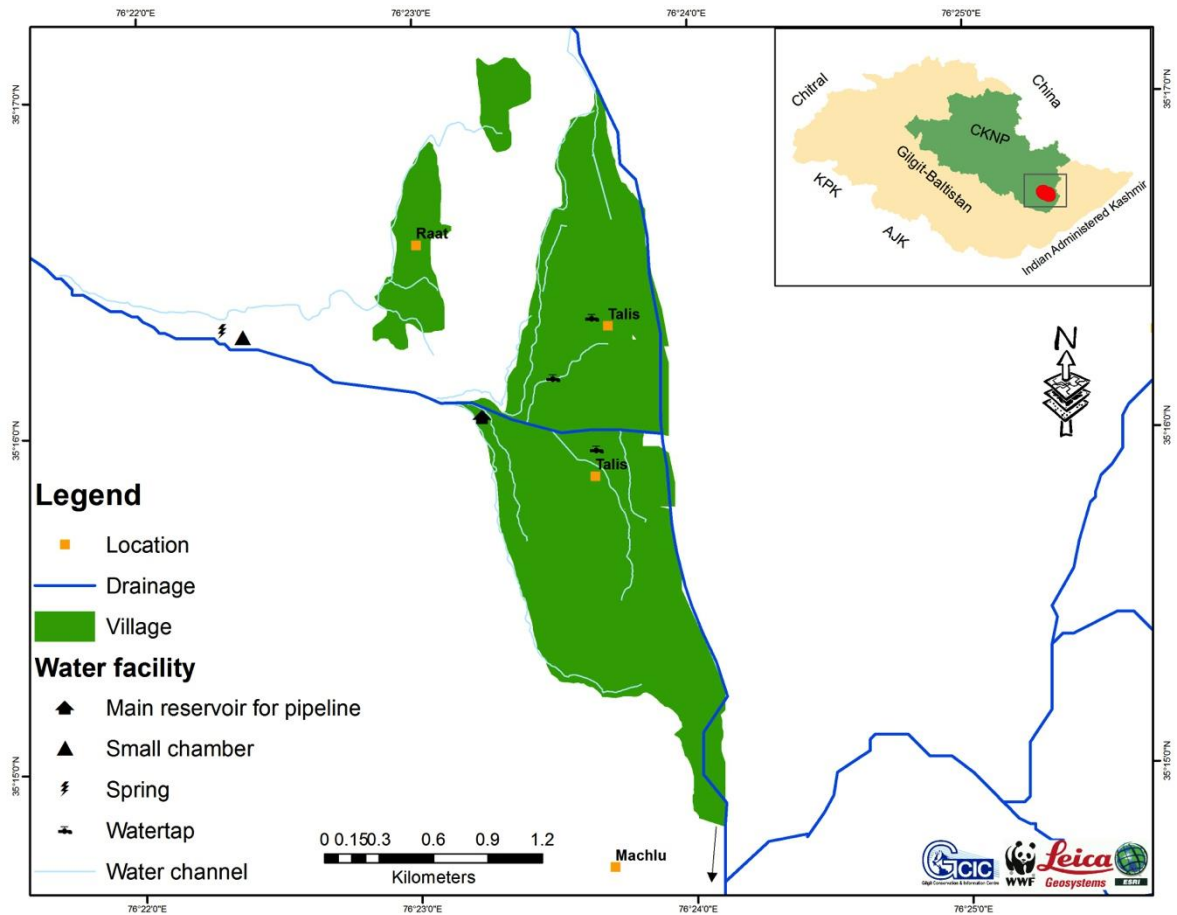


Figure 10 Water resources and facilities in Tallis village

1.7. Livestock herding

1.7.1. Livestock holding and herd composition

Livestock herding is the second largest source of livelihood in the valley followed by subsistence agriculture. Majority of the local people (> 90%) rear livestock, varying in numbers and types depending upon the owner's land holding status, availability of fodder and household labour to rear livestock. Various types of livestock in the valley include sheep, goats, yaks, and cattle including cow, bull, cross breeds of yak and cow (locally called zo for male and zomo for female, but there are about seven generations each having a specific name in the local context). Equines like donkeys and horses are very few in the valley.

A brief summary of livestock types and numbers in the valley is given the following table:

Villages	Sheep	Goats	Cattle (cow, bull)	Crossbreeds of yak and cow	Yak	Equines (donkeys and horses)	Total	Milking cattle
Hushey	813	902	556	419	46	25	2761	323
Kanday	813	1393	178	405	115	0	2904	333
Marzigond	308	388	123	120	31	0	970	117
Tallis	1254	1351	356	341	72	21	3395	872

Average number of livestock per household in the valley is 16 (2014). It has been decreased by 38% during the last five years (from 26 animals in 2009). The reasons of decrease in livestock numbers per household are:

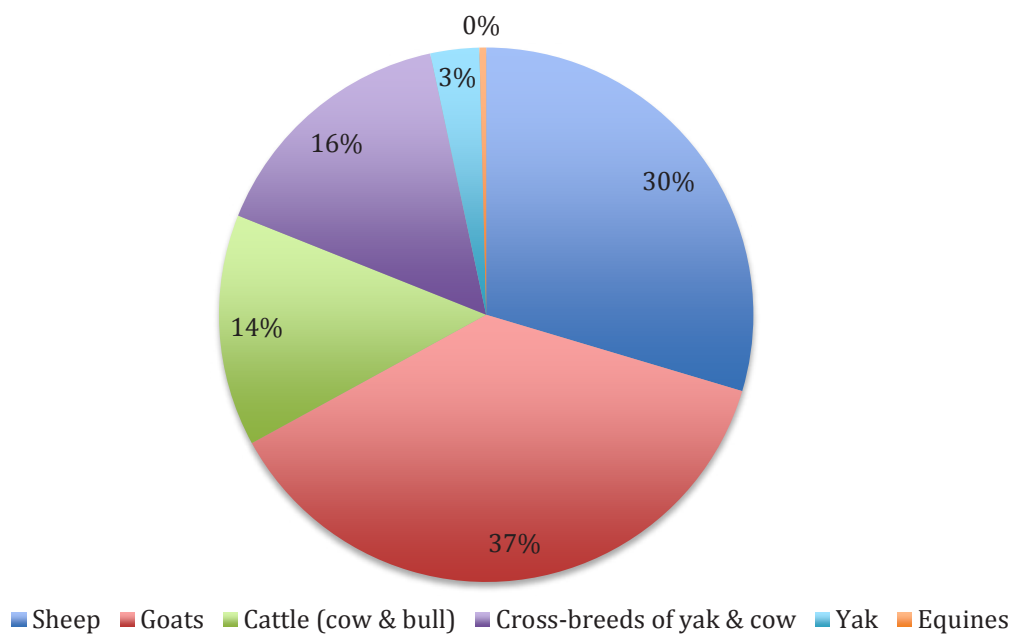
- Lack of household labor especially due to the engagement of youth in education, employment and tourism etc.
- Lack of fodder due to decreased landholding
- Widespread diseases and non availability of medicine
- Higher rate of depredation due to increased number of predators as a result of community-based conservation

Average herd size and composition per household is given in the below table:

Villages	Sheep	Goats	Cattle (cow, bull)	Crossbreeds of yak and cow	Yak	Equines (donkeys and horses)	Total	Milking cattle
Hushey	5	6	4	3	0.3	0.2	18	2
Kanday	5	8	1	3	1	0	18	1
Marzigond	4	4	2	2	0.3	0	12	2
Tallis	5	6	2	2	0.3	0.1	15	4

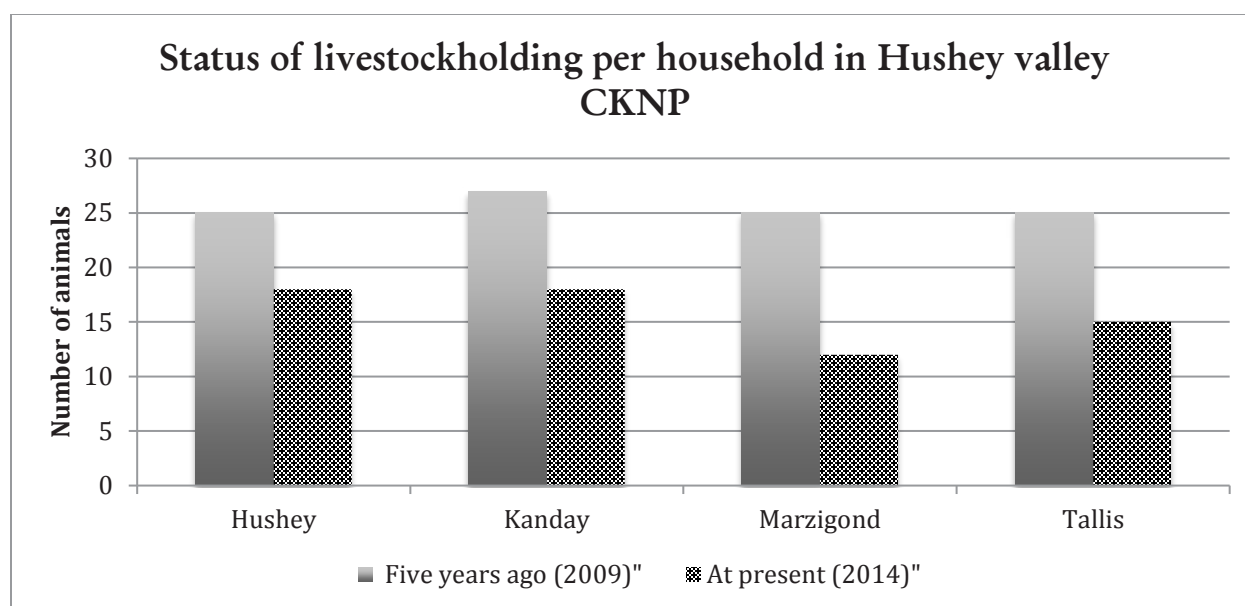
Herd composition in Hushey valley shows that goats are the dominant animal type followed by sheep, cross-breeds of cow, cattle and yak. Equines are absent in Basha valley

Herd Composition in Hushey valley CKNP, 2014



Trend in livestock populations and numbers over the past five years

Villages	Average Herd size (at present, 2014)	Average herd size 5 year ago (2009)	Difference (% decrease)
Hushey	18	25	28
Kanday	18	27	33
Marzigond	12	25	52
Tallis	15	25	40



1.7.2. Seasonality, Feeding and Grazing Pattern

On average 90% of the total livestock is grazed in high pastures. Grazing pattern is transhumance, which involves seasonal movement of people with their livestock over relatively short distances, typically to higher pastures in summer and lower valleys during winters. Herders have permanent homes in the valley, only the herds move with the people necessary to tend them. There are defined customary laws for seasonal movement of livestock to as well as on the pastures.

The organization of grazing in time and space is closely connected with seasonal availability of fodder for the livestock. There are insufficient grazing land near the village and the accessibility of different pasture vary during the year which lead to the necessity of a seasonal movement of livestock through and altitudinal range of pastures to allow the animals access to diverse fodder source.

On sunny days in late winters and early spring goats are led to graze on the slopes near the village where they find Artemisia. In March some stockholders take their animals on daily movement to transitional pasture. When the field are ploughed, zo are driven to high elevation pasture where the graze unattended. Sheep and goats are moved up valley normally in May in all valleys. Cattle and Zomo are moved up to the pasture in mid June by the stockholders themselves. All the livestock that have been taken to the pasture spend the rest of summer up valley until offer crops have been harvested. Almost from mid September some of the stokes e.g cow goat and sheep driven down to spring seasoned pastures (Yul Broq) at the end of September in most of the valleys. Cattle like zo/zomo are brought back down from the pasture mostly at the end of September. From then they are allowed to freely graze in the harvested field. Two to three shepherds remain present at the pasture during the season turn by turn from each household. In some particular cases herdsmen are hired for the whole period of grazing and at the end of season they are paid in the form of butter. There are specific pastures in all the valleys

where Yak and non-lactating cow are left to graze together more or less unattended. The crossing of animals is thus made easier. Zo / zomo and calves are usually not attended by shepherd and graze on different meadows. Yak and Yakmo stay in the highest pastures close to the snow line. Lactating cows and zomo graze on the meadows above the pasture settlements. The return to the pasture settlements every evening for milking and stay the night near the cattle sheds. Goats and sheep are penned in cattle shed which is always half roofed or opened.

Hushey					
Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring (April-May), depending upon snowfall	Sheep and goats	✓	✓	✗	Grazing in pastures near to village and tended by owners turn by turn at daily basis
	Lactating cattle including cow and zomo	✓	✓	✗	Grazing in and around the village and taken care by an owner him/herself
	Non- lactating cattle and yak	✓	✓	✗	Free grazing in and around the village and taken care by an owner him/herself
Summer (June to Mid October)	Sheep and goats	✓	✗	✗	Guarded grazing by two male shepherds in high pastures both in Saicho and Mashabrum sides
	Lactating cattle including cow and zomo	✓	✗	✗	Guarded grazing in pastures by owner women in groups comprising 5-10 members in Shaksha, Alday and Aling and 30-40 members in Humbroq
	Non- lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures
Autumn (Mid October-Early December) depending upon snowfall	Sheep and goats	✓	✗	✗	Controlled grazing in pastures near to village by owners turn by turn at daily basis
	Lactating cattle including cow and zomo	✓	✓	✗	Free grazing in and around the village and taken care by an owner him/herself
	Non- lactating cattle and yak	✓	✗	✗	Free grazing in and around the village and taken care by an owner him/herself
Winter (mid December to March)	Sheep and goats	✗	✗	✓	Mostly remain in cattleshed during heavy snowfall, except for taking out for drinking water
	Lactating cattle including cow and zomo	✗	✗	✓	Mostly remain in cattleshed during heavy snowfall, except for taking out for drinking water
	Non- lactating cattle and yak	✗	✗	✓	Sometime let outside the cattleshed

Kanday					
Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring (May-June), depending upon snowfall	Sheep and goats	✓	✓	✗	Grazing in intermediate pastures (near to village) and tended by two paid grazers
	Lactating cattle including cow and zomo	✓	✓	✗	Grazing in intermediate pastures and taken care by an owner him/herself
	Non-lactating cattle and yak	✓	✓	✗	Free grazing in intermediate pastures
Summer (July-Aug)	Sheep and goats	✓	✗	✗	Grazing in high pastures and tended by two paid grazers
	Lactating cattle including cow and zomo	✓	✗	✗	Grazing in high pastures and tended by two paid grazers
	Non-lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures
Autumn (Sep-Oct) depending upon snowfall	Sheep and goats	✓	✗	✗	Grazing in intermediate pastures (near to village) and tended by two paid grazers
	Lactating cattle including cow and zomo	✓	✓	✗	Grazing in intermediate pastures and taken care by an owner him/herself
	Non-lactating cattle and yak	✓	✗	✗	Free grazing in intermediate pastures
Winter (Nov-April, depending upon snowfall)	Sheep and goats	✗	✗	✓	Mostly remain in cattleshed during heavy snowfall, or grazed in pastures adjacent to the village by the owners themselves
	Lactating cattle including cow and zomo	✗	✗	✓	Mostly remain in cattleshed during heavy snowfall, except for taking out for drinking water
	Non-lactating cattle and yak	✗	✗	✓	Mostly remain in cattleshed during heavy snowfall, or grazed in pastures adjacent to the village by the owners themselves, but yaks go upto intermediate pastures for grazing

Marzigond					
Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring to early summer (April-July), depending upon snowfall	Sheep and goats	✓	✗	✗	Grazing in Koonday pastures, tended by owners themselves (2 persons or households per day)
	Lactating cattle including cow and zomo	✓	✓	✗	Grazing in Koonday pastures, tended by owners themselves (2 persons or households per day)
	Non- lactating cattle and yak	✓	✗	✗	Free grazing in Koday broq and tended by owners themselves on need basis
Summer-Early Autumn (August to 10 September)	Sheep and goats	✓	✗	✗	Grazing in Gholong pastures, tended by owners themselves (2 persons or households per day)
	Lactating cattle including cow and zomo	✓	✗	✗	Grazing in Gholong pastures, tended by owners themselves (2 persons or households per day)
	Non- lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures
Autumn (10 Sep to 25 Sep in Gone Ali Sher khan and Thang area)	Sheep and goats	✓	✗	✗	Controlled grazing by owners themselves (4 persons or households per day)
	Lactating cattle including cow and zomo	✓	✓	✗	Controlled grazing by owners themselves (4 persons or households per day)
	Non- lactating cattle and yak	✓	✗	✗	Controlled grazing by owners themselves (4 persons or households per day)
Winter (mid December to March)	Sheep and goats	✓	✗		Controlled grazing by owners themselves (4 persons or households per day)
	Lactating cattle including cow and zomo	✗	✗	✓	Free grazing in and around the village and taken care of by the owners individually
	Non- lactating cattle and yak	✗	✗	✓	Free grazing in and around the village and taken care of by the owners individually

Tallis					
Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring (Mid April-Mid June), depending upon snowfall	Sheep and goats	✓	✗	✗	Grazing in Hachor and Katcha pasutres and surrounding pastures, initially by 4 persons for one week and subsequently by 2 persons who are the owners themselves go for grazing turn by turn. (2 households for 2 days)
	Lactating cattle including cow and zomo	✓	✓	✗	Grazing in and around the village and taken care by an owner him/herself
	Non-lactating cattle and yak	✓	✓	✗	Free grazing in and around the village and taken care by an owner him/herself.
Summer (Mid June to Aug)	Sheep and goats	✓	✗	✗	Guarded grazing in high pastures by owners themselves comprising of 2 herders (men from two households) for two days
	Lactating cattle including cow and zomo	✓	✗	✗	Guarded grazing in high pastures by owners themselves comprising of four groups of herders (2 persons per group) (one household per day or two households for two days)
	Non-lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures
Autumn and Winter (Sep to March) depending upon snowfall	Sheep and goats	✓	✓	✗	Controlled grazing in pastures near to village by owners turn by turn at daily basis
	Lactating cattle including cow and zomo			✓	Free grazing in and around the village and taken care by an owner him/herself
	Non-lactating cattle and yak	✓	✓	✗	Free grazing in and around the village and taken care by an owner him/herself

1.7.3. Status of livestock vaccination in Hushey valley

Data obtained for the number of livestock vaccinated and treated in case of any disease in last five years (2009-2013) is given in the following table:

Village	% of people having vaccination/ treatment of various livestock types			For which diseases			Supporting Agency
	Sheep	Goats	Cattle	Sheep	Goats	Cattle	
HusheyN=61 (No of respondents)	75	85	80	Lungs & Skin Disease, Stomach and Dysentery, Pox & PPR, Mange	PPR, Pox, Lungs Disease, Diarrhea, Dysentery, Mange	Dysentery, Lungs disease, Pox and PPR	CKNP/EvK2CNR, WWF, GB LS & DD and BWCDO
Kanday N=58	48	69	64	Lungs & Skin Disease, Stomach and Dysentery, Pox & PPR, Mange	PPR, Pox, Lungs Disease, Diarrhea, Dysentery, Mange	Dysentery, Lungs disease, Pox and PPR, Mange	CKNP/EvK2CNR, WWF, GB LS & DD and BWCDO
Marzigond N=26	27	31	27	Mange, FMD, PPR	Mange, FMD, PPR	Dysentery, Lungs disease, Pox and PPR	CKNP/EvK2CNR, WWF, GB LS & DD
Tallis N=98	10	13	14	Mange, FMD, PPR	Mange, FMD, PPR	Dysentery, Lungs disease, Pox and PPR	CKNP/EvK2CNR, WWF, GB LS & DD

1.8. Pastures of the Valley

Pastures of the valley can be divided into three categories: a) summer pastures (located at higher altitudes >4000 m, b) autumn/spring pastures (located at intermediate altitudes, 3500-4000 m, and winter pastures (located around the village at lower altitudes, 2500 m-3500). Gradual upward movement of livestock starts from April-June and downward movement occurs during September and October, keeping in view the altitudinal gradient, farming activities and local customs of various villages in the valley. During November to April livestock graze freely in and around the villages or remain in cattlesheds and stall fed in case of heavy snowfall.

1.8.1. Name, location, surface area, facilities and use of pasture

Hushey village

I d	Name	Coordinate (at pasture center)		Altitud e (m)	Estimate d surface (Ha)	Facilities	Other use
		Latitude (E)	Longitude (N)				
1.	Chhari (Lithiaq, Namakhoto, Chariging)	76.3835713448 0	35.4338555830 0	3754	1665	10 small accommodation s and 5 cattlesheds	Collectio n of Dung
2.	Ongmajing	76.36666667	35.46666667	3054	1443.06	40 cattlesheds for sheep and goats	Collectio n of Dung
3.	Wasoq	76.35235833	35.47060278	3386	345.7	Huts and corrals	Collectio n of Dung
4.	Onghdongsta n	76.3750008447 0	35.4977364280 0	3722	1443 (includin g Manzilla)	40 small accommodation s	Fuelwood , Dung, Manure
5.	Saicho	76.4039016632 0	35.5222443389 0	3634	3198	4 accommodation s 1 corral improved under SEED project	Collectio n of Dung and fuelwood
6.	Ghondoghor o	76.4075780423 0	35.5401547561 0	4206		3 accommodation s and 1 corral improved under SEED project	-
7.	Dalsangpa	76.4017046413 0	35.5646783551 0	4318		-	-
8.	Alday, Gholdongpa, Ghorsit	76.43590872	35.48369589	4030	1123	12 accommodation s	-
9.	Dumsum	76.3436520991 0	35.4999411867 0	3298	1402	45 accommodation s	Fuelwood , Dung, Manure
10.	Tirsir	76.3734839273 0	35.5212758085 0	4084		accommodation s	Fuelwood , Dung

11.	Ghaam	76.3502863470 0	35.5080138231 0	3885	1775	2 accommodations, 1 corral improved by BWCDO	Fuelwood , Dung, Manure
12.	Shakhsha	76.3487128252 0	35.5238093603 0	3983		12 accommodations	-
13.	Choghospang	76.3163528145 0	35.5428397777 0	4072		2 accommodations and 1 corral improved under SEED Project	-
14.	Aling	76.2716597595 0	35.4919177123 0	3748	4096	35 accommodations	Collection of Dung
15.	Humbroq	76.3156685555 0	35.4542393623 0	4146	2325	40 accommodations	Fuelwood , Dung, Manure
16.	Chogholingsa	76.4756392151 0	35.5260708048 0	4334	1016	-	-
17.	Spangsar	76.4558192477 0	35.5077289101 0	4486		-	-

Kanday Village

Id	Name	Coordinate (at pasture center)		Altitude (m)	Estimated surface (ha)	Facilities ¹	Other use ²
		E	N				
1.	Khotit	76.336798	35.382876	3598	Kanday nallah 5448.25	42 huts, 1 open corral	Dung and Manure collection
2.	Nangbroq	76.308561	35.399789	3811		10 huts	Fuelwood collection
3.	Karpobraqbo	76.281659	35.407265	4272		5 huts, 1 open corral	-
4.	Andaq	76.262622	35.394509	4694		5 hura	-
5.	Apobroq	76.344306	35.356152	3600		8 huts	-
6.	Tinis	76.316462	35.342367	4538		4 huts	-
7.	La	76.316641	35.359398	4728		5 huts	-

8.	Chheley	76.346070	35.407008	3957	981.50	55 cattlesheds	Fuelwood collection only for some collective/ communal events
9.	Jorti	76.399706	35.379015	3404	Mingulu nallah 3672.72	A cave for storing fodder	-
10.	Minguilo broq	76.421595	35.376644	3562		46 huts, 1 open corral	Fuelwood and Dung collection
11.	Nangma	76.444702	35.377541	4003		8 Huts	Manure collection

Marzigond

ID	Name	Coordinate (at pasture center)		Altitude (m)	Estimated surface (ha)	Facilities¹	Other use²
1.	Koonday broq (Zaigo) and surrounding pastures	76.336694	35.304341	3807	850	5 small accommodations, 3 large open corrals, 3 small cattlesheds with roof	Collection of fuelwood and dung
2.	Koonday Broq (Skillmal) and surrounding pastures	76.339149	35.310359	4215			
3.	Gholong boq (Sachat) and surrounding pastures	76.348381	35.310099	3884	553	2 small accommodations and 2 cattle sheds with roof	
4.	Gholong broq (Ghodong) and surrounding pastures	76.337572	35.294307	4220			
5.	Gone Ali Sher Khan	76.38397	35.30504	3013	30		
6.	Village and surrounding pastures	76.37237	35.30191	3110	190		

Tallis

Id	Name	Coordinate (at pasture centre)		Altitude (m)	Estimated surface (ha)	Facilities ¹	Other use ²
		E	N				
1.	Hachor	76.363558	35.274686	3363	114.30	1 large open corral and 1 small accommodation	Fuelwood, manure, dung
2.	Katcha	76.337467	35.280185	3913	161.46	1 open corral, 1 accommodation, 1 mosque	Artemisia, manure, dung
3.	Shubrangsa	76.318200	35.284694	4615	173.10	3 open corrals, 5 accommodations, 1 mosque	Artemisia, manure, dung
4.	Tassibrangsa	76.326426	35.286329	4187	210.42	2 corrals, 5 accommodations	Artemisia, manure, dung
5.	Ongdongstan	76.329357	35.288621	4195		-	Artemisia, dung
6.	Gaghdong	76.320422	35.289930	4352	152.70	-	Artemisia, dung
7.	Chuskistonma	76.351793	35.273392	3977	182.16	-	Artemisia, dung
8.	Serchumik	76.337377	35.285988	4253	80.73	3 accommodations, 2 corrals	Artemisia, dung
9.	Phorondas	76.345327	35.285235	4126		4 accommodations, 2 corrals	

1.8.2. Pastures Grazing Fee

Livestock in the valley, especially cattle are brought from one village to another for grazing during summer. In that case the host community or grazers charge grazing fee in cash or in kind (a portion of the total ghee or butter produced from the animal during that particular grazing season). Details of grazing fee charge for grazing animals from out side a village in the valley is given in the following table:

Village	Pasture Name	Period	Animal types	Number	Grazing fee value	Name of villages from where animals are brought
Hushey	Humbroq, Aling, Sahakhsha, Gholdongpa	May-Sep	Zomo (female progeny of a cross between yak and cow)	52 (2013)	Rs. 1200 plus half of the total ghee (butter) produced from the milk of an animal	Tallis, Halday, Marzigond, Balegond, Khanay and Machulu
Kanday	Nangma, Nangbroq, Khotit	April-Nov.	Cow, Zomo	50-60 (2013)	Rs. 1000 per animal	Tallis, Marzigond, Machulo, Khanay
Marzigond	Koonday and Gholong pastures	May-Sep	Zomo (milking only)	5-10 (2013)	Rs. 1000 plus half of the total ghee (butter) produced from the milk of an animal	Balegon
Tallis	No animals from outside villages are brought to Tallis for grazing					

1.8.3. Grazing Cycle in Hushey valley of CKNP

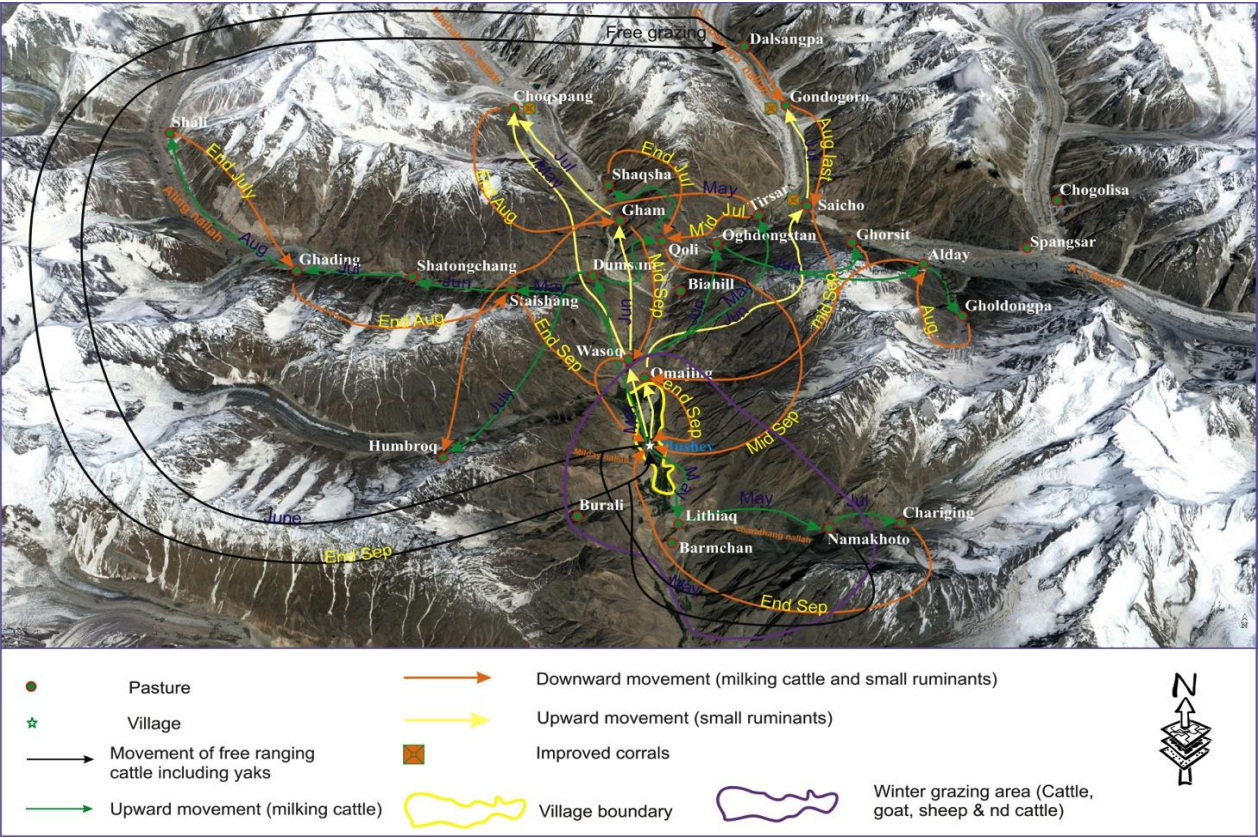


Figure 11 Pasture grazing cycle in Hushey village

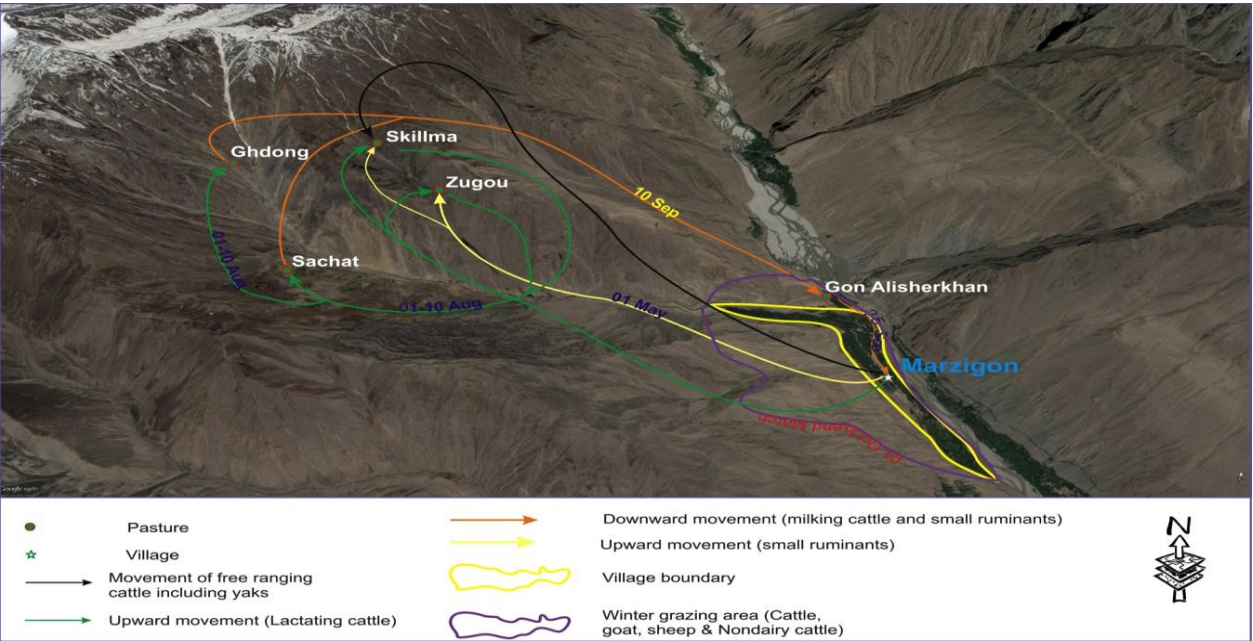


Figure 12 Pasture grazing cycle in Marzigond village

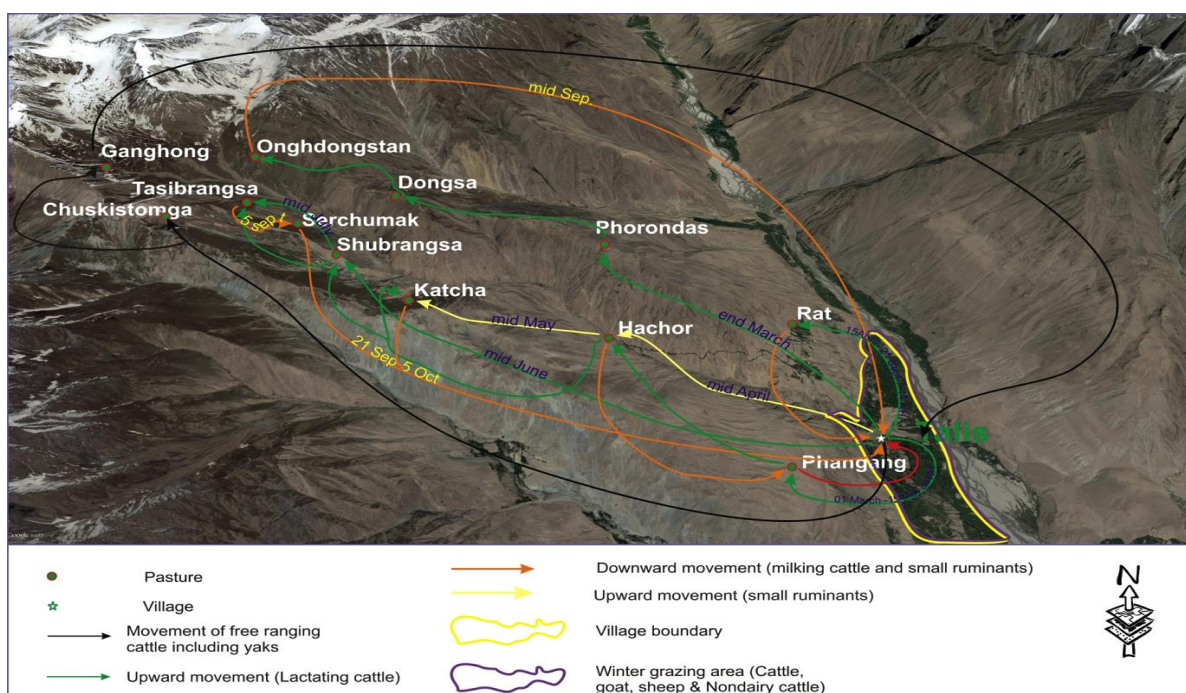


Figure 13 Pasture grazing cycle in Tallis village

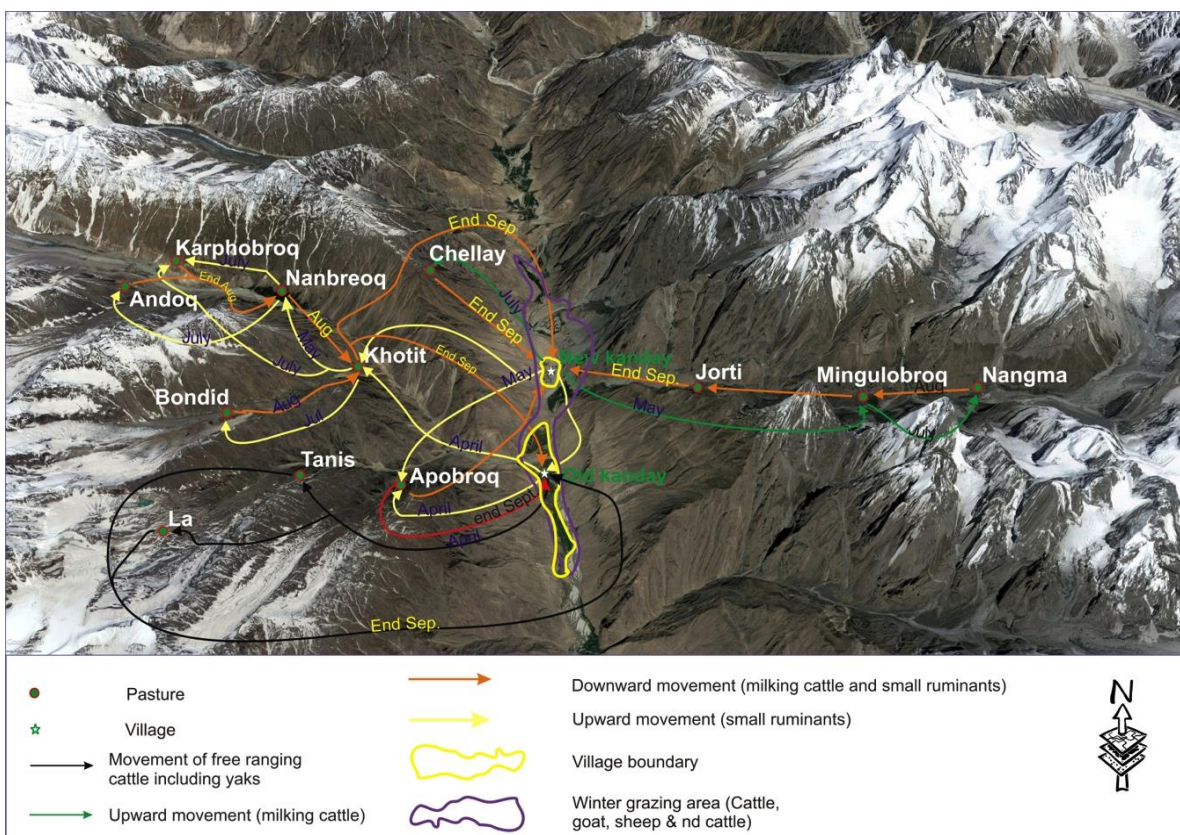


Figure 14 Pasture grazing cycle in Kanday village

Wildlife

1.8.4. Numbers and status

Village	Species	Estimated Numbers	Source of Information
Hushey	Ibex <i>Capra ibex sibirica</i>	350-450	Khan et al., 2014 ¹¹ , CKNP unpublished reports
	Snow leopard <i>Panthera unica</i>	2	Integrated Park Management Plan (IPMP) for CKNP (2014)
	Grey Wolf <i>Canis lupus</i>	2	Integrated Park Management Plan (IPMP) for CKNP (2014)
	Lynx <i>Lynx lynx</i>	2	Integrated Park Management Plan (IPMP) for CKNP (2014)
Kanday	Ibex <i>Capra ibex sibirica</i>	100-150	WWF-Pakistan, CKNP (unpublished reports)
	Urial <i>Ovis vignei vignei</i>	0	As per the local community has been locally extinct
	Snow leopard <i>Panthera unica</i>	Not known	-
	Grey Wolf <i>Canis lupus</i>	Not known	-
Marzigond	Ibex	50-60	Ibex from Kanday visit pastures of Marzigond in Koonday Broq side. Hunting of ibex in the village is not easy due to distant location of the animals (People of Marzigond (FGD participants)
	Snow leopard	Not known	In 2014 in Altanos area (Koonday side) 20 animals were killed by snow leopard (People of Marzigond (FGD participants)
	Grey Wolf	Not known	Can be seen only in upper pastures during summers (may not be a resident population)

¹¹ Khan, M. Z, Awan M. S, Bocci, A., Khan, B., Abbas, S. Y., Khan, G., Abbas, S. 2014b. Population structure and grouping tendency of Asiatic ibex *Capra sibirica* in the Central Karakoram National Park, Pakistan. J. Bio. & Env. Sci. 5 (2) 542:554.

Tallis	Ibex	20-30	In the upper reaches of the village the pastures are contiguous with Kanday and Hushey and as a result of conservation in those village population of predators has increased that frequent to upper grazing areas of Tallis, causing depredation of their livestock. Any retaliatory killing may effect predator population of the entire Hushey valley (People of Tallis (FGD participants).
	Snow leopard	Not known	-
	Grey Wolf	Not known	Marmots have become a pest in the upper pastures which may cause a dietary competition with domestic and wild herbivores (People of Tallis (FGD participants).
	Marmots	Hundreds	Can be seen only in upper pastures during summers (may not be a resident population) (People of Tallis (FGD participants)

1.8.5. Trophy hunting of Himalayan ibex in Hushey valley of CKNP

Two villages in Hushey valley, namely Hushey and Kanday have been notified by government of Gilgit-Baltistan as Community-managed conservation areas, to facilitate limited hunting of Himalayan ibex.

Starting from 1997, in Hushey village a total of 44 animals have been hunted (42 till January 2012 as per Mr. Aslam, former President VCC) and 2 in 2014 while no hunt in 2013. Record of trophy hunting with VCC is very poor and fragmented. The only information available with VCC is in the form of hunter's comments made in the visitors' books, given as under:

Year	Species	Value requested for each head	Assigned animals	Successful hunts	Hunter from	Value paid for each head	Income for the community (80% value paid)
1997				2	USA		USD 6000 + 4500
1998	Ibex			0			
1999	Ibex			2	Pakistani		
2000	Ibex			2	USA (1), Pakistani (1)		
2001	Ibex			0			
2002	Ibex			2	Pakistani		
2003	Ibex			1	Not known		

2004	Ibex			2	German		
2005-6	Ibex		7	4	Canada (1) US (1) Italy (1) Turkey (1)		
2006-7	Ibex			4	Mexican (2) Norwegian (2)		
2007	Ibex			0			
2008-9	Ibex		4	3	Canada (2) US (1)		
2009-10	Ibex			4	US (3) Pak (1)		
2011	Ibex			3	US (2), Spain (1)		
2012	Ibex			2	Philippine (1) US (1)		
2013	Ibex			0			
2014	Ibex	USD* 3100 for foreigners USD 1000 for Pakistanis USD 660 for GB locals	4	3	German (2), GB Local (1)	USD 3760 (3100+660)	USD 3008

From the available records and discussions with local community members in Hushey village following information was obtained about utilization of trophy hunting amount:

- Repair of water channel (2005)
- Honorarium paid to watcher during seasonal wildlife surveys (2005-onwards)
- Repair of pipe in drinking water supply (2005)
- Land compensation paid to land owner for water channel repair and widening (2005)
- VCCs expenses mainly incurred on travel of office bearers to Skardu and Gilgit for pursuing VCCs matters (2005 onwards)
- Land compensation paid to owners in location of the micro-hydel scheme (2008)
- Construction of mosque (2005-2009)
- Teachers salary @ R. 4000 per month (2010 onwards)
- Land compensation paid to land owner for access road to the community owned hotel (2013)

In Kandy so far three ibexes trophies have been harvested, and details are given as under:

Year	Species	Value requested for each head	Assigned animals	Hunter from	Value paid for each head	Income for the community (80% value paid)
2011	Ibex		1	USA	0	Hunt was not successful
2013	Ibex	115000 (PKR)	1	Local GB	115000 (PKR)	88,000 (PKR)
2014	Ibex	150000 (PKR)	1	Pakistan	150000 (PKR)	Yet to pay

From the fragmented record of the Kandy VCC, following information could be extracted about utilization of trophy hunting amount:

- In 2013 Rs. 70,000 was spent on construction of Khanqah (mosque)
- In 2013 Rs. 18,000 was spent on VCC matters (travel, meetings, stationary etc)

1.9. Forests and forestry

Hushey valley like other areas of District Ghanche dominated by rugged and barren lands, dominated by *Artemisia* slopes and devoid of natural forests. Vegetation cover in Hushey area (1039 km²) comprises of only 2.33 km² of closed forests, which is 0.2% of the total surface area of the valley. Open forests are spread on 30.37 km² (2.9% of the surface area) while sparse vegetation on 151.95 km (14.6% of the surface area)¹². Average biomass and increment calculated for each of the vegetation class is given below¹³:

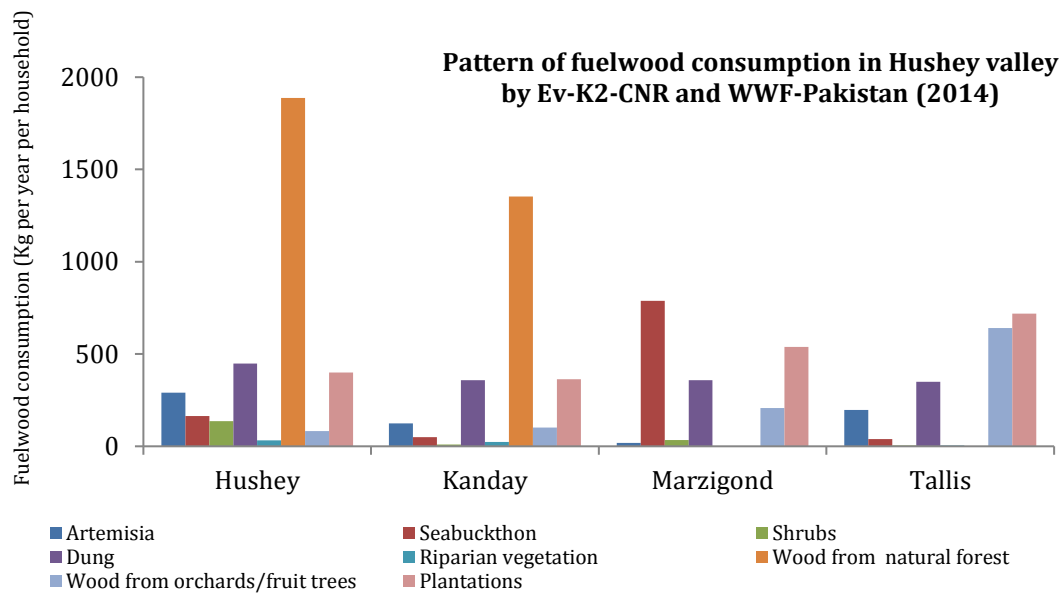
Vegetation class	Increment (Mg ha ⁻¹ yr ⁻¹)	Biomass (Mg ha ⁻¹)
Sparse trees	0.910	29.37
Open forests	1.528	50.93
Closed forests	2.714	104.39

The slopes are dominated with *Artemisia*, while rest of the vegetation is comprised of *Ephedra gerardiana*, wild rose *Rosa webbiana*, scurba *Berberis* spp, sea buckthorn *Hippophae rhamnoides*, and *Myricaria germanica*, whereas tree species include Junipers, Salix, Poplars and *Betula utilis*.

¹² IPMP for CKNP (2014). Developed by Ev-K2-CNR, Bergamo, Italy

¹³ Anfodillo, T., M. Carrer, E. Dalla Valle, M. T. Melis, A. Tenca and J. Vasquez Pique (2009). A plan for promoting the CKNP Sustainable Forest Management (KARA-FOR Project). In IPMP for CKNP (2014). Developed by Ev-K2-CNR, Bergamo Italy.

The local people in the valley meet their requirements of firewood and timber from plant biomass obtained from agro-forestry interventions, massively carried out in the valley on lands, relatively less suitable for growing crops or vegetables. However, dependence of local people on plant biomass from natural forests is still high in Hushey and Kanday villages of the valley. An analysis of various sources of fuelwood in Hushey valley is given in the following figure:



Most of the construction timber in the villages is obtained from community plantation or social forestry. The species include Poplar and Willows either purchased from outside village (mostly from Khaplu and Sailing) or extracted from plantation in the villages. Locally the indigenous species of willows provide good quality timber for construction. There is no natural forest except some scattered and sparse patches of Juniper and Birch.

From the table given below one can assess the demand of timber for construction and importance of social forestry to meet the demand in Hushey valley of CKNP.

Village	Timber consumed on construction of houses in the last five years	
	Number of logs	Volume (CFT)
Hushey	1434	5019
Kanday	990	3465
Marzigond	273	956
Tallis	759	2656

Areas of Fuel wood collection from natural forests in Hushey valley

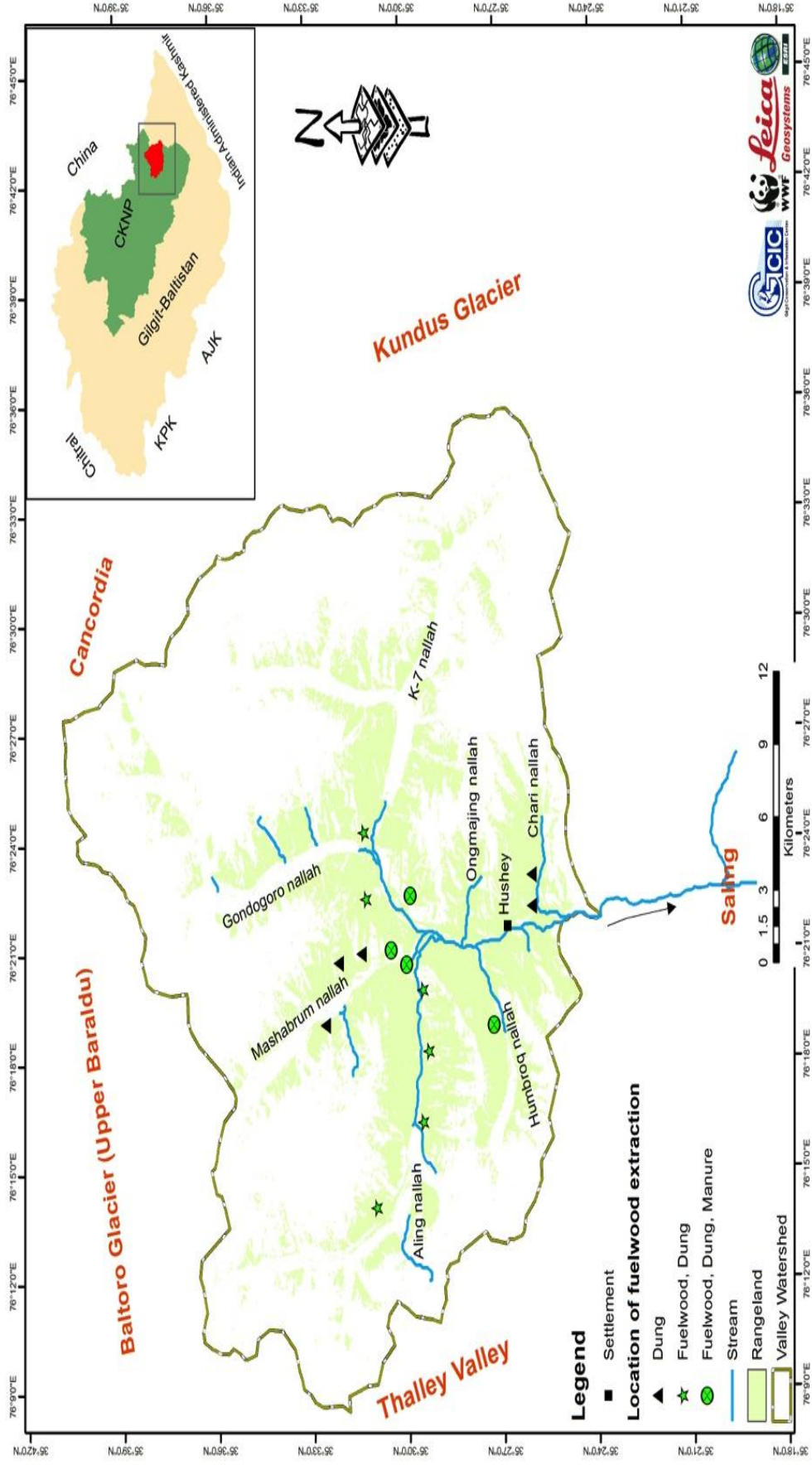


Figure 15 Areas of fuelwood collection in Hushey village

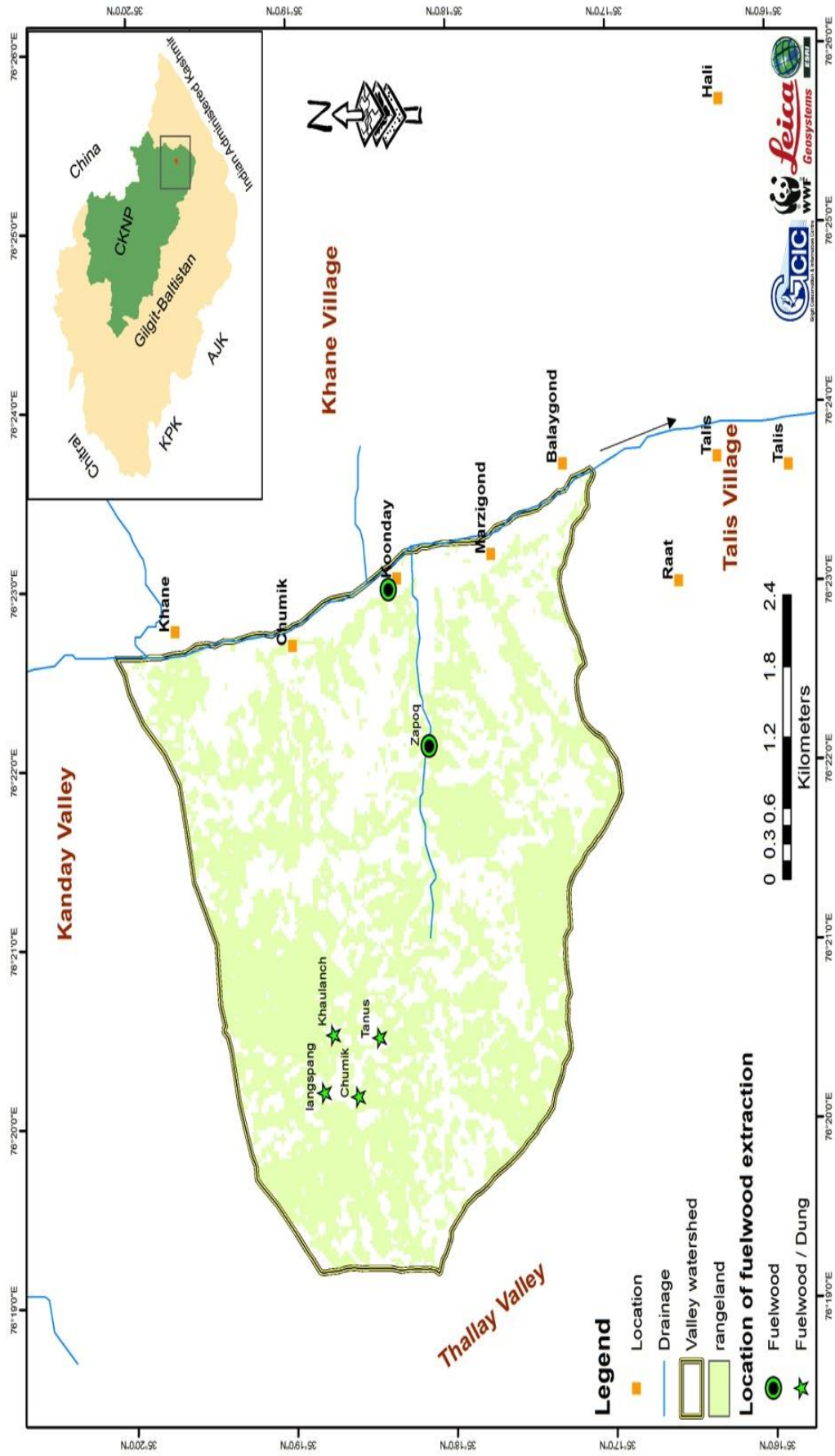


Figure 16 Areas of fuelwood collection in Marzigond village

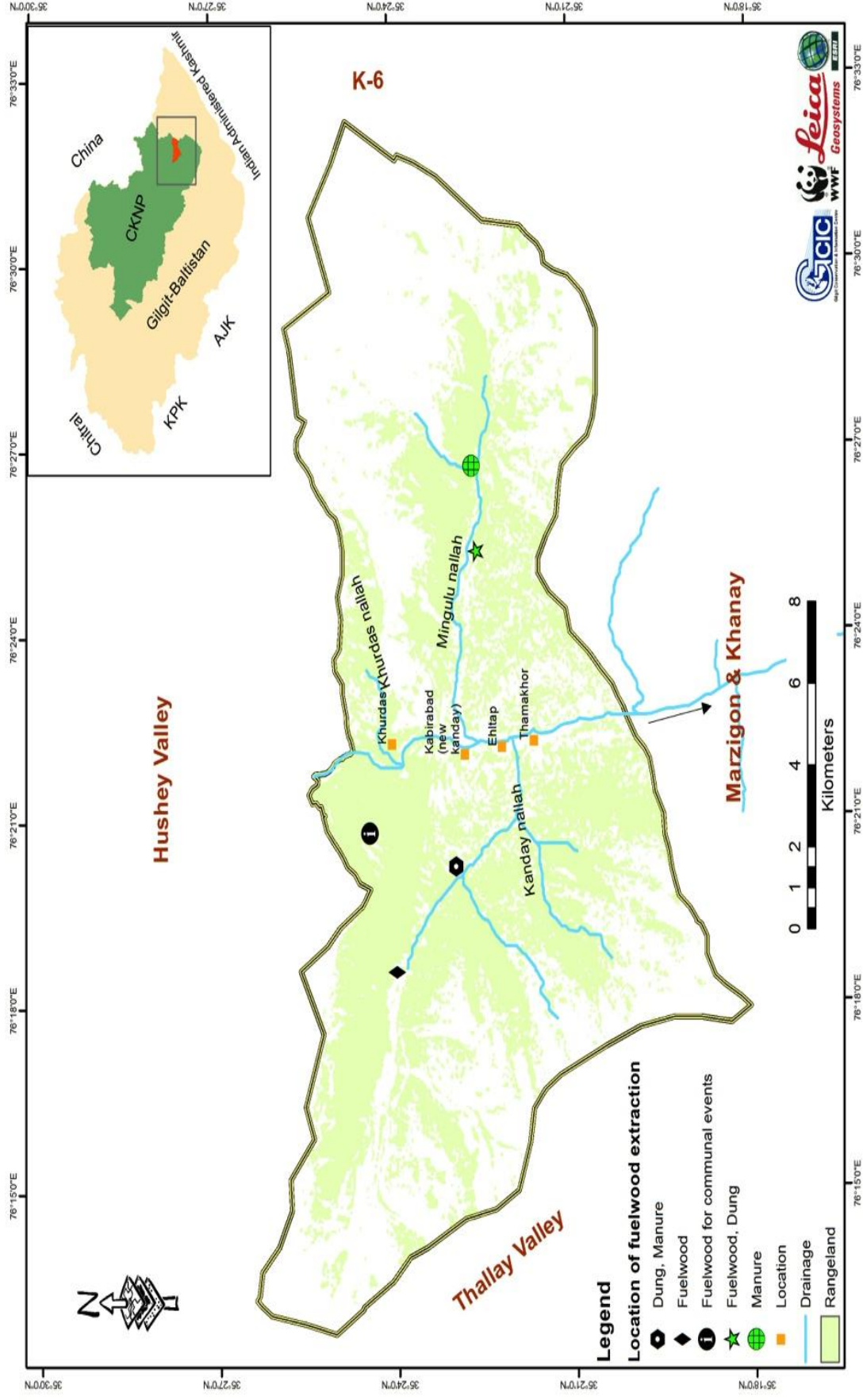


Figure 17 Areas of fuelwood collection in Kanday village

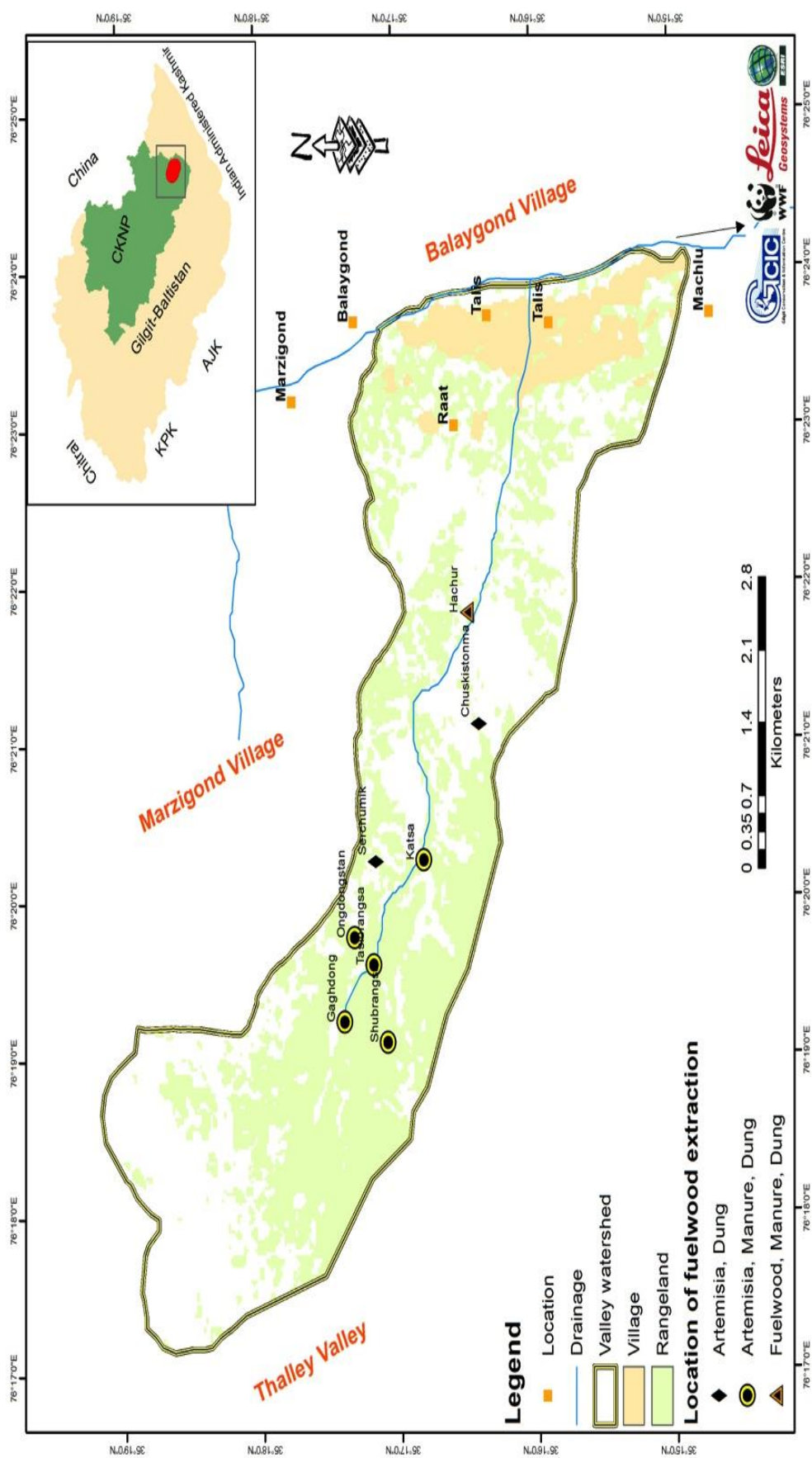


Figure 18 Areas of fuelwood collection in Talls village

The CKNP partners including Ev-K2-CNR and WWF under SEED project for CKNP have started massive afforestation schemes in the valley. A summary of plantation undertaken by WWF, Ev-K2-CNR and Directorate of CKNP under SEED Project is given as under:

Village	Site Name	Coordinates	Alt. (m)	Species and %	Spacing between trees Average diameter (cm at person shoulder) and high (m) <i>estimated</i>			Concern CBO	Planting year
					Species	Diam (inch)	High (ft)		
Hushey	Wasoq	76°21'8.49"E 35°28'14.17"N	3386	5000 (90% willow, 10% poplar)	Willow	3.5	5.6	Hushey VCC	2013
	Hushey Village	76°21'20.15"E 35°27'5.85"N	3182	1000 Willow 100%	Willow	4	7	Hushey VCC	2014
	Hushey near road	76°21'41.64"E 35°26'32.68"N	3289	1000 Popular 100%	Poplar	4.5	5	Hushey VCC	2014
	Barli thang	76°21'23.99"E 35°26'19.00"N	3346	10,000 Willow 100 %	Willow	5	5.6	Hushey VCC	2011
Marzigond	Arzapog (Gone Ali Sher Khan)	76°22'4.15"E, 35°18'6.51"N	3040	Willow 70%	Willow	5	7	Mir Aliwa Social Welfare and Development Society	2014
	Arzapog (Gone Ali Sher Khan)	76°21'55.61"E, 35°18'8.34"N	3045	Popular 30 %	Poplar	4	6.7	Mir Aliwa Social Welfare and Development Society	2014
Tallis	Talis near river bank	76°23'47.35"E, 35°15'33.18"N	2570	Willow 80%	willow	8	6	Conservation Committee Tallis (c/o Mr Ali Hassan)	2014
	Talis near river bank	76°23'45.60"E, 35°15'32.30"N	2578	Popular 20%	Popular	5 i	6	Conservation Committee Tallis (c/o Mr Ali Hassan)	2014

1.10. Mining Sector

Mining of precious stones in Hushey valley is yet to explore. Some locals try to bring in expertise from Basha valley to locate mining areas but no success as yet. In 2013 a team from Kharmang tehsil of Baltistan division, extracted 30 maunds (1.2 ton) of Benzion from Hushey village (locally called Salajeed) to use as traditional medicine for various ailments like pain in joints and sexual potency.

1.11. Tourism

Following is an assessment of tourism facilities present in the villages of Hushey valley:

Facilities	Hushey	Kanday	Marzigond	Tallis
Accommodation	i. Hotel Refugio Hushey, 11 rooms ii. Hassan Sheikh Guest House, 4 rooms iii. Mashabrum Inn, 3 rooms	K-6 Hotel (old Kanday)	Felix Guest House, Machulo	Felix Guest House, Machulo
Campsites	i. Laila peak (in the village with toilets, shops and accommodation) ii. Saicho (toilet, shop, accommodation) iii. Ghondoghor (toilets) iv. Dalsangpa (toilets) v. Khiuspang (toilets) vi. Brumbrama (toilets) vii. Dumsum viii. Mashabrum basecamp ix. High camp x. Ali camp xi. Changkil xii. Spangsar xiii. K-7 basecamp (toilets) xiv. Chogholingsa basecamp xv. Aling	-	Felix Guest House, Machulo	Felix Guest House, Machulo
Services	i. Guides: 12 ii. Porters: 150 iii. Cooks: 8 iv. Cooks Assistant: 18 v. Climbers: 15 vi. Rescue team: 3	i. Guides: 10 ii. Porters: 30 iii. Cooks: 50 iv. Cooks Assistant: 60 v. High altitude porters: 5	i. Guides: 0 ii. Porters: 20-30 iii. Cooks: 2 iv. Cooks Assistant: 30-35	i. Guides: 1 ii. Porters: 10 iii. Cooks: 5 iv. Cooks Assistant: 15

1.12. Local Management Institutions (LMIs) in the Valley

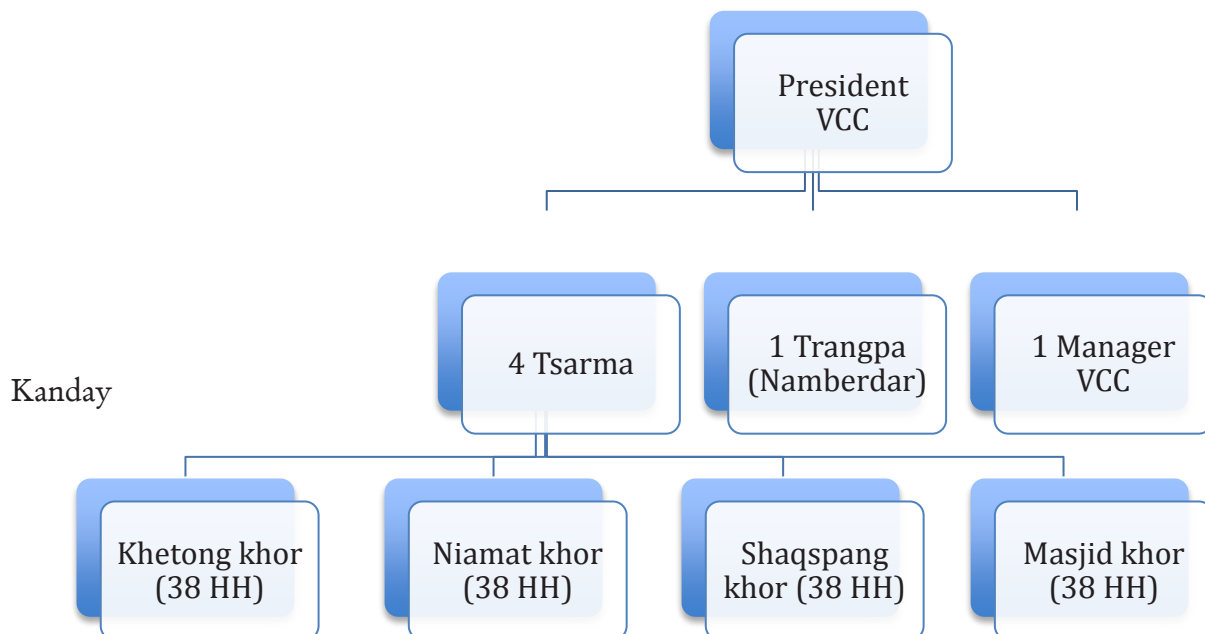
Local Management Institutions responsible for traditional governance system in the Hushey valley is called *Tsarma* (or *Jirga*), run through *Tsarma* (notables or representatives) selected by each *Stranso* (a tribe of a settlement) of the village. The *Tsarma* are mostly selected through mutual consensus by members of a *Stranso* for a period of two to six years, depending on their performance or confidence of local people in them. The decisions are taken in the light of local traditions and customs through consensus among all *Tsarma*.

Structure of local governance system in the valley is given in the following table:

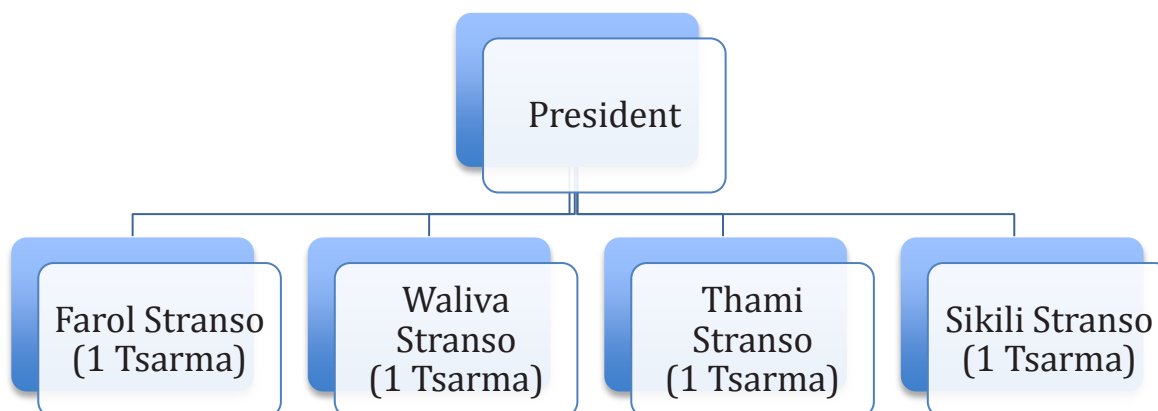
Village	Number of Stranso	Number of Tsarma	Other members	Total members	Headed by
Hushey	4	4	Namberdar (1), VCC President (1), VCC Manager (1)	7	President VCC
Kanday	4	4	President of Tsarma	5	President
Marzigond	3	6	Trangpa	7	Trangpa
Tallis	4	4	UC member, Trangpa, Molvi (Religious leader) Syed (Religious leader)	8	Collective decision (but in most of the NR related activities Trangpa)

Hushey

Decision making system in the village is a transformation of the traditional local governance system into a VCC, which in addition to the traditional representation of community elders also contains a Manager and a President. This change happened in 1997 with formation of the VCC. The traditional system, locally called *Tsarma* (notables) elected by a *Stranso* (tribes or settlements) of the village, headed by a *Trangpa* or *Namberdar* used to exist in the past. At present there is a seven-member committee, called VCC, without women participation and the structure is given as under:

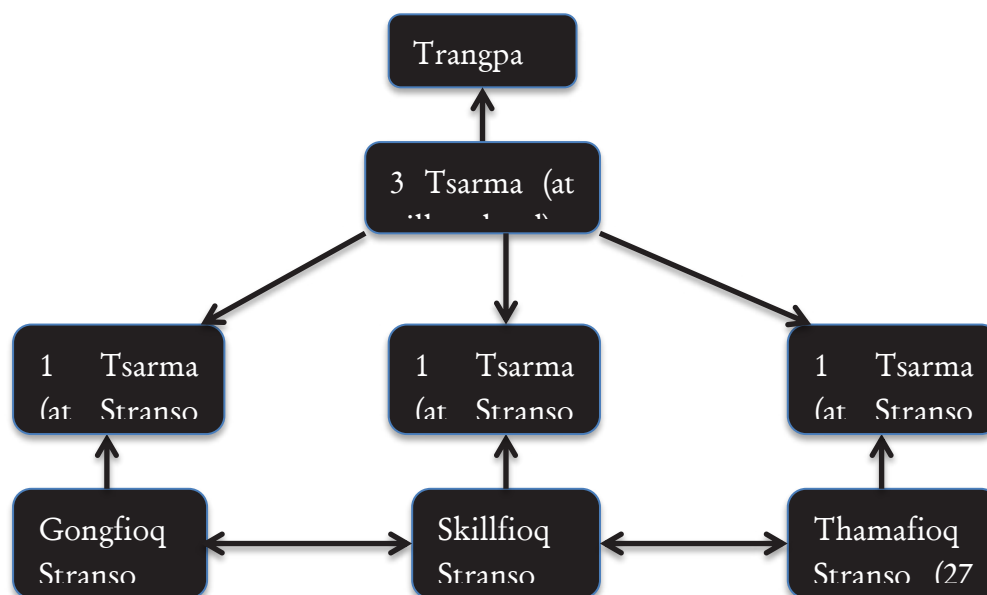


The traditional governance system is called Stranso. There use to be four Stranso (administrative units) of the village, having one Tsarma (head or notable) of each Stranso, who use to sit together for decision making according to their customary laws. Decisions at village level are taken through collective consensus while at Stranso level through a set pattern. No women is part of Stranso system in decision making.



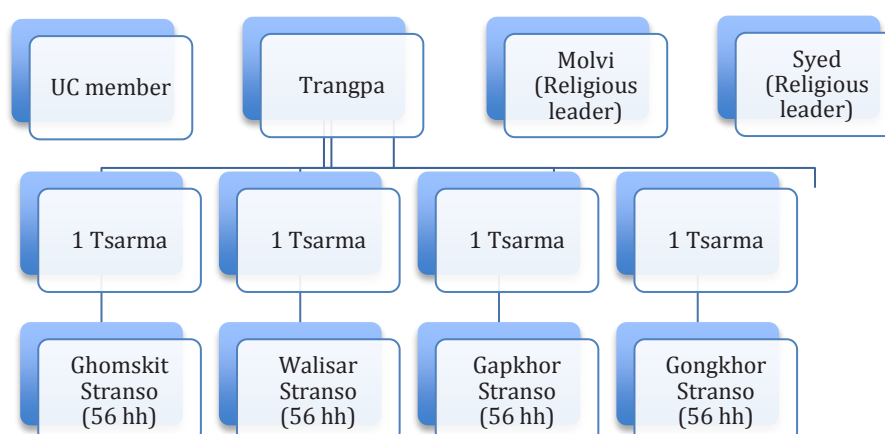
Marzigond

The traditional governance system in the village is called *Stranso* (administrative unit of the village), carried out by *Tsarma* (selected notables from each Stranso), headed by *Trangpa* (traditional leader). There are three Stranso in the village containing 27 HH each. The governance system comprise of seven person including three common Tsarma, three Tsarma elected one each by a *Tstranso* and a *Trangpa*. A *Tsarma* is selected for 1-5 years, keeping in view his performance. Women are not represented in the traditional governance system. A schematic diagram of the traditional governance system is given as under:



Tallis

Traditional governance system in Tallis village consists of eight member informal committee, comprising of a four *Tsarma* (notable/elder), selected one by each of the four *Stranso* (traditional administrative unit of the village), headed by a *Trangpa*/*Namberdar* (traditional leader). At higher level the decision are made collectively by Trangpa with consensus of Union Council (UC) member, *Molvi* (Religious leader) and *Syed* (Religious leader). Most of the decisions regarding natural resources are made by *Trangpa* in consultation with UC member and *Tsarma*. But when a matter is beyond their capacity Molvi or Syed (Religious leaders) are involved. Most complicated matters are resolved by involvement of the Syed. All members in the setup are male. A schematic diagram of the traditional governance system in Tallis is given as under:



1.13. Role of LMIs in managing natural resources

Sector/areas of decision making	Role in decision making	Rate in terms of effectiveness*
Hushey		
Pasture	Grazing cycle management, moving up into the pastures in spring and returning back to the village in autumn is decided by the VCC in consultation with the religious leader of the village, called Mir-waiz.	10
Forests	Fixing quantify of fuelwood, i.e. 800 kgs per HH per season; ban on green wood cutting	6
Land resources	Division of new lands brought under cultivation among village people, conflict resolution on individual and communal lands	8
Water resources	Distribution of irrigation water among Stranso (2 days per Stranso). Thus one HH in a Stranso avails water for irrigation at the interval of 8 days on regular basis. This is done due to scarcity of irrigation water in some channels.	10
Agriculture	Dates are fixed for cultivation, harvesting and grass cutting	8
Religious matters	Keeping religious harmony, all construction matters of the mosque	6
Tourism	No effective role at the moment	1
Kanday		
Pasture and livestock	Grazing cycle management, ban on free grazing during cultivation season	9
Forests	Dates are fixed for collection of fuelwood	8
Land resources	Division of new lands brought under cultivation among village people, conflict resolution on individual and communal lands	8
Water resources	Distribution of irrigation water into various channels of the village	9
Agriculture	Dates are fixed for cultivation, harvesting and grass cutting	9
Tourism	No effective role at the moment	1
Marzigond		
Pasture	Grazing cycle management	10
Forests	No active role	1

Land resources	Distribution, divisions, conflict resolution	10
Water resources	Equitable distribution into various channels	10
Agriculture	Dates are fixed for cultivation, harvesting and grass cutting	8
Tallis		
Pasture	Grazing cycle management by fixing date of movement of livestock	10
Forests	Regulate use by banning cutting in some areas and allowing certain quantities of fuelwood	8
Land resources	Division of new lands brought under cultivation among village people, conflict resolution on individual and communal lands	9
Water resources	Repair of water channel, distribution of irrigation water through various channels	10
Agriculture	Dates are fixed for cultivation, harvesting and grass cutting	10
Livestock herding	Ban on free grazing	5
Tourism	No effective role at the moment	1

*(1 not effective - 10 extremely effective)

1.14. Use rights of natural resources and associated customary laws

Theme/Area	Customary laws/restrictions	Enforced by
Hushey		
Grazing areas/pasture use/livestock migration, guarding	<p>Dates are fixed for movement of livestock from one location to another. In spring for moving upward and in late autumn for returning back to the village the dates are fixed in consultation with Mirwaiz (religious leader). No one can go against the fixed dates, if someone reallocates the livestock before or after the fixed dates Rs. 1000 is fined.</p> <p>Fee is charged on livestock @1200 per cattle when animals from outside village are brought to the pastures of Hushey for grazing</p>	VCC
Fuelwood harvesting from natural forests	Dates are fixed for collection of firewood, i.e. May-June in spring and October in Autumn. Each Stranso (a fixed division of HH) is given specified time and location to fetch firewood under supervision of a Tsarma (local leader/elder) who monitors the time and quantity and ensures no cutting of green wood. Each HH is allowed to fetch 20 maunds (800 kgs) of firwood. A log measuring 8x4 ft is considered to	VCC

	be equal to 1 maund (40 kg). If someone violates the specified dates or quantity, Rs. 500 fine is imposed and excess quantity is confiscated.	
Timber harvesting from natural forests and use	Completely banned	VCC
Use of water resources	Distribution of irrigation water among Stranso (2 days per Stranso). Thus one HH in a Stranso avails water for irrigation at the interval of 8 days on regular basis. This is done due to scarcity of irrigation water in some channels.	VCC
Mining	No rules at the moment. During 2013 a group from Kharmang collected 30 maunds (1200 kgs) of Salajeet from Hushey valley	-
NWFPs including MAPs collection	No rules at the moment	-
Agriculture	Dates are fixed for cultivation and grass cutting. If someone goes to cut grass earlier the specified period the quantity of grass he cuts is confiscated.	VCC
Wildlife	Ban on hunting or killing/poaching of animals. If someone hunts an ibex illegally, a fine is imposed equivalent to the amount of ibex national trophy hunting permit.	VCC
Kanday		
Grazing areas/pasture use/livestock migration, guarding	<p>Dates are fixed for movement of livestock to and from pastures. In spring for moving upward and in late autumn for returning back to the village the dates are fixed in consultation with Molana (religious leader).</p> <p>Each year during May to November, two persons are deputed for livestock grazing (locally called <i>Norziya</i>), who are paid by all livestock owners of the village @ Rs. 40 per goat/sheep.</p> <p>During cultivation season (May to September) free grazing in the cultivated areas is strictly banned. All households in the village unanimously depute two persons (locally called <i>Larava</i>) to take care of cultivated areas. If animals of someone enter into the agricultural areas the Larava impose a fine of upto Rs. 100 per animal.</p> <p>If animals come back from pastures earlier the fixed dates (before September) the <i>Larava</i> take them back to the pastures.</p> <p>Larava is paid in kind by all village households @ 5 kg cereals per HH.</p> <p>Fee is charged on livestock @1000 per cattle when animals from outside village are brought to the pastures of Kanday for grazing</p>	Stranso in consultation with religious leader
Fuelwood harvesting from natural forests	No one in the village can fetch fuelwood before <i>Stono</i> (end of September). If someone violates fine is imposed @ Rs. 200-1000 per offence and wood is confiscated. Specified duration for fuelwood collection from natural forests is Oct-Nov. each year.	Stranso

Timber harvesting from natural forests and use	Banned	Sranso
Use of water resources	<p>In Ralum and Kharidas, the person first reaching the location gets water first. In Khuwarkat area the irrigation is sequential meaning if the last irrigated field is situated at low altitude in village bottom then irrigating fields will go upward one by one in a sequence. Or if the last irrigated field in a day is located at higher elevation above the village then irrigating field one by one go in a sequence from higher areas to lower areas.</p> <p>In Kinidas area, two persons have been deputed by the village people to regulate flow of water in Kinidas channel during April. Those persons are paid @ Rs. 8000/person/month by collecting money from all +140 landowners of the village. A trustworthy person is nominated to collect money from all households.</p>	Sranso
Mining	No specific rules at the moment.	-
NWFPs including MAPs collection	No specific rules at the moment	
Agriculture	Dates are fixed for cutting of grass (fodder for animals), which is usually after mid August each year. If someone cuts grass in his field before the specified date he is fined	Sranso
Land resources	Barren lands in the village are <i>Khalsa</i> (property of the state), people can develop below channel <i>Khalsa</i> lands without government permission. After 5-6 year it becomes property of the land developer.	-
Marzigond		
Grazing areas/pasture use/livestock migration, guarding	<p>Dates are fixed for movement of livestock to and from grazing areas. Each year during April-October one of the three Stranso will be responsible to manage livestock grazing that include: guarding or tending animals in high pastures and ensuring free grazing in the cultivated areas in the village. The responsible Stranso deputed two households everyday to perform the said duties. Repairing the corrals in high pastures and removing dung from the corrals is also the responsibility of the deputed Stranso.</p> <p>If someone violates the ban on free grazing, a fine is imposed @ Rs. 50-100/cattle for local villages or if the cattle owner belongs to some other village the amount of fine is Rs. 1000. Amount of fines is collected by the Stranso on duty and this amount is spent on various activities of common interest, e.g. supply of food items to the villagers at the time of repair of water channels in spring; clearing of corrals from dung in high pastures and improvement of corrals in high pastures.</p>	Sranso

Fuelwood harvesting from natural forests	People from outside Marzigond village are not allowed to fetch fuelwood from vicinity of the village. Quantity is not fixed nor any duration is specified to collect fuelwood. However, green wood cutting is prohibited.	Stranso
Timber harvesting from natural forests and use	Timber is not readily available, except some stands of juniper and birch in higher altitudes, which are not accessible. Therefore, no role in timber harvesting.	
Use of water resources	In Thang (the upper reaches of the village) irrigation water is distributed among village people turn by turn, whereas at lower reaches of the village water is abundant for irrigation.	Stranso
Mining	No rules at the moment.	-
NWFPs including MAPs collection	No rules at the moment	-
Land resources	Ban has been imposed in Astanyoq area to sale out a piece of land to a person outside the Marzigond village. Gradually this rule will be extended to all areas of the village. A fine of Rs. 100,000 has been fixed if someone violates the rule. In addition construction has also banned in the Astanyoq area.	Stranso
Social matters	Trangpa (Namberdar) has to be witness of every marriage of divorce that happens in the village	Trangpa
Tallis		
Grazing areas/pasture use/livestock migration, guarding	Dates are fixed for movement of livestock from one location to another. No one can go against the fixed dates, if someone reallocates the livestock before or after the fixed dates Rs. 1000 is fined. Fee is charged on livestock @1200 per cattle when animals from outside village are brought to the pastures of Hushey for grazing	Trangpa and Stranso
Fuelwood harvesting from natural forests	Local people for domestic use do not bring fuelwood from natural forests individually, rather only at the occasion of religious rituals for cooking food for religious congregations.	Trangpa and Stranso
Timber harvesting from natural forests and use	No rules for harvesting of timber primarily due to absence of natural forests in the area.	-
Use of water resources	It is mandatory for everyone in the village to participate in repair works of water channels on the onset of spring. If someone gets absent, a fine of Rs. 300 is imposed who do not participate in repair works on channels near to the village and Rs. 400 who stay absent of work on distant channels such as the one in Hachor.	Stranso
Mining	No rules as such	-
NWFPs including MAPs collection	No rules at the moment	-

Agriculture	Dates are fixed for cultivation and grass cutting. If someone goes to cut grass earlier the specified period the quantity of grass he cuts is confiscated.	Sranso
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1.15. Local NGOs and CBOs in the target villages

Name Organization	Year of Establishment	Number of Members (Individuals/HH)	Roles	Who established (name of organization)	Rate in terms of effectiveness (mandate)
Hushey					
Hushey Welfare & Development Organization (HWDO)	1988	40 individuals	Education, health and Environment. Providing 52 scholarships to student of Hushey of which 23 are female	Mr. Ghulam Hussain and youth of the village	Education = 10 Health = 8 Environment = 6
Women Organization	1994-5	112 HH	Saving, Health Hygiene	AKRSP	8
Anjuman-e-Fidayan-e-Ehl-e-Bait	1993-4	70 HH	Education, Health, Construction of Mosque	Anwar, Haji Mohammad Hussain	1
Kanday					
Farool VO	1996	96 HH	Construction of Water channel at Kharidas, Nursery raising, construction of water channel head of Kinidas channel, land terracing	AKRSP	At the time of establishment the rating was 10 but now not so active
Waliva VO	1996	96 HH			
Thami VO	1996	96 HH			
Sikil VO	1996	96 HH			
VCC	2007-8	160 HH	Nature conservation	WWF	2
VDO	1996	35 youth individuals	Social welfare	Youth of the village	1

Marzigond					
Mir Aliwa Social Welfare and Development Society	2007	15 indiv.	Social development (Education, tree plantation etc)	Haji Mohammad Ali of Marzigond with support of a Norwegian mountaineer, Felix Foundation and Central Asia Institute	9
Marzigond Wlfare Organization	2011	25 HH	To resolve the problem of lack of irrigation water in Koonday area	Ashraf Hussain	1 (yet to perform)
Noor Bakhshia Youth Federation	1990	80 HH	Religious harmony	All villagers	10
VO Marzigond	2008-9	80 HH	Water channel in Bushkerat	AKRSP	8
WO Marzigond	2008-9	80 HH	Domestic and village Health Hygiene	AKRSP	10
Tallis					
Tallis Students Federation	2006	6 individuals	Construction of Madrassa (Religious centre) and run a Maktab (religious school)	Local youth	10
Human Wlfare Organization	2005	All HH representatives	To establish a “ <i>Musafir Khana</i> ” in Islamabad to facilitate people of Tallis traveling down the country	Community elders/notables	10

VO Gainkhor	1988	52 HH	Social and Rural Development	AKRSP	10
VO Gapkhor	1991	45 HH	Social and Rural Development	AKRSP	10
VO Manchu	1993	85 HH	Social and Rural Development	AKRSP	10
WO Gainkhor	1993	40 HH	Social and Rural Development	AKRSP	10
Cluster of VOs and WO	1993	+ 200 HH	Social and Rural Development	AKRSP	7

2. Management issues and problems

2.1. Traditional low yielding agro-practices

Yield of wheat in Hushey valley is 1160 kg/ha, which is far less the national average of 2833 kg/ha (Government of Pakistan, 2010-11)¹⁴. In addition, due to limited agriculture land holdings (on average 0.41 ha per household) and availability of wheat on Government subsidized rates, growing wheat seems to be economically less viable option in the valley. The area is suitable for production of high value crops such as buckwheat and vegetables like potato and peas, but due to non-availability of a proper market chain the product is seldom sold for earning some disposable income. In addition to their domestic consumption, a household in the valley sells only 13-25% of total production of potatoes, 15-50% peas and only 7% of fruits (mostly walnut and apricots). Whereas, there was no record of selling any quantities of buckwheat. Due to limited landholding there is little option for crop rotation, leading to declined productivity.

2.2. Pastures degradation

Intermediate (spring/autumn grazing areas located at 3500-4000 m) and lower pastures (winter grazing areas surrounding the villages) are partly or heavily degraded due to extensive grazing. Pasture grazing cycle follows a permanent pattern practiced for a long time and the pattern is seldom changed, thus no area is deferred for grazing. Although the livestock holding per household has been decreased, but due to increasing human populations leading to multiplying households, pressure on grazing lands is still high. In addition, livestock has to graze almost 6-8 months on pastures, resulting in depletion of grazing grounds.

One of the reasons for extensive grazing of intermediate and lower pastures is lack of fodder produced on farmland. Although the cultivated area of fodder crops is greater than that of cereals or vegetables but total fodder produce is still not sufficient to feed animals during long winters, spanning over five-six months.

Secondly, as a result of conservation initiatives the number of wild ungulates has also been increased, exerting pressure on the shared grazing ground. In Hushey Saicho and Dumsum area are heavily grazed due to preference of grazers to stay in these locations for earning some income from tourism activities.

Moreover, due to poor accessibility to existing water points or lack of drinking water in certain pastures, the more accessible areas with availability of drinking water are excessively grazed. In Hushey village 8 out of 17, in Kanday 7 out of 12, in Marzigond 3 out of 5 and in Tallis 2 out of 10 pastures were found being “partly degraded”. Whereas, two pastures in Kanday, one in Marzigond and one in Tallis have been identified as “degraded”. A summary of pastures status in the valley indicating degraded and partly degraded state of pastures is given as under:

¹⁴ GoP. 2010-11. Agriculture Statistics of Pakistan. Statistical Division, Bureau of Statistics, Islamabad.

ID	Hushey		Kanday		Marzigond		Tallis	
	Pasture Name	Status*	Pasture Name	Status*	Pasture Name	Status*	Pasture Name	Status*
1.	Chhari (Lithiaq, Namakhoto, Chariging)	PD	Khotit	D	Koonday broq (Zaigo) and surrounding pastures	PD	Hachor	D
2.	Ongmajing	PD	Nangbroq	PD	Koonday Broq (Skillmal) and surrounding pastures	PD	Katcha	PD
3.	Wasoq	PD	Karpobraqbo	PD	Gholong boq (Sachat) and surrounding pastures	PD	Shubrangsa	PD
4.	Onghdongstan	PD	Andaq	PD	Gholong broq (Ghodong) and surrounding pastures	H	Tassibrangsa	H
5.	Saicho	PD	Apobroq	PD	Gone Ali Sher Khan	D	Ongdongstan	H
6.	Ghondoghor	H	Tinis	PD	Village and surrounding pastures	D	Gaghdong	H
7.	Dalsangpa	H	La	H			Chuskistonma	H
8.	Alday, Gholdongpa, Ghorsit	H	Chheley	D			Serchumik	H
9.	Dumsum	PD	Jorti	PD			Phorondas	H
10.	Tirsir	H	Minguilo broq	PD				
11.	Ghaam	PD	Nangma	H				
12.	Shakhsha	H						
13.	Choghospang	H						
14.	Aling	H						
15.	Humbroq	PD						
16.	Chogholingsa	H						
17.	Spangsar	H						

* D degraded, PD partly degraded, H healthy

A summary of problems faced by local people in various pastures of the valley is given in the following table:

Village	Name of Pasture	Problems need to address
Hushey	Dalsangpa	Difficult access due to seasonally damaged pavements
	Humbroq and Onghdongstan	Overgrazing
Kanday	Apobroq	Lack of drinking water for herders and livestock. Water can be supplied from Tinis
	La	Difficult access due to seasonally damaged pavements
Marzigond	Koonday broq	Lack of drinking water for livestock, which can be supplied from Braqmar through a 1000 m pipe Difficult access due to seasonally damaged pavements
	Arzapog	Shift gate from lower to certain higher altitudes
Tallis	Hachor, Katcha and Tassibrangsa	Livestock die of cold and stress in case of excessive rainfall because the corrals are without roof
	Phorondas	Scarcity of drinking water for livestock and grazers, which can be brought from Ongdongstan
	Shubrangsa	Lack of fuelwood for cooking by grazers Livestock die of cold and stress in case of excessive rainfall because the corrals are without roof

2.3. Traditional animal husbandry and associated problems

2.3.1. Livestock mortality

Annual livestock mortality in Huhey valley is about 9.5% of the total livestock holding in 2013. Local people attribute majority of the livestock deaths to mammalian predators (57%) followed by accidents (18% - avalanches, landslides, floods etc) and diseases (13%). The dominant diseases are PPR, pox, diarrhea, mange, FMD, gastro intestinal tract diseases, hematuria, and weakness due to lack of food and winter stress. Suspected predators are wolf and snow leopard and sometime foxes are said to prey upon young animals. There are no predation incidences by lynx or stray dogs.

Causes of deaths attributed to mammalian predators in villages of Hushey (77%) and Kanday (71%) are higher than Tallis (39%) and Marzigond (39%), probably due to the presence of livestock insurance schemes in the village, in which local people try to be compensated by

attributing a case to a predator. Another reason could be abundance of predators in Hushey and Kanday village due to comparatively higher number of Himalayan ibex.

The livestock owners least know about the causes of animal mortality in high land pastures during summers, who often do not stay there with livestock. One of the reasons of animal deaths is winter stress coupled with lack of fodder leading to weakness and sometimes death of animals. Diseased animals when left out for grazing near the village, especially during spring, their chance of being killed increases many fold, e.g., a diseased goat was killed by an unknown predator just next to the owner's house (Ismail Khan, per. com., 17 April 2013).

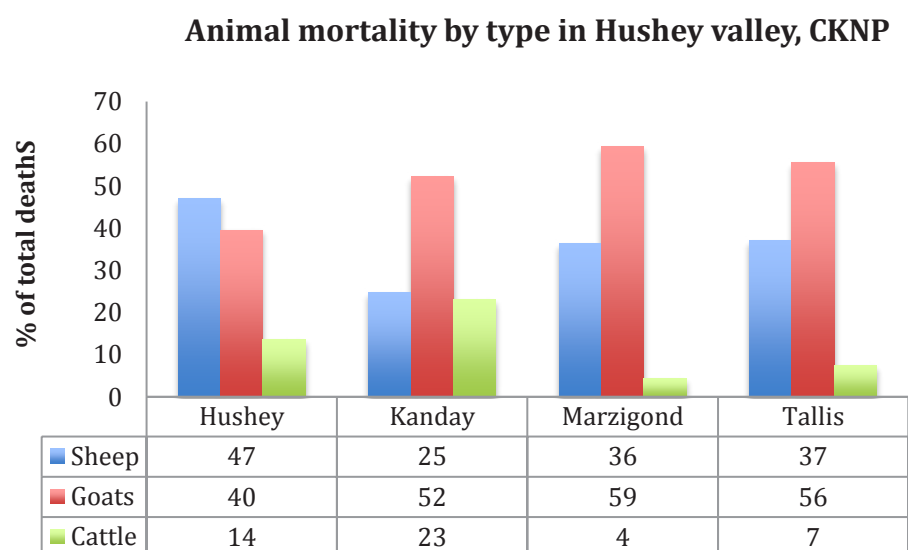
Status of livestock mortality during last one year (2013) in Hushey valley is given in the following table:

Village	Livestock type	Number of animals died (2013)	% of total deaths	Causes of mortality (%)			
				Predation	Diseases	Accidents	Unknown
Hushey	Sheep	94	47	86	3	7	3
	Goats	79	40	82	6	6	6
	Cattle	27	14	62	10	19	10
	Sub-total	200					
Kanday	Sheep	60	25	76	12	4	8
	Goats	127	52	70	13	13	4
	Cattle	56	23	68	14	8	11
		243					
Marzigond	Sheep	50	36	57	4	35	4
	Goats	82	59	61	6	29	3
	Cattle	6	4	0	20	40	40
		138					
Tallis	Sheep	104	37	43	15	23	19
	Goats	156	56	47	20	14	20
	Cattle	21	7	28	33	22	17
		281					

A comparison of livestock mortality numbers and causes among different villages of the valley is given in the following table:

Village	Total animals died (In 2013)	Annual livestock mortality (% of total livestock holding)	Causes of mortality (% of total animals died)			
			Predation	Diseases	Accidents	Unknown
Hushey	200	7.2	77	6	11	6
Kanday	243	8.4	71	13	8	8
Marzigond	138	14.2	39	10	35	16
Tallis	281	8.3	39	23	20	19

Among types of animals died sheep constitutes highest in Hushey (47%) while goats in rest of the villages (52%, 59%, 56% in Kanday, Marzigond and Tallis, respectively). An assessment of animal mortality in Hushey valley, explained by type of livestock is given in the following figure:



2.3.2. Lack of Veterinary Facilities

There is only one small veterinary facility with one technical staff member to deal with more than 10,000 livestock heads of four villages of the valley.

Hushey: In Hushey village there is veterinary dispensary, which serves other villages of the valley including Kanday, Marzigond and Tallis. The dispensary has a trained veterinary technician though but its efficiency of service delivery is hampered by the following problems:

- No diagnostic facility in the dispensary such as a basic laboratory
- Lack of basic equipment such as a freezer or cooler and sterilizer in the dispensary to store vaccines and medicines
- Lack of cattle crush to control animals during treatment
- Insufficient supply of required medicine for treatment and vaccination

Kanday: No veterinary facility in the village. The animals are taken to Hushey (13 km) for treatment or medicine is fetched from Hushey dispensary, which is seldom available there. In most of the cases, farmers buy veterinary medicine from Khaplu (AKRSP store) or Skardu.

Marzigond: A veterinary facility is lacking in the village. The nearest facility is Machulo (3-5 km), but according to the locals, that facility, most of the time lacks medicine, therefore they have to travel to Hushey (20 km) for treatment and if they had to transport disease animals it costs them about Rs. 5000 only for transportation. Most of the time they bring medicine from AKRSP store situated in Khaplu (25 km). Ali Musa, a local person, self-trained, sometimes treats the animals.

Tallis: There is no proper veterinary facility in the village, except three extension workers trained by AKRSP in some basic treatment and vaccination of livestock. The last vaccination campaign in the village was carried out in 2009-10, in which vaccines were bought from AKRSP Store in Khaplu on subsidized rates.

The nearest vet centre is a dispensary in Machulo, which most of the time lacks medicine, therefore, they livestock owners have to go to Khaplu (22 km) either inot the office of Livestock and Dairy Development Department or AKRSP Store to fetch medicine.

2.3.3. Lack of a permanent vaccination Programme for livestock

The villages doesn't have a permanent or systematic vaccination campaign for livestock, rather it has been an occasional activity for the last few years. Some of such campaigns have been arranged by LS& DD, WWF and Ev-K2-CNR under SEED project and also by BWCDO.

The LS&DD have limited financial and human resources to make the livestock vaccination a regular activity. The individual herders cannot afford to buy vaccines as per their needs.

WWF and Ev-K2-CNR have organized the campaigns jointly with the LS&DD department of the local government, Ghanche, while BWCDO first trained a community member and subsequently organized the campaigns with support of LS&DD Ghanche.

2.3.4. Traditional cattle sheds with poor sanitary measures

Traditionally built cattle-sheds (in most of the cases lying at the ground floor of peoples houses) seriously lack sanitary measures, affecting health and productivity of animals. There are not separate compartments for feeding and drinking water. Cattle-sheds are quite congested, often without light and ventilation. Animals defecate, feed and sleep at the same place. In the events of heavy rains or snowfall the sheds get excessively wet for longer periods adding to the

stress of animals. Majority of the diseases (*CCPP*, *PPR*, *Theileriosis* & *Pasteurellosis*) are exacerbated by harsh winter coupled with poor hygienic conditions.

2.3.5. Inadequate grazing practices

In Hushey valley livestock in upper (summer) pastures of each village are tended by only 2-4 dedicated or delegated men grazers during May-September. Whereas in Hushey village in addition to men grazers 10-20 women are responsible for grazing of milking cattle (zomo and cow) and their young. Men shepherds both stay in pasture all the time while women used to get back to the village in the evening except 2-3 women staying their at night. A summary of number of grazers and animals per grazers (for guarding during summers) is given in the following table:

Village	Number of grazers during summer		Number of livestock per grazer
	Male	Female	
Hushey	2	10-20	1219
Kanday	2	0	1452
Marzigond	2-4	0	242-485
Tallis	2-4	0	849-1698

Thus except Marzigond total number of animals per grazers (for tending or guarding purposes) in all the three villages is quite high to keep animals safe against predators. Secondly the grazers are not trained enough in guarding practices to save their animals from predators.

2.4. Forests and forestry related issues

2.4.1. Depletion of plant biomass due to firewood collection

The natural forests in Hushey valley are very scarce, comprising only few scattered patches of juniper and shrubs. A major cause of deforestation in natural forest patches is extraction of plant biomass for fuel wood. Construction timber is not extracted from natural forests except in few cases reported from Hushey village for construction of a cattle shed in a pasture.

With growing human population the need of firewood is also exponentially increasing posing significant pressure on the scare natural forest patches of the area. An analysis of firewood consumption in Hushey valley shows the pressure on natural forests for fuel wood consumption is fairly high in Hushey and Kanday villages (> 1800 kg and > 1200 of wood from natural forests per household per year, respectively), whereas it was none in Marzigond and Tallis. In Marzigond and Tallis natural forests are either not available or not easily accessible, therefore, people in both villages buy fuelwood from Khaplu, Sailing and other nearby village, accounting for more than 200 kg per household per year on average.

Average daily consumption of fuelwood per household is highest in Hushey (10 kg) followed by Kanday (7 kg), Tallis (6kg) and Marzigond (6 kg). An analysis of fuel wood consumption in all four villages of Hushey valley is as under:

Statistics of fuelwood consumption in Hushey village

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Kg
Artemisia	28	25	15	15	18	20	17	17	30	35	34	37	290
Sea buckthorn	14	10	15	12	14	15	15	14	13	15	11	14	164
Shrubs	12	13	10	7	11	13	12	10	10	14	14	10	136
Dung	94	80	24	11	6	3	3	6	28	43	64	87	449
Riparian vegetation	3	1	3	4	3	3	3	5	3	1	1	2	33
Natural forest	299	298	152	105	78	64	63	59	114	159	206	291	1887
Orchards	13	11	6	3	1	1	1	6	7	12	10	12	83
Plantations	40	34	35	28	27	26	26	25	33	36	45	45	399
Buy from market	07	05	04	02	01	01	00	01	04	08	07	07	47
Other	00	00	00	00	00	00	00	00	00	00	00	00	00

Statistics of fuelwood consumption in Kanday village

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Kg
Artemisia	14	14	6	7	7	10	11	12	11	10	8	15	124
Sea buckthorn	5	5	2	3	5	4	4	4	5	4	5	5	50
Shrubs	2	1	1	1	1	1	1	1	1	0	1	1	10
Dung	64	52	26	10	8	4	5	6	22	41	55	64	358
Riparian vegetation	1	1	1	2	3	3	2	3	1	2	2	2	23
Natural forests	231	230	111	71	46	34	31	39	71	118	146	227	1354
Orchards	4	4	3	5	14	15	16	14	9	5	7	6	101
Plantations	38	31	26	29	28	28	27	27	27	23	38	40	364
Buy from market	3	3	2	3	4	4	4	4	2	1	1	1	33

Statistics of fuelwood consumption in Marzigond village

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Kg
Artemisia	0	0	0	0	2	2	5	3	3	2	2	2	18
Sea buckthorn	88	86	65	39	40	40	31	45	96	88	86	85	788
Shrubs	0	0	0	0	5	5	5	5	5	5	3	3	34
Dung	56	34	9	5	2	12	12	22	34	45	62	66	358
Riparian vegetation	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural forest	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchards	20	15	8	12	16	17	16	25	15	23	20	20	208
Plantations	66	65	57	40	29	26	29	29	36	47	58	58	539
Buy from market	35	32	34	18	11	11	15	11	18	26	32	32	277

Statistics of fuelwood consumption in Tallis village

Vegetation type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Kg
Artemisia	24	25	11	9	9	8	10	12	18	22	25	26	197
Sea buckthorn	4	5	3	3	2	3	3	1	2	3	5	5	39
Shrubs	1	0.4	0	0	0	0	0	0	0	0.4	0.8	1	4
Dung	71.5	56.4	15.9	4.9	2.35	2.3	3.26	6.5	18.8	35.6	58.8	72.9	349
Riparian vegetation	0.4	0.4	0.4	0	0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4
Natural forest	0	0	0	0	0	0	0	0	0	0	0	0	0
Orchards	92.2	88	50.6	36.7	35.4	32.9	31.3	31.2	34.3	52.4	70.3	85.9	641
Plantations	82.6	75.6	62.3	44	38.9	38.27	38.7	43.9	50.6	73.1	85.9	84.6	719
Buy from market	26	30	24	13	12	12	12	12	27	30	29	30	258
Other	0.82	0.82	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.36	0.61	0.82	6

2.4.2. Free grazing, a challenge for afforestation and social forestry

During late autumn, winters and early spring livestock are feely grazed in and around the villages, primarily due to lack of accessibility to higher pastures due to heavy snowfall. Most of the damage to newly planted forest and fruit trees occur during this time due to debarking of

plants by goats, cattle and equine. In addition to debarking, animals also damage plants by trampling, due to the reason that local people are tended to plant trees very closely (as low as 1 x 1 feet) due to scarcity of cultivable lands. However, there is strict ban on free grazing during summers, imposed by locals under customary laws.

Local people find it difficult to fence large areas of land for planting purposes, which is neither affordable for poor farmers nor easily doable in absence of stone for wall masonry. In most of the cases local people fence planting areas with the help of sea buckthorn hedges, but again that depends on availability of sea buckthorn in large quantities. Since sea buckthorn is one of the major source of fuel wood and being heavily consumed for domestic energy.

2.4.3. Lack of alternatives of domestic energy

Due to lack of alternative sources of fuel wood and fuel-efficient technologies, plant biomass is extensively used as domestic fuel for cooking and heating houses in the long winters. In most of the houses wood is burn in the traditional stoves, which in addition to excessive consumption results in various health ailments such as sight (Eyes irritation), lungs (Asthma, Cough) and Skin related disorders commonly found in local people.

Currently the alternative energy sources in the valley are not readily accessible. Following is an analysis of use of alternatives of fuelwood by local people in Hushey valley:

Hushey village

Most of the respondents (77%, n=61) do not use alternatives of fuel sources however, some of the respondents (23%, n=61) use alternative fuel sources like electricity (28%, n=14), LPG (4%, n=14) @ 2.1 kg per month from September to March.

For LPG, people buy it by themselves while the village has two micro-hydel projects (150 KW), established in collaboration with Aga Khan Rural Support Programme (AKRSP) in 2008-2009. One of the two micro-hydel stations is not functional. The community used to pay Rs. 50-100 per household for using the electricity from the micro-hydel, which was consumed for repair and maintenance of the MHP. But since 2013, after supply from 1.5 MW Marzigond hydel power station, micro-hydel has been abandoned for the time being.

Kanday

Only 27% (n=58) of the sample uses some alternatives of fuel wood such as LPG (3.4%, n=58), Electricity (18.9%, n=58) and Kerosene oil (6.8%, n=58). LPG is being used throughout the year while kerosene is mostly being used in winters (December – January) and Electricity is also being used throughout the year as an alternative fuel source. No supporting agency was observed promoting the use of these fuel sources however a number of respondents reported that they produce electricity by their own at household level.

Marzigond

Most of the respondents (54%, n=26) use alternative fuel sources however some of the respondents (46%, n=26) do not use alternative fuel sources like electricity (71%, n=26), LPG (29%, n=26)

For LPG, people buy it by themselves while the village has one hydel power station. Since 2013, after supply from 1.5 MW Marzigond hydel power station, other micro-hydel station has been abandoned for the time being.

Tallis

Almost 40% (n=98) of the sample uses the alternative fuel sources like LPG (38%, n=98) and Electricity (21%, n=98). LPG is being used in winters (November – January) and Electricity is also being used mostly from May to September as an alternative fuel source. No supporting agency was observed promoting the use of these fuel sources however a number of respondents reported that they produce electricity by their own at household level.

2.4.4. Insect Pests on Forest Trees

In Hushey valley, heavy infestation by some hairy caterpillar has been observed on newly planted poplar and willows trees in Kanday. The insects defoliate the trees leading to wilting and stunted growth.



Figure 19 Insect attack on a young willow tree in Kanday (Courtesy: Zafar/WWF-Pakistan)

2.5. Challenges for wildlife conservation

2.5.1. Illegal hunting and poaching

There are no recorded incidences of illegal hunting and poaching in all villages of Hushey valley but such activities cannot be ruled out as indicated by some anonymous reports about hunting of Himalayan ibex. The illegal hunting matters are either due to internal conflict of interests or otherwise orchestrated by outside influential people for getting meat. Most of such hunting takes place during winter when animals descend down to valley bottoms due to heavy snowfall. Moreover, some local people also complain about some outsider influential people shooting game birds in the valley such as Chakor (*Alectoris chukar*) found abundantly during late autumn and winters.

Ladakh urial (*Ovis vignei*) is said to be locally extinct from Kanday village because of excessive hunting in recent past, but the primary reason for its decline was told to be an unknown disease, spread in the village some 50-60 years ago.

2.5.2. Retaliatory killing of mammalian predators

In the past killing of snow leopard in traps (locally called *Akhchandong*) was quite common but now only 4-5 abandoned traps are owned by some ex hunters in Kanday village. A famous hunter in Kanday namely Aldet (some 50 years back) used to hunt snow leopards and wolves. Even now if any predator is seen near the village, people shout the name of Aldet to scare the animals.

The last known or recorded incidence of killing a large predator in Hushey village happened in 1988, a person namely Shardo, caught a snow leopard inside a trap and then stoned it to death. Presence of quite a few abandoned *Akhchandongs* proves the history of human-carnivore conflict in the village.

At present people are reluctant to share information about killing of any predator, but some local (with condition of kept anonymous) were of the view that even at present killing of a carnivore by an aggravated livestock owner cannot be ruled out. In 2013 an alpine chough was found dead near a carcass of a goat in Hushey village, the Wildlife Department Officials suspected that the carcass has been poisoned, but it could not be proved later.

There is a strong negative attitude of local people towards wolf in Hushey village, despite snow leopard being suspected for majority of the livestock depredation cases. Overall, the strongest predictors of respondents' tolerance towards snow leopard population in Hushey village was the size of livestock holding while in case of wolf it was the number of predation incidences. People with large livestock holdings were likely to favour reduction or elimination of snow leopards from the valley while people with more livestock depredation cases were less tolerant

of wolves¹⁵. This type of a negative behaviour towards wolf is not only likely to exacerbate wolf persecution in future, but may eventually affect snow leopard and other predators as a result of trapping or poisoning.

2.5.3. Mortality of overwintering ibex kids

Hushey valley is one the most important areas of CKNP, especially for distribution and abundance of Himalayan ibex. In Hushey village, despite a strict ban on illegal hunting and a good reproductive potential (100 females/80 kids) still the low density of Asiatic ibex (1.2 animals km⁻²) is due to mass mortality of overwintering ibex kids, presumably due to seasonal severity and killing of young cohort by mammalian predators¹⁶. These factors need to be further evaluated and addressed through appropriate conservation measures.

2.5.4. Chance of disease transmission between livestock and wildlife

Urial sheep (*Ovis vignei*) is said to be locally extinct from Kanday village due to an unknown disease, spread in the village some 50-60 years back. In 2013 a fox was seen in the village (Marzigond) suffering from some unknown disease, which later on seen dead in Balegon village. In 2011, an injured snow leopard broke into a village in Skardu town, which was found dead later on and suspected by the veterinary officials to be suffering from mange. Another example is from Shimshal Pamir, Pakistan (adjacent to CKNP) where a severe outbreak of *sarcoptic mange* affected blue sheep population in 2000, whose likely source was indicated in infected livestock¹⁷. Similarly, contact with infected livestock was suspected on occasion of a deadly Contagious *Caprine Pleuropneumonia* episode amongst threatened Markhor in Tajikistan¹⁸.



Figure 20 An injured snow leopard, suspected of being affected by mange during 2011 in a village near Skardu city (Courtesy: The Pamir Times)

¹⁵ Khan, M. Z. 2014. Distribution, management and conservation of large mammals (snow leopard, Tibetan gray wolf and Himalayan ibex) in Hushey valley of CKNP. PhD Thesis (Draft), submitted to Karakoram International University, Gilgit.

¹⁶ Khan, M. Z, Awan M. S, Bocci, A., Khan, B., Abbas, S. Y., Khan, G., Abbas, S. 2014b. Population structure and grouping tendency of Asiatic ibex *Capra sibirica* in the Central Karakoram National Park, Pakistan. *J. Biod. & Env. Sci.* 5 (2) 542:554.

¹⁷ Dagleish, M. P., Qurban Ali, R. K. Powell, D. Butz, M. H. Woodford. 2007. Fatal sarcoptic scabbies infection of blue sheep (*Pseudois nayaur*) in Pakistan. *Journal of Wildlife Disease*, 43(3): 512-517

¹⁸ Ostrowski, S., Thiaucourt F, Amirbekov M, Mahmashoev A, Manso-Silvan L, et al. 2011. Fatal outbreak of *Mycoplasma capricolum pneumonia* in endangered markhor, Tajikistan. *Emerg Infect Dis*, <http://dx.doi.org/10.3201/eid1712.110187>

Usually an animal died of a disease is left outside without properly disposing off, leading to increasing change of disease transmission to scavenging wildlife, as there is no domestic dogs in Hushey valley.

2.5.5. Gaps in wildlife monitoring and trophy hunting procedures

In Hushey valley two villages (Hushey and Kanday) have been notified as CCHA for trophy hunting of Siberian ibex. In Hushey village during 1997-2014 a total of 44 animals while in Kanday during 2012-2014 a total of 3 animals were taken as trophy by national and international hunters. For trophy hunting of wild ungulates in Pakistan and Gilgit-Baltistan, specific procedures have been developed^{19, 20} (yet to be rectified and enforced by Government of Gilgit-Baltistan). The procedures provide proper guideline about wildlife census prior to allocation of a hunting permit and utilization of trophy hunting amount. The local community representatives are unaware of such procedures. The hunting is taken merely as in economic incentive rather an incentive for promotion of environmental conservation. Wildlife census undertaken by community themselves (without involvement of the GB Parks and Wildlife Department or CKNP Directorate or a supporting agency like Ev-K2-CNR, WWF, IUCN and other conservation organization) seems to be less reliable in terms of accuracy.

In addition record of trophy hunting in the villages has not been properly maintained including vital information like number of hunts, date and location of hunting, amount generated and spent on various activities.

2.5.6. Challenges in running livestock Insurance scheme

Hushey

A Livestock Insurance Scheme (LIS) exists in the village since 2013 with support of Ev-K2-CNR/ WWF (under SEED Project) and a local NGO called Baltistan Wildlife Conservation and Development Organization (BWCO), aimed to conserve snow leopard. The scheme comprises of an endowment fund (Livestock Insurance Fund-A, LIF-A), initially amounting Rs. 650,000 plus amount of premium collected by insuring livestock (Livestock Insurance Fund-B, LIF-B) amounting Rs. 106,400. A Livestock Insurance Management Committee (LIMC) comprising of Village Wildlife Guards and VCC members monitors the scheme and recommends predation cases for compensation. The funds have been deposited in local banks to generate fixed interests. The VCC has planned to compensate the losses from amount of interest of LIF-A. So far 1303 animals of various types by 93 households have been insured. In

¹⁹ Shackleton, D. M. 2001. A review of community-based trophy hunting programme in Pakistan. Prepared for the Mountain Areas Conservancy Project with the collaboration of The World Conservation Union (IUCN-Pakistan), and the National Council for the Conservation of Wildlife, Ministry of Environment, Local Government and Rural Development, Pakistan, Islamabad. 59 pp.

²⁰ WWF-Pakistan. 2010. Draft Procedures for Trophy Hunting Programme. Gilgit-Baltistan Parks and Wildlife Department, Gilgit.

the first year of the scheme 53 predation cases were reported, of which 50 have been recommended for compensation.

The VCC is keeping a proper record of the scheme. Thus, systematic monitoring of the scheme will be easy in future.

Earlier BWCDO demonstrated a snow leopard insurance scheme in the village by providing some fixed cost of depredation, but that schemes were a challenge due to being only focused on snow leopard whereas wolf predation cases were not entertained. Secondly verification of a predation case and proving that it happened due to snow leopard not a wolf was a big challenge. Thirdly the amount of scheme was like a onetime payment process not a revolving or endowment fund like the current scheme, therefore, generating new funds every year was a challenge.

Currently the biggest challenge in operating the livestock insurance scheme is insufficient amount of interest that generates from LIF-A. The amount is not enough to compensate all the cases or to recover the maximum cost of a lost animal. Ev-K2-CNR, WWF and Hushey VCC are trying to increase the amount of LIF-A so from the increased amount of interest, people who loose their livestock could be compensated up to an acceptable level.

Kanday

A snow leopard insurance scheme exists in the village since 2009 with support of a local NGO called Baltistan Wildlife Conservation and Development Organization (BWCO), aimed to conserve the cat by reducing its retaliatory killings. Seventy households are members in the scheme who have insured about 1200 animals of various types by paying a premium of Rs. 96,000, all together. BWCDO has contributed Rs. 160,000 in the scheme and so far Rs. 54,000 has been paid to the members as compensation of their livestock loss. Amount of the scheme has been kept in a joint account in the First Microfinance Bank in Skardu.

The major challenge of the scheme is difficulty in verification of the depredation cases of snow leopard as most of the cases are attributed to snow leopard. Secondly amount generated for the scheme is not enough to compensate the cases. The lack of funds also hamper the verification process, because when a predation incidence happens in a high pasture, no one gets ready to go for verification without any monetary benefits.

Proper record of the scheme is lacking with the VCC, so it is difficult to assess success of the scheme.

Marizond and Tallis: There are not such schemes in Marigond and Tallis

2.6. Problems associated with irrigation water supply

Construction, repair and maintenance of irrigation water channels in the valley has been a serious challenge for local communities due to limited financial resources, difficult terrain and disaster-prone topographic conditions. Floods and landslides frequently damage irrigation water

channels and local people have to repair such damages on a self-help basis contributing in cash or in kind (free labor work).

A summary of water channels, which need urgent action, is given in the following table:

Village	Name of location	Coordinates	Estimated length of water channel (m)	Detail of repair works
Hushey	Wasoq	76°21'15.84"E 35°28'32.39"N	1000	Overall repair work
Kanday	Kharidas (new Kanday across the river)	76°22'2.20"E, 35°24'11.89"N	1000 m	Channels has been damaged since 2000, no water in the channel
	Kinidas (above new Kanday)	76°22'23.78"E ,35°23'47.02"N	3000	Overall repair work
Marzigond	Thang	76°22'42.13"E, 35°18'12.24"N	120 m	Head need to be reconstructed
Tallis	Hachor	76°21'48.81"E, 35°16'28.87"N	Not known	Overall repair work
	Bama	76°23'34.74"E, 35°16'11.55"N	Not known	Overall repair work

2.7. Lack of VCCs/CBOs role in tourism management

Local CBOs or VCCs responsible for natural resource management seem to have no or meager role in managing tourism in the valley, which can be deputation of porters, maintenance of treks and campsites and rescue work in high altitude mountaineering expeditions. Ecotourism is highly unlikely without proactive involvement of local communities.

2.8. Lack of planning and facilities for mining sector

Mining sector has not been formally taken up as an economic activity in the valley. Mining sites have not been properly identified and explored. In Hushey village Benzion (Salajeet) is being extracted but neither there are some operating procedure, nor the VCC has played a due role in this regard.

2.9. Problems associated with Human and Institutional Development

2.9.1. Alienation from traditional governance systems

While establishing VCCs or other CBOs the traditional governance system has not been taken into account, despite a significant role of this system in natural resource use such as grazing

cycle management, repair and maintenance of water channels, implementing calendar of agricultural activities, etc. However, in Hushey village, basic structure of VCC comprises of traditionally nominated representatives, which alone is not very much effective.

2.9.2. Community mobilization and management issues

Strengthening of CBOs in Hushey valley is a daunting challenge, due to limited human and institutional capacities. Lack of financial resources is the underlying cause, however there are multiple factors, which limit CBOs human and institutional capacities. A synthesis of some general factors is as under:

- Interest groups hindering community-based initiatives
- Lack of proper election process to scrutinize and bring forward competent personnel/office bearers
- Lack of financial capital to hire a paid staff to operate CBOs day-to-day matters
- Ignorance from bylaws of the CBOs
- Non-adherence to the bylaws of the CBOs

A summary of human and institutional competency or capacity issues of specific villages, keeping in view community-based NRM is as under:

Village	Capacity gaps
Hushey	<ul style="list-style-type: none"> • Inappropriate selection process of VCC office bearers, which comprises of a tossing system instead of identifying and selecting competent personnel • Improper record keeping of official matters. The record is either unavailable or fragmented. • Lack of office set up. However, a new office building has been constructed with the help of CZESVI (2012-13), still not in use. • VCC reported to have an office manager (paid) but he never showed up in any official meeting • Lack of trained personnel (most of the training have been attended by the current president)
Kanday	<ul style="list-style-type: none"> • VCC president has been controversial, thus the entire VCC seems dysfunctional at the moment • VCC needed reorganization since 2012, but it has not happened so far (2014) • Lack of a proper office set up • Record keeping is very poor • Lack of trained personnel (most of the trainings have been attended by the current president)
Marzigond	<ul style="list-style-type: none"> • No dedicated community organization for conservation
Tallis	<ul style="list-style-type: none"> • No dedicated community organization for conservation

3. Proposed management interventions

3.1. Sustainable mountain agriculture

There should be a greater focus on value chain development for agricultural produce like vegetable seeds (potatoes and peas), buckwheat and dry apricots. Tallis and Marzigond are most suitable areas for buckwheat and apricots while Kanday and Hushey for potatoes and peas. In addition, sea buckthorn is abundantly present in the valley. For Tallis and Marzigond proper mechanism should be introduced for processing of dry apricots including picking, drying and packaging. Adequate market avenues need to be explored for sea buckthorn berries and buckwheat grains. In addition, by providing training to local farmers, a small cottage industry can be developed to prepare some products for sea buckthorn and buckwheat.

At the moment there is no proper utilization wool and hair of domestic animals, despite a high value of woollen products in the market. With support of an organization like Baltistan Culture Development Foundation (BCDF) or Karakoram Area Development Organization (KADO) local women need to be trained in processing of sheep wool, goat and yak hair for making of woollen products and rugs. This can be an income generating activity especially for local women who stay idle in their homes for almost six months in a year due to harsh weather conditions of snowfall.

3.2. Pasture management and improvement measures

3.2.1. Creation of Sustainably Managed Pasture Area (SMPA)

A specific pasture area in Hushey and Kanday village can be specified as SMPA to demonstrate controlled grazing and other pasture improvement measures. Creation of a SMPA will need rigorous community consultations keeping in view the scope and limitation of pasture management activities. A sub-committee of VCC should be formed namely SMPA Valley Committee, preferably comprising of those herders who stay in pastures for extended period of times including the grazers delegated by villagers for collective grazing for certain period of time.

3.2.2. Grazing management

Uncontrolled and excessive grazing contributes to the overall degradation of resources. The case is more critical in case of ecological zones like Gilgit-Baltistan where annual precipitation level is less than 200 mm. Lower precipitation rates has a direct impact on diversity and growth rate of plants. Since plants are the primary source of production in a rangeland ecosystem, therefore, their continuous survival even in severe conditions is essential for both ecosystem functioning and livelihood of people depending on pastures. Also, uncontrolled grazing is destructive in terms of productivity as well as ecological point of view.

The objectives and envisaged benefits of the controlled grazing system include one or more of the following²¹:

- Carry out deferment or rest over a period of years, so that the key plants can complete their full growth cycle uninterrupted or replenish their carbohydrate reserves.
- Obtain uniform pasture forage use within each pasture unit, thus preventing selective grazing, and aid in the judicious management of the livestock and forage plants in other parts of the pastures.
- Meet the nutritional needs of livestock, and avoid stress on animals, and thereby reducing supplemental feeding, and the associated labor cost.

In the context of these objectives, controlled grazing system can be an integral part of overall management plan for a given pasture. However, the major goal is to improve or maintain the grazing resource (pasture) and to increase livestock production and productivity.

Most grazing systems are designed around some sort of rotation, may be short duration or long duration. A given pasture is divided into more than one unit, and the grazing is rotated in all these units, thus allowing new growth in the closed units. A number of grazing systems can be adopted in a given area with some modification, however, due to the short grazing period in the alpine pastures (June-August), only Rest Rotation and Deferred Rotation Systems are recommended.

A brief description of the systems is provided below;

Rest Rotation Grazing System

In the rest rotation grazing system, one part of the pasture is un-grazed for an entire year or longer, while the other pastures are grazed for a part or perhaps all of a growing season.

Based on 90 days grazing season (June-August)

Rest rotation system differs from the deferred rotation system in that, deferment is not rotated seasonally, while in rest rotation, grazing is banned for one season (generally one, however, based on the vegetation condition and availability of alternate grazing area, grazing can be banned for two seasons as well).

Rest rotation is considered as a good system for both the vegetation and livestock in rugged mountain terrain. Furthermore, it is useful for multipurpose use of the pasture, as it will encourage the regeneration of some palatable bushes. Introduction of this system will in most cases improve the grazing capacity due to better livestock use of upland areas and improve vegetation vigor and composition in the more productive areas.

²¹ Beg SU. 2011. Pasture and Pastoralism in the Central Karakoram National Park (CKNP), (unpublished report). WWF-Pakistan, Gilgit-Baltistan, Gilgit and Directorate of the Central Karakoram National Park, Skardu. Pakistan, Pages. 29

Deferred grazing system

According to this system, one part of the pasture is protected from grazing for a longer period and second part of the pasture is allowed for grazing. This system of grazing is applied to severely depleted pastures and to improve the pasture condition. This system allows plants for seed production as well as seedling establishment, but in this case deferment always occurs during the same time period. More pasture area or units are required to apply the deferred grazing system, as animal stock requires alternate pastures for grazing.

3.2.3. Pasture Improvement Measures

Fodder cultivation

Utilization of valley slopes and barred lands for fodder production has been a practice in Baltistan and overall mountainous areas for the long time. This practice also contributes to the stabilization of valley slopes besides increasing the green cover. In order to meet the feeding requirements of lactating animals kept in the village in summer as well as stall-feeding of all animals in winters, improved varieties of fodder crops would be encouraged at the villages level. The activity also requires provision of water through construction of small water channels for which the CBOs have to make concerted efforts in collaboration with CKNP partners.

Careful selection of fodder seeds is a must as the seeds from unreliable sources may contain weeds as well that can be invasive under favorable circumstances. Further, common varieties of seeds available in the market are hybrid and genetically modified that can survive for few years. On the other hand, there are native varieties of fodder like *Medicago*, which is a nitrogen fixing plant that can be promoted through seed production.

Purchase of fodder seed such as Alfalfa becomes a difficult job for local farmers due to distant market facilities. The local farmers must be urged to have their own seed production system for alfalfa, e.g. the people of Bargo village in Gilgit. This can also be an income generating opportunity for certain farmers in the valley.

Potential areas for fodder cultivation in the valley are given in the table in *section 4.4*.

Development of water points

The introduction of controlled grazing system requires water points in all the pasture units, in which the animals suppose to be rotated. Therefore, development of new water points is required to facilitate the design of rotational grazing system. Efforts shall be made to get the water spread throughout the pastures. In addition due to non-availability of water in some pastures, the pastures with available water sources are extensively grazed. This activity is possible, as there is sufficient source of glacier and snowmelt water. Following the grazing system mentioned above some of the pasture units would be banned for entire grazing season while some units would be allowed for grazing. Both the grazing and banned units require water to rotate the animal in different pasture units. Therefore construction of water point is mandatory to implement proposed grazing system in the valley.

While constructing water points in alpine and sub-alpine pastures, it would be desirable to make minimum use of plastic containers and pipe as well as concrete structures. Likewise, construction of large water channels in pastures should also be avoided so that pastures may not be converted into agricultural activities. The simple, cost effective and environment friendly way for developing water points could be the construction of ponds (wide enough but not very deep), made of fine clay that will make the ground layer impermeable. Preferably, channelizing spring water, where available or snowmelt water to the ponds in very small quantities.

One of such a pasture identified on priority basis in Hushey valley is Gone Ali Sher Khan, Marzigond village for which water can easily be channeled from Koonday broq.

Improvement of Pavements in selected pastures

Due to poor accessibility in some pastures, other areas are extensively grazed for longer periods. By improving pavements to such pastures uniform grazing can be maintained and perspectives for controlled grazing can be enhanced. Those pastures include Dalsangpa in Hushey, La in Kanday, Koonday broq in Marzigond. No such pastures was identified in Tallis.

3.3. Livestock management

3.3.1. Improvement of veterinary services in the valley

The only veterinary dispensary located in Hushey village need to be strengthened by providing needful facilities and equipment such as diagnostic facility or laboratory, a freezer or cooler and sterilizer to store vaccines and medicines and a cattle crush to control animals during treatment. The dispensary has only one Livestock Assistant (LSA), who is unable to frequently travel through the entire valley to deliver his services. A short-term arrangement can be to train livestock extension workers from community and link them with LSA Hushey Dispensary for operations. The trained extension workers should be provided with a kit, for basic treatment. Such an extension workers or vaccinator has already been trained in Hushey village by BWCDO. Local community for their services should pay the extension workers. To make the system sustainable the extension workers should be paid for their services by the beneficiary community members in cash or in kind. The local community members should have close interaction with LS&DD officials in the District to obtain medicines or other facilities whenever available.

3.3.2. Livestock Vaccination Programme

As stated above in section 3.5, many viral and bacterial diseases affect the livestock health and productivity. Sometime, epidemic diseases cause huge losses of livestock in the valley. Since livestock share the summer pastures with wild ungulates (ibex) and chances of transfer of livestock diseases to the wildlife cannot be ignored. Therefore, regular livestock vaccination is a must to avoid losses to the farmers and help promote a healthy ecosystem. In this respect, each village should have a permanent livestock vaccination program. For this purpose, additional seed money should be provided to Hushey and Kanday to top-up the valley Conservation Fund

(VCF) for sparing some portion of the interest of VCF to purchase medicine for livestock vaccination. In Marzigond and Tallis while establishing VCF, amount required for livestock vaccination should also be kept into account.

Livestock vaccination program developed by experts of Ev-K2-CNR may be followed as a guideline.

3.3.3. Improvement of cattle sheds for improved sanitation and predator avoidance

Cattle shed improvement has two aspects: first to improve health and productivity of animals and second to prevent animals from attack of predators. By improving cattle shed in the village diseases of animals can be reduced, which are exacerbated by harsh weather, coupled with unhygienic conditions. In addition, improving structural composition of existing cattle sheds can also enhance productivity of livestock. For this purpose at least two cattle sheds in each village should be improved for proper hygiene, ventilation, feeding and resting of animals. Such interventions for demonstration purposes has already undertaken by AKRSP in low-lying villages of Baltistan. There experiences need to be learnt prior initiating such interventions in Hushey valley.

Second aspect of improving structure of traditional corrals in high pastures is to prevent killing of livestock my mammalian predators such as wolf and snow leopard. Attacks on livestock by predators, particularly snow leopard in summer pastures has been frequently reported by local people. The traditional corrals are normally open structures and animals are unsafe in case of any attack by a predator. The loss of livestock by predators leads to retaliatory killing of the predators through poisoning, trapping and shooting.

Five predators-proof corrals have already been built by the VCC of Hushey village with support of Ev-K2-CNR and WWF (under SEED Project) and BWCDO in Ghondogoro, Saicho and Choghospang (Mashabrum).

Similar corral improvement work in high pastures of Kanday, Marzigond and Tallis are also required. In Tallis pastures namely Hachor, Katcha and Tassibrangsa, one of the causes of livestock mortality is cold stress in case of excessive rains as most of the corrals are roofless. In addition to make them predator-proof another objective of corral improvement in these pastures should be to provide a shelter from rainfall.

3.3.4. Livestock breed improvement

The most preferred animals in the project area are goats, sheep and cross breeds of cow, respectively. The breed of all three animal types is nondescript resulted after years of interbreeding. Because of interbreeding of same generations, the productivity is below average, however, they are very adaptive to the local conditions and have the ability to survive and produce with minimum forage.

Local people in Baltistan including low lying villages of Ghanche District such as Sailing, Khaplu and Daghoni-Balghar have started to rear cross breeds of indigenous cow and improved Jersey

breed, which are regarded as highly productive in terms of dairy production. Rearing improved breeds have certainly resulted in reducing the number of less-productive local breeds. Moreover, rearing such animals need stall feeding, leading to reduced pressure on pasturelands.

One of an option for breed improvement is artificial insemination (AI), but it has been observed in Baltistan that villages at higher altitudes like the ones in Hushey are less suitable for AI due to hard topographic conditions; therefore, crossing of local cow with proven Jersey bull can be a suitable option for breed improvement.

One of such a proven bull has been provided to a local farmer in Hushey village in 2013 by WWF/Ev-K2-CNR under SEED Project with a view to promote more productive cattle in the area (to meet dairy requirements of local people). Under this initiative a proven Jersey bull was identified with the help of LS&DD Ghanche. A local farmer in Hushey valley was identified by the VCC to take care of the bull and facilitate breeding services. The local farmer contributed 25% of the total cost of the bull, while 75% cost was born by SEED Project. Local people who get their cow serviced by the bull have to pay the bull owner in cash or in kind. And the owner is responsible to take care of the bull's health. By end of 2013, 18 cows in the village were reported to being served by the bull, the progenies were yet to come. Results of this particular intervention need to be carefully monitored and if successful, this intervention needs to be replicated in the area.

3.4. Afforestation and forest conservation

3.4.1. Ban on timber harvesting from natural forests

Due to scarcity of natural forests, extraction of timber from natural forests is already either banned or not in common practice. There are instances of cutting trees (where available) to construct or repair cattle sheds in high pastures. The local people seem to abide by the local rules of not cutting forest trees for timber. This ban must be strictly imposed by local VCCs or CBCOs.

3.4.2. Regulate use of firewood from natural forests

Extraction of firewood from natural forests is still high in Hushey and Kandy whereas, it is minimum in Marzigond and Tallis. In Hushey the best practice started very recently is allowing certain quantity within certain period of time while in Kandy the dates are specified but no quantity has been fixed. Building upon their customary laws it can be further regulated through Tsranso, with the following considerations:

- Juniper trees: cutting or uprooting of a complete tree should be strictly prohibited, except cutting of single branches if there is no other option
- Riparian vegetation: for coppice plants such as sea buckthorn or willows it is suggested to cut single basal shoots from each plant to preserve its root system. But doing so, new shoots can re-grow rapidly producing new biomass to be harvested

- Shrubs: for coppice plants it is suggested to partially cut the basal shoots trying to avoid, if possible the cutting of whole individual. In these cases local knowledge and traditional management system should be emphasized and taken into consideration.

3.4.3. Fire wood plantation

In order to cope with lack of vegetative biomass in the valley local communities have traditionally planting trees, primarily to meet their fuelwood needs and timber for construction. Commonly grown trees are poplar, willow and sea buckthorn. AKRSP is the pioneering organization in promoting social forestry in the valley. Since 2011 the Gilgit-Baltistan Forests, Wildlife and Parks Department, Ev-K2-CNR and WWF Pakistan are also endeavoring to promote afforestation in CKNP buffer zone valleys. An effort has also been made to gauge the progress of plantation including planting success and growth (given in section: 1.10)

Proposed areas for future plantation

Village	Name of location	Coordinates	Irrigation water availability (Yes No)	If no from where water can be brought?	Estimated length of water channel (m)	Estimated cost of water channel (Rs.)
Hushey	Lithiaq	76°21'54.60"E 35°25'54.67"N	Yes	-	-	Boundary wall needs to be repaired (Rs. 500,000)
	Biahil	76°21'54.70"E, 35°26'15.05"N	No	Shomachan	1500	1,500,000
	Wasoq	76°21'15.84"E 35°28'32.39"N	Yes	Repair of water channel	1000	600,000
	Chubar	76°21'16.84"E 35°26'51.28"N	No	Dumsum	1000 m	1,200,000
Kanday	Kharidas (new Kanday across the river)	76°22'2.20"E, 35°24'11.89"N	Yes (but needs to be repaired)	Channels has been damaged since 2000, no water in the channel	1000 m	600,000
	Kinidas (above new Kanday)	76°22'23.78"E ,35°23'47.02"N	Yes	Need s to be repaired	3000	1,000,000
	Minguilo Broq	76°23'16.73"E, 35°22'54.11"N	No	Nangma valley River	1000	1,000,000

Marzigond	Thang	76°22'42.13"E, 35°18'12.24"N	Yes	Head need to be reconstructed	120 m	600,000-800,000
	Gone Ali Sher Khan	76°21'48.99"E, 35°18'7.92"N	No	A lake in Tinis	100 m pipe + water channel	800,000-1,000,000
Tallis	Hachor	76°21'48.81"E, 35°16'28.87"N	Yes	-	-	No idea
	Bansar	76°23'47.35"E, 35°15'33.18"N	No	Tallis nullah	1500	No idea
	Bama	76°23'34.74"E, 35°16'11.55"N	Yes	-	-	No idea

3.4.4. Promotion of energy efficient technologies and alternative energy options

There are numerous ways to reduce consumption of plant biomass as domestic fuel, which is, on average 6-10 kg per household per day in Hushey valley. Promoting energy efficient housing, heating and cooking techniques and use of alternative/renewable forms of energy such as hydropower and biogas, use of plant biomass can be reduced. Aga Khan Planning & Building Services (AKPBS) has already demonstrated energy efficient housing, heating and cooking technologies. Some of which including house insulation, hatched window, improved stove connected with water geyser, etc., have been widely adapted by local communities in Gilgit-Baltistan. Communities in Hushey valley seldom use these technologies, which need to be promoted in the valley through subsidized rates with the help of AKPBS.

Secondly, Ev-K2-CNR has also introduced an improved stove in Aarandu village of Basha, Baltistan, cherished by local people for its efficient use. This stove needs to be replicated in Hushey valley, by making it affordable to local people initially through some subsidized rates.

Thirdly, there is great potential of micro-hydel electricity production. In Hushey village there are two micro-hydel projects (150 KW), established in collaboration with Aga Khan Rural Support Programme (AKRSP) in 2008-2009. One of the two micro-hydel stations is not functional. Prior the power supply from Marzigond power station the community used to pay Rs. 50-100 per household, as tariff, for using the electricity from the micro-hydel, which was consumed to repair and maintenance of the MHP. But since 2013 after supply from Marzigond use of the micro-hydel has been reduced. Local community in Hushey should be motivated and facilitated to run the micro-hydel scheme. This can meet their needs by supplementing domestic energy for cooking and heating.

In Tallis AKRSP conducted a feasibility survey to establish a micro-hydel power station the village but due to lack of consensus among local people the scheme could not be realized. There were some apprehensions among locals that the outflow of micro-hydel turbine would destroy

one of their irrigation channels. This scheme can be reinitiated if some funds are made be available.

Demonstration of biogas in Tallis and Marzigond can be another option to produce gas from cow dung. A similar small biogas project is being successfully run by a local farmer in Bara village near Khaplu (some 30 km from Tallis). Such a plant cannot function in winter, however it can be a good alternative option for couple of months during summer.

3.4.5. Control of insect pests on forest trees

Infestation of newly grown willow and poplar trees by a caterpillar in Kanday village need to be assessed prior suggesting some control measure. Research students of KIU can be engaged in this regard.

3.5. Wildlife Conservation

3.5.1. Community-based watch and ward and monitoring of wildlife populations

Monitoring of wildlife populations in Hushey valley (Hushey and Kanday villages only) is undertaken by CKNP watchers, who monitor illegal hunting and poaching activities and also assess the populations of wild animals through standard survey protocols developed by University of Siena, Italy (UNISI) under SEED Project for CKNP (please refer to CKNP Management Plan 2014 for details). In addition, in Hushey village three community representatives used to work as Village Wildlife Guards (VWGs) during the implementation period of SEED Project (2011-2014). These VWGs, trained by CKNP wildlife experts from UNISI and WWF used to perform their duties under specific ToRs and report on monthly basis to CKNP partners through their VCC on a prescribed form (in Urdu), recoding their observations on numbers and distribution of wild animals, predation incidences, illegal activities such as hunting, poaching or forest cutting, etc. In addition to Hushey village this practice was much successful in other valleys like Thalay, Tormik, Basha, Bagrote and Hisper. The initiative on one hand was quite helpful in regular monitoring of wildlife and associated activities and on the other it supplemented the human effort of CKNP Directorate in controlling exploitative activities in and around the Park. In addition to CKNP valleys, VWGs system has also been quite significant in other buffer zone of other PAs such as KNP and Qurubmer National Park.

The biggest challenge in sustaining the VWGs is their monthly remuneration, which used to cover in Hushey valley from SEED Project during 2011-2014. One of the options is to sustain the remuneration of these VWGs from the interest of VCF or from trophy hunting amount (in Hushey and Kanday). Similar practice of paying VWGs from trophy hunting amount is still managed in some other CMCA in Gilgit-Baltistan such as KVO, Khyber, Ghulkin, SKB, Bunji and Qurumber, etc. The system of VWGs should be revived in Hushey and Kandy together with a system of monthly reporting to CKNP Directorate on the proforma given as **appendix-C**. One of the important functions of VWGs in Hushey and Kanday is to facilitate trophy-hunting programme. Moreover, these VWGs can also be helpful in keeping a vigilant eye on harmful activates such as use of poisons on carcasses to kill predators. They can also be helpful

in monitoring use of poisonous chemical which are used to control various pests, e.g. in KNP area (some ten year back) DDT has been observed lying with some herders aimed to use on livestock to control ticks and mites.

In addition to VWGs, a system of appointing a community representative as Honorary Wildlife Officer (HWO) has also been practiced in the past (during 1997-2006) in various CMCA of Gilgit-Baltistan. The DCC used to delegate specific powers to HWOs to deal with illegal hunting and poaching cases. Appointment of HWOs needs to be revived in CMCA including Hushey and Kanday villages.

3.5.2. Trophy hunting management

In Hushey valley two villages namely Hushey and Kanday have been designated by Government of Gilgit-Baltistan as Community Controlled Hunting Areas (CCHAs) to facilitate trophy hunting of Himalayan ibex. In Hushey village 44 trophy animals have been taken during 1997-2014 (on average 2-3 animals per year), while in Kanday 3 animals during 2011-14 (1 animal per year). The programme needs to be managed keeping in view its prime objective as an environmental wellbeing (conservation tool) instead of an economic wellbeing. The programme needs to be managed and monitored strictly following the position paper developed by CKNP wildlife experts from UNISI duly endorsed by *Caprinae* Specialist Group of the Species Survival Commission of IUCN (*appendix-D*) and Trophy Hunting Procedures developed by Gilgit-Baltistan Wildlife and Parks Department with the following considerations:

- i. Siberian ibex population data (including both counts and population structure) must be systematically collected and accurately recorded (following standard survey protocols developed by UNISI and WWF, *appendix-E*)
- ii. Population data and trophy hunting plans should be peer reviewed by professional wildlife biologists within and outside Pakistan
- iii. During the hunting event a hunter should be accompanied by CKNP/GB Wildlife Department officials and concerned community members to ensure adherence with SOPs specified in the Trophy Hunting Procedures
- iv. The community should keep proper record of trophy hunting including date and location of hunt, name and nationality of hunter, horn size of trophy animal. A simple format should be developed in Urdu to record this information.
- v. VCC should develop a plan for spending of amount (80% community share of the hunting permit) generated from trophy hunting programme. At least 50% of this amount should be spent proportionately on the following conservation and sustainable development activities:
 - a. Strengthening of VCF
 - b. Community-based watch and ward
 - c. Livestock insurance schemes to compensate verified livestock depredation cases
 - d. Livestock vaccination
 - e. Repair and maintenance of water channels
 - f. Repair and maintenance of micro-hydel schemes

3.5.3. Livestock Insurance Schemes to promote positive human-carnivore interaction

The livestock insurance scheme in Hushey valley needs to be strengthened to reduce the chance of retaliatory killing of predators by promoting a positive interaction between local herders towards large mammalian predators, i.e. snow leopard and wolf. Such a scheme has been initiated in Hushey village by Ev-K2-CNR and WWF under SEED Project in collaboration with BWCDO and Hushey VCC. In Kanday village local people with support of BWCDO, which aims only to compensate snow leopard predation cases, run another scheme. To strengthen these schemes the Livestock Insurance Fund (LIF) need to be enhanced from PKR. 600,000 in Hushey and PKR. 100,000 in Kanday to at least PKR. 1,000,000 in each village. VCCs in the valley where trophy hunting is successfully practised (Hushey and Kanday), must be strongly urged to deposit at least 20% amount of the permit fee every year into the LIF.

Secondly in Kanday village the predation incidences by wolf also need to be taken into account. Livestock Insurance Management Committee-LIMC (preferably comprising of VWGs, where possible) needs to be strengthened by providing necessary training in monitoring predation cases. Monitoring predation incidences is a difficult task; therefore, certain remuneration should be given to LIMC members, either by allocating a portion (e.g., 20% of the LIF interest). If a village appoints VWGs (explained above in 3.5.1), monitoring of predation cases for compensation must be included in the Terms of References (ToRs) of VWGs.

3.5.4. Take measures to reduce mortality of overwintering ibex kids

Higher mortality of young cohort of Himalayan ibex during winters has been observed in Hushey valley, the causes may be predation by large predators, lack of forage in wintering areas and severe weather condition. These reasons need to be explored through further research engaging student of the Karakoram International University. Initially one of the recommended initiatives may be to reduce livestock grazing in ibex overwintering areas.

3.6. Improvement of water courses

One of the best practices in Kanday village is maintain flow of water in Channels by deputing two local persons who are being paid @ Rs. 8000/person/month by collecting money from all +140 landowners of the village. A trustworthy person is nominated to collect money from all households. Similar practice can be promoted where necessary. But the biggest issue to repair and maintain water channels if damaged due to landslides or floods. There are few channels (detail given in *section 2.6*), which need immediate repair to bring additional areas under cultivation for firewood plantation and fodder cultivation. CBCSDOs of each village must contact with supporting agencies from government and civil society for needful financial help. A summary of target water channels is given below:

Village	Name of location	Coordinates	Irrigation water availability (Yes No)	If no from where water can be brought?	Estimated length of water channel (m)	Estimated cost of water channel (Rs.)
Hushey	Lithiaq	76°21'54.60"E 35°25'54.67"N	Yes	-	-	Boundary wall needs to be repaired (Rs. 500,000)
	Biahil	76°21'54.70"E, 35°26'15.05"N	No	Shomachan	1500	1,500,000
	Wasoq	76°21'15.84"E 35°28'32.39"N	Yes	Repair of water channel	1000	500,000
	Chubar	76°21'16.84"E 35°26'51.28"N	No	Dumsum	1000 m	1.200,000
Kanday	Kharidas (new Kanday across the river)	76°22'2.20"E, 35°24'11.89"N	Yes (but needs to be repaired)	Channels has been damaged since 2000, no water in the channel	1000 m	600,000
	Kinidas (above new Kanday)	76°22'23.78"E ,35°23'47.02"N	Yes	Need s to be repaired	3000	1,000,000
	Minguilo Broq	76°23'16.73"E, 35°22'54.11"N	No	Nangma valley River	1000	1,000,000
Marzigond	Thang	76°22'42.13"E, 35°18'12.24"N	Yes	Head need to be reconstructed	120 m	600,000-800,000
	Gone Ali Sher Khan	76°21'48.99"E, 35°18'7.92"N	No	A lake in Tinis	100 m pipe + water channel	800,000-1,000,000
Tallis	Hachor	76°21'48.81"E, 35°16'28.87"N	Yes	-	-	No idea
	Bansar	76°23'47.35"E, 35°15'33.18"N	No	Tallis nullah	1500	No idea
	Bama	76°23'34.74"E, 35°16'11.55"N	Yes	-	-	No idea

3.7. Ecotourism promotion with community-participation

The upper reaches of Hushey valley, comprising high peaks and passes, is of the tourism hotspots within CKNP. The famous Ghondogohoro la route of Hushey valley lies in the Tourism Focussed Zone (TFZ) of the park, i.e. Hushey – Saicho – Khiyuspang (Hispan) – Ali camp, leading to K2 BC and Broad Peak BC and Concordia. Whereas, the K6 and K-7 are of Hushey valley is situated in Low Frequency Tourism Area (LFTA) of the Park. Community of Hushey valley should be involved to manage tourism in these specific zones as per the guidelines provided in IPMP for CKNP (2014).

3.8. Institutional Strengthening of Community Organizations

3.8.1. Integration of LMIs and other CBOs

For soliciting community support in rural development, NRM and to strengthen CKNP management through community participation, the facilitating NGOs such as AKRSP, IUCN and WWF have established various COs such as Village Conservation Committee (VCC) in Hushey, Wildlife Conservation Welfare Committee also called VCC in Kanday and numerous VO and WO in Marzigond and Tallis (a summary of which is given in section 1.16). As explained above in (sections 1.13-1.15) the LMIs or local governance system has crucial role in regulating use of natural resources such as pastures, forests, livestock and agriculture. But somehow proactive role of LMIs has not been solicited in the existing COs.

Thus, for effective management of natural resources, LMIs or traditional governance system must be integrated with community organizations like VCCs, LSOs, VO, WO, etc. For this purpose the IPMP for CKNP (2014) recommends integration of VCCs and LSOs into integrated conservation and development bodies (ICDBs). This initiative can help institutionalize an integrated conservation and development approach at community level. For the integration purpose a CO should be termed as Community-based Conservation and Sustainable Development Organization (CBCSDO), but it can work by any name (preferably by the existing names), because changing the name or nomenclature may jeopardize their functioning. However, for all villages of Hushey valley it must include the following functionaries of LMIs and COs:

Hushey	Kanday	Marzigond	Tallis
President CBCDO	President CBCDO	President CBCDO	President CBCDO
Trangpa (member)	Trangpa (member)	Trangpa (member)	Trangpa (member)
Religious leader (member)	Religious leader (member)	Religious leader (member)	Religious leader (member)
<i>Stranso</i> of all <i>Tsarma</i> (members)	<i>Stranso</i> of all <i>Tsarma</i> (members)	<i>Stranso</i> of all <i>Tsarma</i> (members)	<i>Stranso</i> of all <i>Tsarma</i> (members)

Member UC (member)	Member UC (member)	Member UC (member)	Member UC (member)
Presidents of VOs (members)	Presidents of VOs (members)	Presidents of VOs (members)	Presidents of VOs (members)
Presidents of WOs (members)	Presidents of WOs (members)	Presidents of WOs (members)	Presidents of WOs (members)
President Hushey Welfare & Development Organization (member)	President VDO (member)	President Mir Aliwa Social Welfare and Development Society (member)	President Human Welfare Organization (member)
Manager (preferably must be paid in cash or in kind)	Manager (preferably must be paid in cash or in kind)	Manager (preferably must be paid in cash or in kind)	Manager (preferably must be paid in cash or in kind)

Except the representation of VOs and WOs, this structure is in-place in Hushey and seems to work better except the weak role of their Manager. In Hushey and Kanday, the existing VCCs, which are already registered, must be strengthened or restructured by representation of the said functionaries. In Marzigond and Tallis, new CBCSDOs need to be established following the above pattern.

3.8.2. Capacity-building of CBCSDOs

The newly established CBCSDOs in Marzigond and Tallis must be registered with competent government authority (as deemed necessary by the CBCSDOs), while in case of Hushey and Kanday their bylaws should be reviewed and necessary amendments should be made to deal with diversified and multi-faceted aspects and or emerging environmental challenges such as climate change adaptation, access to biological resources, co-management of protected areas, etc.

The CBCSDOs governance and management bodies should be fully acquainted with bylaws and SOPs and necessary trainings should be organized in this regard. Role of the Board and management should be clearly spelt out. In order to educate the Board members about the overall organizational policies, structures and systems, they should be fully oriented and provided with relevant information. The performance of the Board is also important to be assessed/measured. This could be done according to the governance timetable, ToRs for the Board, meetings attendance ratio and participation of each director. It is therefore advised that each new member should be provided with a kit containing documents of policies and procedures besides the bylaws.

A network of CBCSDOs should be established to broaden the horizon of natural conservation and sustainable at valley level. The President or Chairman of this body must have a representation in CKNP Management Board.

All villages in Hushey valley are part of Machulu UC and if AKRSP happens to establish an LSO, it must consider the network of existing CBCSDOs.

Each CBCSDO should have an office manager (preferably paid) to handle day-to-day official business. For a village earning some revenue from natural resources, e.g., Hushey and Kanday, payment for office manager should not be an issue. The office Manager should be trained in necessary skills such as proposal development, bookkeeping, and stakeholder facilitations etc.

3.8.3. Financial Management and Sustainability of CBCSDOs

In the absence of a financial support mechanism it is highly unlikely for the CBCSDOs to be efficient in their functions. One of the options is Valley/Village Conservation Funds (VCF), which is an endowment fund for conservation, established by conservation supporting organization, e.g. IUCN in Hushey and Ev-K2-CNR/WWF in Kanday.

Following measures are recommended to streamline the matter of VCF in Hushey valley:

Village	Existing Sources	Problem	Recommendations
Hushey	VCF: PKR. 300,000 LIF-A PKR. 650,000 Total: 1,050,000	- Difficulty in managing multiple funds - Insufficient to meet organizational and conservation needs - Improper record keeping	- Merging various funds under the title of Conservation and Sustainable Development Fund (CSDF) and allocating proportions of the interest amount to various initiatives given as under: Watch and Ward: 30% Livestock Insurance: 30% Livestock vaccination: 20% Office expenses: 20% - Strengthening CSDF by additional allocation of Rs. 700,000 to strengthen LIS and initiate livestock vaccination - Strengthening CSDF by annual allocation of at least 50% amount generated from trophy hunting and CKNP entry fee
Kanday	VCF: PKR. 250,000 LIF: 100,000 Total: PKR. 350,000	- Difficulty in managing multiple funds - Insufficient to meet organizational and conservation needs - Improper record keeping	- Merging various funds under the title of Conservation and Sustainable Development Fund (CSDF) and allocating proportions of the interest amount to various initiatives given as under: Watch and Ward: 30% Livestock Insurance: 30% Livestock vaccination: 20% Office expenses: 20% - Strengthening CSDF by additional allocation of Rs. 700,000 to strengthen LIS and initiate livestock vaccination - Strengthening CSDF by annual allocation of at least 50% amount generated from trophy hunting
Marzigond	Nil	-	Establish CSDF, initially amounting Rs. 700,000 (500,000 as CSDF and 200,000 to support livestock vaccination)
Tallis	Nil	-	Establish CSDF, initially amounting Rs. 700,000 (500,000 as CSDF and 200,000 to support livestock vaccination)

4. Management actions

4.1. Sustainable mountain agriculture

#	Action	Village*	Priority Rank
1.	Improve marketing of high value crop such as buck wheat	H, K, M, T	Medium
2.	Improve post-harvest techniques (processing and packaging) through improved technology and training	H, K, M, T	Medium
3.	Vocational Centre established for local women to promote local handicrafts (woolen products and rugs) from wool and hair of domestic animals	H, K, M, T	Medium

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.2. Pasture management

#	Action	Village*	Priority Rank
4.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	H, K,	High
5.	In consultation with local community declare SMPA and initiate controlled grazing	H, K,	High
6.	Train selected herders (those having greater dependency on livestock or those members of the community who remain in pastures quite often) in improved guarding practices in SMPA	H, K	
7.	Promote cultivation of fodder crop such as alfalfa on individual farmlands	H, K, M, T	Medium
8.	Improve pavement to selected pastures	H, K, M	Medium
9.	Develop drinking water points in selected pastures	K, M, T	

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.3. Livestock management

#	Action	Village*	Priority Rank
10	Strengthen Hushey Vet Dispensary by establishing a basic diagnostic facility (a basic laboratory) and providing needful equipment (freezer or cooler, sterilizer, cattle crush) and required medicine to Hushey vet dispensary	H	High
11	Train livestock extension workers in improved animals husbandry and veterinary care and provide them with basic kits (linked to 12, 13, 14 and 15)	H, K, M, T	High
12	Establish and operationalize a permanent livestock vaccination programme (following guidelines of Ev-K2-CNR vet experts)	H, K, M, T	High
13	Improve one cattleshed in each village on demonstration basis (for improved hygiene, feeding, watering to improve animal health and productivity)	H, K, M, T	Medium
14	Improve primitive corrals to make them predator proof structures and top provide shelter against rainfall (in Tallis)	H, K, M, T	High
15	Improve breed of local cattle for enhanced productivity and to reduce number of less productive animals	K, M, T	Medium

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.4. Afforestation and sustainable forest management

#	Action	Village*	Priority Rank
16	Through VWGs/Tsarma/Larava/Norziva ensure ban on cutting of forest trees for timber	H, K, M, T	High
17	With the help of VWGs/Tsarma/Larava/Norziva, monitor duration, quantity and pattern of fuelwood collection from natural forests as prescribed above in section 3.4.2	H, K, M, T	High
18	Hold community-based afforestation campaigns annually in the areas specified in section 3.4.3, reward at least two farmers per village with a cash prize of Rs. 20,000 for highest number of plants in each village	H, K, M, T	High
19	Regularly monitor progress on afforestation campaigns carried out by CKNP/WWF under SEED Project	H, K, M, T	High
20	Introduce fuel-efficient stoves in target villages	H, K, M, T	High
21	Establish/Repair and operationalize micro-hydel schemes Hushey valley	H, T	Medium
22	Investigate infestation and insect pest on forest trees and adopt appropriate pest management practices	K	High

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.5. Wildlife Conservation

#	Action	Village*	Priority Rank
23.	Maintain VWGs in Hushey and appoint VWGs in Kanday	H, K	High
24.	Provide basic training to VWGs in monitoring of wildlife	H, K	High
25.	Monitor wildlife populations (number and structure) following standard survey protocols for CKNP	H, K	High
26.	Review existing trophy hunting programme in target CMCAs (could be a research activity in collaboration with KIU)	H, K	High
27.	Manage trophy hunting programme as prescribed above in section 3.5.2		
28.	Enhance allocations for Livestock Insurance Fund	H, K	High
29.	Train LIMC members and engage CKNP directorate in monitoring of LIMC	H, K	High
30.	Minimize livestock grazing in Ibex overwintering areas (linked to action # 5	H, K	High

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.6. Improvement for water courses

#	Action	Village*	Priority Rank
31.	Construct water channels as prescribed in section 3.6	H, K, M, T	Medium
32.	Repair water channels as prescribed in section 3.6	H, K, M, T	Medium

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.7. Community-based ecotourism

#	Action	Village*	Priority Rank
33.	Review role of CBCDOs in tourism management	H, K,	Medium
34.	Through CBCDO ensure tourism management in TFZ and LFTA	H, K, M, T	Medium

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

4.8. Institutional Strengthening of Community Organizations

#	Action	Village*	Priority Rank
35	Establish new CBCSDOs in Marzigond and Tallis and restructure CBCSDOs in Hushey and Kanday	H, K	High
36	Develop new bylaws and operational procedures for in Marzigond and Tallis and revise the same for Hushey and Kanday	H, K	High
37	Orientate CBCSDOs on new bylawys and operating procedures	H, K	High
38	Facilitate CBCSDOs in establishing their offices	H, K	High
39	Enhance CSDF in Hushey and Kanday and establish the same in Marzigond and Tallis		
40	Develop a network of CBCSDOs in Hushey valley	H, K	High
41	Develop Conservation and Sustainable Development Plan for Hushey valley	Hushey valley	High

* Name of villages: H=Hushey, K=Kanday, M=Marzigond, T= Tallis

5. Indicators of process and progress

for each of the action that are proposed under 3. These have to be assumed on the basis of any such work done anywhere, in CKNP, KNP or elsewhere to compare of what we get as a result of similar interventions elsewhere

#	Action	Process Indicator	Progress Indicator
5.1. Sustainable Mountain Agriculture			
1.	Improve marketing of high value crop such as buck wheat	New buyers linked to local farmers	Production and sale potatoes, peas and buck wheat increased
2.	Improve post-harvest techniques (processing and packaging) through improved technology and training	Training for local farmers in post harvest techniques of peas, buck wheat or other agro products	Marketing perspectives enhanced for value added products
3.	Vocational centre established for local women to promote local handicrafts (woolen products and rugs) from wool and hair of domestic animals	1 vocational centre established in each village	Enhanced role of local women in household economy
5.2. Pasture management			
4.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	2 research studies (one each in Hushey and Kanday)	Baseline available regarding health, productivity and carrying capacity of pastures
5.	In consultation with local community declare SMPA and initiate controlled grazing	One SMPA in each target village declared with controlled grazing plan	Controlled grazing system in place and adopted by target communities
6.	Train selected herders (those having greater dependency on livestock or those members of the community who remain in pastures quite often) in improved guarding practices in SMPA	1 training event/40 herders trained	Selected herders have adopted improved pasture management measures
7.	Promote cultivation of fodder crop such as alfalfa on individual farmlands	Fodder crop grown on at least 10 ha in each of the target village	Pressure on grazing lands reduced by increasing stall feeding
8.	Improve pavement to selected pastures	1 trail to identified pasture improved in each of the target village	Grazing pressure uniformly distributed among pastures
9.	Develop drinking water points in selected pastures	1 drinking water facility developed in each of the target village	Grazing pressure uniformly distributed among pastures

5.3. Livestock Management			
10.	Strengthen Hushey Vet Dispensary by establishing a basic diagnostic facility, providing needful equipment and required medicine to Hushey vet dispensary	A basic diagnostic facility (a basic laboratory), needful equipment (freezer or cooler, sterilizer, cattle crush) and required medicine have been made available to Hushey veterinary dispensary.	% of domestic animals being treated by the Hushey Vet Dispensary increased
11.	Train livestock extension workers in improved animals husbandry and veterinary care and provide them with basic kits (linked to 12, 13, 14 and 15)	One training (15 days) organized for at least 8 herders from Hushey valley	% Increase in number of beneficiary households getting treatment for their animals
12.	Establish and operationalize a permanent livestock vaccination programme (following guidelines of Ev-K2-CNR vet experts)	Livestock vaccination plan and funds made available in each target village	At least 80% of the livestock going to higher pastures are vaccinated
13.	Improve one cattle shed in each village on demonstration basis (for improved hygiene, feeding, watering to improve animal health and productivity)	One cattle shed in each target village improved for better hygienic conditions	Local community have started to adapt improved structures for newly constructed cattle sheds
14.	Improve primitive corrals to make them predator proof structures	One primitive corral in each target village improved as predator	No incidences of mass killing of livestock inside corrals
15.	Improve breed of local cattle for enhanced productivity and to reduce number of less productive animals	One proven Jersey breeding bull provided to target villages for breed improvement purpose	Increased number of improved breed of local cattle
5.4. Afforestation and Sustainable Forest Management			
16.	Through VWGs/Tsarma/Larava/Norziva ensure ban on cutting of forest trees for timber	Ban on extraction of timber from natural forests	Extraction of timber from natural forests is none
17.	With the help of VWGs/Tsarma/Larava/Norziva, monitor duration, quantity and pattern of fuelwood collection from natural forests as prescribed above in section 3.4.2	VWGs/Tsarma/Larava/Norziva remain on duty during fuelwood extraction period	Duration, quantity and prescribed pattern of fuelwood collection is followed by local people
18.	Hold community-based afforestation campaigns annually in the areas specified in section 3.4.3, reward at least two farmers per village with a cash prize of Rs. 20,000 for highest number of plants in each village	At least 1000 trees are planted in each village every year Every year two farmers/target village rewarded with cash prize of Rs. 20,000	Increased area under tree plantation/No of plants owned by each household increased

19.	Regularly monitor progress on afforestation campaigns carried out by CKNP/WWF under SEED Project	CBCSDO submits annual report to CKNP Directorate regarding tree plantation	Consumption of fuelwood from natural forests reduced and from plantation increased
20.	Introduce fuel-efficient stoves in target villages	At least 50% of the households in target villages use fuel efficient stoves	% reduction in consumption of fuelwood per household
21.	Establish/Repair and operationalize micro-hydel schemes in Hushey valley	MH scheme in Hushey repaired and operational	Local people use electricity from MH scheme of Hushey
22.	Investigate infestation and insect pest on forest trees and adopt appropriate pest management practices	One research study on insect pests of forest trees in Hushey valley	Integrated pest management techniques are applied to control insect pest of forest trees
5.5. Wildlife Conservation			
23.	Maintain VWGs in Hushey and appoint VWGs in Kanday	2 VWGs each at Hushey and Kanday are in place	No poaching or illegal hunting incidences in Hushey and Kanday
24.	Provide basic training to VWGs in monitoring of wildlife	VWGs got basic training of watch and ward and wildlife monitoring	CKNP directorate is getting monthly report from VWGs
25.	Monitor wildlife populations (number and structure) following standard survey protocols for CKNP	Bi-annual wildlife surveys are being conducted for H. ibex and population survey for large predators have been undertaken following standard monitoring protocols	Systematic survey reports are available with CKNP Directorate
26.	Review existing trophy hunting programme in target CMAs (could be a research activity in collaboration with KIU)	An investigative study conducted in collaboration with KIU	Review report available with CKNP Directorate
27.	Manage trophy hunting programme as prescribed above in section 3.5.2		
28.	Enhance allocations for Livestock Insurance Fund	Additional allocations amounting Rs. 500,000 being made to Hushey and Kanday villages	Predation cases are being compensated annually
29.	Train LIMC members and engage CKNP directorate in monitoring of LIMC	One training conducted form LIMC member to monitor LIS	LIMC members are monitoring the predation cases

30.	Minimize livestock grazing in Ibex overwintering areas (linked to action # 5)	Controlled grazing system introduced	No/Duration of Livestock grazing in ibex overwintering areas reduced
5.6. Improvement of water courses			
31.	Construct water channels as prescribed in section 3.6	On new water channel in each of the target location constructed	Increased area under tree plantation and fodder cultivation
32.	Repair water channels as prescribed in section 3.6	On existing water channel in each of the target location repaired	Increased area under tree plantation and fodder cultivation
5.7. Engage CBCDOs in Tourism Management			
33.	Review role of CBCDOs in tourism management	Review report	Plan for CBOs engagement in tourism activities
34.	Through CBCDO ensure tourism management in TFZ and LFTA	Agreement with CBCSDOs for ecotourism promotion	Ecotourism promoted in TFZ and LFTA
5.8 Institutional Strengthening of Community Organizations			
35.	Establish new CBCSDOs in Marzigond and Tallis and restructure CBCSDOs in Hushey and Kanday	CBCSDOs are established or restructured in all the target villages	CBCSDOs have representation of key functionaries as indicated in section 3.8.1
36.	Develop new bylaws and operational procedures for in Marzigond and Tallis and revise the same for Hushey and Kanday	All CBCSDOs have their bylaws and operating procedures	All CBCSDOs are registered with competent government authority
37.	Orientate CBCSDOs on new bylaws and operating procedures	4 orientation sessions conducted	CBCSDO board and management officials are aware of their bylaws and operating procedures
38.	Facilitate CBCSDOs in establishing their offices	Needful support provided to each CBCSDO for office set up	CBCSDO office set up in each target village is available for meeting and office record
39.	Enhance CSDF in Hushey and Kanday and establish the same in Marzigond and Tallis	CSDF amounting at least Rs. 1 million established in each of the target village	CBCSDOs are meeting their expenses of conservation and

			office management from CSDF
40.	Develop a network of CBCSDOs in Hushey valley	A network of CBCSDO established in Hushey valley	The network has active participation in DCC and CKNP Management Committee
41.	Share Conservation and Sustainable Development Plan for Hushey valley for local communities and stakeholder to solicit their technical and financial support	Organized consultative workshops (4 at community level and 1 at other stakeholder level) Present CSDP in DCC Ghanche for approval	CSDP is endorsed by DCC for further implementation

6. Implementation Mechanisms

6.1. Implementation Mechanism

The whole process needs to be facilitated by CKNP Directorate in collaboration with NGOs such as AKRSP, BWCDO, Ev-K2-CNR and WWF. Following steps are important in this regard:

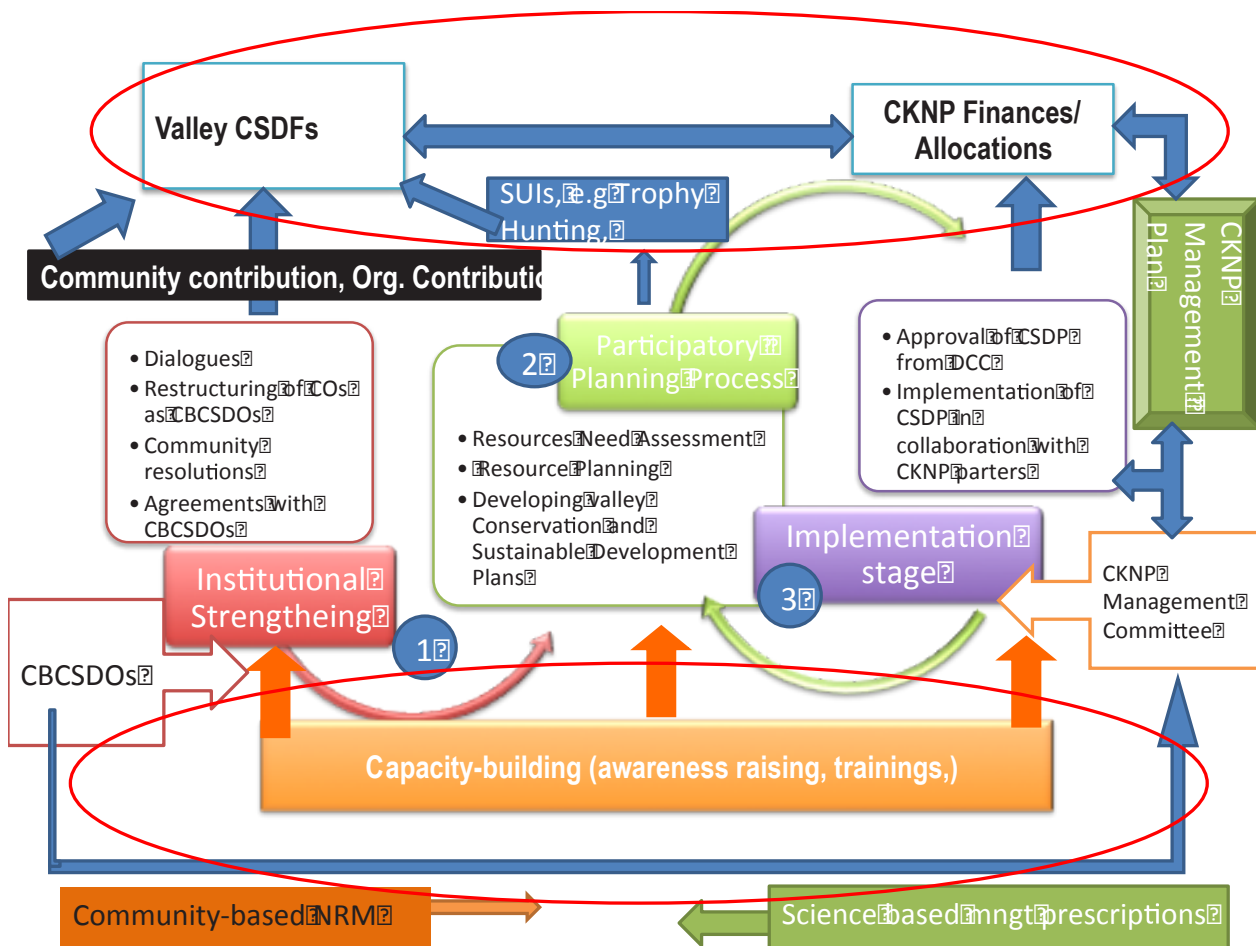
The **first step** should be to reorganization existing partner COs of CKNP into CBCSDOs as prescribed above. In Marzigond and Tallis New CBCDOs need to be established. Agreements should be signed with CBCSDOs for their proactive participation in CKNP Management. The local communities are now well mobilized in support of CKNP. Their representative organizations need to be restructured through consultations and dialogues. After restructuring agreements should be signed specifying roles of the CBCSDOs and CKNP Partners.

The **second step** is participatory conservation planning in which the draft CSDP should be shared with the respective communities (involving VCCs/LMIs, UC members, President of VO and WOs (where possible)); line departments at district level (Agriculture, LS&DD, Forests, Wildlife & Parks, Tourism) and concerned NGOs such as AKRSP, AKPBS, BWCDO, Ev-K2-CNR, WWF) to solicit their technical opinion and possible support during implementation of the plans.

The **third step** is approval of CSDP from DCC Ghanche, facilitates and monitors the implementation on CSDP by regularly holding the subsequent DCC meetings.

There are two crosscutting themes. First is Capacity-building involving awareness raising, trainings and exchange programmes. The second is financial sustainability which comes from various sources, primarily Government allocations for CKNP and subsequently at community level from various sustainable use initiatives such as trophy hunting, ecotourism, CKNP entry fee etc.

The overall implementation schemes is given in the following diagram:



Note: cross cutting themes are given in the red circle

6.2. Available Capacities

Local/Community Level	District Level	Provincial Level
<p>Hushey</p> <ul style="list-style-type: none"> • VCC is functional • Trained human resource in CBNRM • Operational trophy hunting programme • Presence of CKNP Camp office • Presence of VCC office facility • Presence of VCF and other financial resources such as LIF and CKNP entry fee in future • Extensive experience of community-based NRM (since 1997) • Membership of Hushey VCC in DCC Ghanche • Hushey Veterinary Dispensary with trained human resource • Existing VCP Hushey • Kaday • VCC is available but needs to be re-organized • Presence of trophy hunting • Presence of VCF and LIF • Trained human resource in CBO management and wildlife monitoring <p>Marzigond and Tallis</p> <ul style="list-style-type: none"> • Pro-active community, realizing the importance of conservation and sustainable development • Inspired from Hushey and ready to follow them in conservation 	<p>District Conservation Committee Ghanche is functional</p> <p>Line Departments (LS&DD, Wildlife and Parks Department, Forest Department, Tourism Department)</p> <p>Presence of NGOs Spanish supporters</p>	<p>CKNP Directorate</p> <p>CKNP Management Committee</p> <p>GB Wildlife Management Board</p>

7. Expected outputs

By 2020:

7.1. Sustainable mountain agriculture

- 20% increase in annual cash income per household from sale of high value agriculture produce (such a vegetable seeds, buck wheat, Sea buckthorn, etc.) and woollen products

7.2. Pasture Management

- Degradation of pastures stopped by adopting best management techniques

7.3. Improved Livestock management

- At 30% reduction in livestock mortality and morbidity
- Per household livestock productivity increased while reducing number of non-productive animals

7.4. Sustainable forest management

- 40% reduction in consumption of plant biomass from natural forests by adopting better management and alternative sources such as farm forestry and fuel efficient techniques

7.5. Wildlife Conservation and management

- Viable populations of ungulates and predators maintained in the valley while pursuing the trophy hunting programme with ecologically acceptable standards

7.6. Efficient uses of water resources

- Area under plantation and fodder cultivation increased through construction, repair and maintenance of water channels

7.7. Sustainable mountain ecotourism

- Environment friendly tourism in CKNP areas promoted with support of CBCSDOs

7.8. Institutional Strengthening of Community Organizations

- Management and decision making system of community organizations strengthened through integration and capacity enhancement

8. Visible bottlenecks in realizing the expected outputs, and arrangements (available and potential both) to overcome the bottlenecks

#	Outputs	Bottlenecks	Arrangements to overcome bottlenecks
1.	20% increase in annual cash income per household from sale of high value agriculture produce (such a vegetable seeds, buck wheat, sea buckthorn, etc) and woollen products	Lack of market chains	Emerging industry of dry-fruit, vegetable seeds and medicinal herbs in GB Experience of BCDF, KADO
2.	Degradation of pastures stopped by adopting best management techniques	Conventional grazing methods Interest groups among community	Incentives to progressive herders such as improvement of cattle sheds Grazers are paid by local herder thus they can be influenced for controlled grazing
3.	- At 30% reduction in livestock mortality and morbidity - Per household livestock productivity increased while reducing number of non-productive animals	Lack of resources	Enhancing amount of CSDF Engaging trained personnel available within local community Soliciting government's support
4.	40% reduction in consumption of plant biomass from natural forests by adopting better management and alternative sources such as farm forestry and fuel efficient techniques	Free grazing causing damage to newly established plantation Lack of resources for alternative option of domestic energy	Economic reward for farmers achieving highest number of plantation Provision of alternatives of domestic energy on subsidized rates
5.	Viable populations of ungulates and predators maintained in the valley while pursuing the trophy hunting programme with ecologically acceptable standards	Interest groups among local community Human-carnivore conflicts Grazing competition with domestic stock	Linking provision of hunting permit with systematic monitoring of wildlife and spending of trophy hunting amount on specified conservation initiatives A strong community-based watch and ward mechanism Enhancing CSDF
6.	Area under plantation and fodder cultivation increased through construction, repair and maintenance of water channels	Required huge financial resources	Soliciting community participation in terms of free labour and local resources Only to initiative where community needs is genuine and urgent
7.	Environment friendly tourism in CKNP areas promoted with support of CBCSDOs	Priorities of tour operating agencies sometime do not match with local needs and aspirations	Engagement of guides, cook and porters from local communities
8.	Management and decision making system of community organizations strengthened through integration and capacity enhancement	Community interest groups Lack of resources	Rewarding most effective and trustworthy community activists Providing office support to CBCSDOs

9. Monitoring Mechanism

9.1. CKNP Directorate

The major responsibility of monitoring all action of a CBCSDO carried out under the framework of CSDP should be with CKNP Directorate. The CKNP Directorate can monitor their progress in the following steps:

- Visiting individual CBCSDOs and checking their records and verifying physical progress on activities
- Attending DCC meetings and reviewing progress of CBCSDOs annual plans
- Monitoring CBCSDOs performance against their annual plans in the meeting of the CKNP Management Committee

9.2. District Conservation Committee Meetings

The CSDP should be presented in DCC Ghanche and endorsed by the Chairman of DCC with recommendations from CKNP Director. The DCC Ghanche in its bi-annual meeting should review the progress of implementation on CSDP. Each village should have an annual plan to be presented and subsequently reviewed in the DCC.

9.3. Community Agreements

CKNP Directorate or any supporting agency intending to initiate any activity with a CBCSDO should sign a letter of agreement explaining the roles and responsibilities of all parties involved in undertaking the activity. A copy of such an agreement should be made available in CBCSOs office records. The CBCSO management

9.4. CBCSDOs Audit and Record Keeping

CKNP Directorate or any supporting organizations should emphasize on proper record keeping of all activities undertaken by CBCSDOs. Checking monthly minutes sheet, proceedings of the special meetings and financial records of CBCSDOs can do this. It should be mandatory for every CBCSDO to have their annual audit report. Any financial support to a CBCSDO should be linked to availability of annual audit report. The community must have a separate file for all major activities to be undertaken as part of the CSDP. For all major initiatives the CBCSDO should constitute two committees: a) project execution committee and b) project audit committee. Most of the local communities are familiar of this system due to the project of AKRSP.

9.5. CBCSDO Visitors Diary

CBCSDO should maintain a Visitors Diary for noting comments, feedback and observations of all visitors coming to a village in connection with conservation and sustainable

development initiatives. The CKNP Directorate and supporting agencies or organizations should clearly instruct their employees visiting any village of Hushey valley to write down notes in CBCSDOs Visitors Diary. This way the supporting agencies can avoid duplication of efforts and it will be helpful in carrying out the activities systematically and logically. A sample of the visitors diary available with CBCSDOs to be filled in by a visitor can be as following:

For five years (2015-2020)

Visitors Diary

Name of CBCSDO.....

Name of Visitor

Organization/institution

Date of visit

Purpose of visit

Venue of meeting

Meeting participants.....

Key discussions or decision points

.....

.....

.....

.....

...

Required follow up actions

10. Proposed budget for implementation

#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
5.1. Sustainable Mountain Agriculture					
1.	Improve marketing of high value crop such as buck wheat	Business plans	1	250000	250000
2.	Improve post-harvest techniques (processing and packaging) through improved technology and training	Training workshops	2	100000	200000
3.	Vocational centre established for local women to promote local handicrafts (woolen products and rugs) from wool and hair of domestic animals	Vocational Centres	4	800000	3200000
	Sub-total				3650000
5.2. Pasture management					
4.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	Research studies	2	200000	400000
5.	In consultation with local community declare SMPA and initiate controlled grazing	Community consultation workshops	4	20000	80000
6.	Train selected herders (those having greater dependency on livestock or those members of the community who remain in pastures quite often) in improved guarding practices in SMPA	Training workshop	1	200000	200000
7.	Promote cultivation of fodder crop such as alfalfa on individual farmlands	Hectare	20	40000	800000
8.	Improve pavement to selected pastures	Improved trails	3	100000	300000
9.	Develop drinking water points in selected pastures	1 drinking water facility developed in each of the target village	3	300000	900000
	Sub-total				2680000
5.3. Livestock Management					
10.	Strengthen Hushey Vet Dispensary by establishing a basic diagnostic facility, providing needful equipment and required medicine to Hushey vet dispensary	(a basic laboratory), (freezer or cooler, sterilizer, cattle crush) and required medicine	1	1000000	1000000
11.	Train livestock extension workers in improved animals husbandry and veterinary care and provide them with basic kits (linked to 12, 13, 14 and 15)	Training workshop	1	500000	500000

12.	Establish and operationalize a permanent livestock vaccination programme (following guidelines of Ev-K2-CNR vet experts)	Funds	4	200000	800000
13.	Improve one cattleshed in each village on demonstration basis (for improved hygiene, feeding, watering to improve animal health and productivity)	Improved cattle shed	4	100000	400000
14.	Improve primitive corrals to make them predator proof structures	Improved corrals	4	100000	400000
15.	Improve breed of local cattle for enhanced productivity and to reduce number of less productive animals	Proven Jersey bull	3	70000	210000
	Sub-total				3310000
5.4. Afforestation and Sustainable Forest Management					
16.	Through VWGs/Tsarma/Larava/Norziva ensure ban on cutting of forest trees for timber	VWGs Honorarium (Man Months)	240	1000	240000
17.	With the help of VWGs/Tsarma/Larava/Norziva, monitor duration, quantity and pattern of fuelwood collection from natural forests as prescribed above in section 3.4.2	VWGs Honorarium (Man Months)	240	1000	240000
18.	Hold community-based afforestation campaigns annually in the areas specified in section 3.4.3, reward at least two farmers per village with a cash prize of Rs. 20,000 for highest number of plants in each village	Cash Awards	80	20000	1600000
19.	Regularly monitor progress on afforestation campaigns carried out by CKNP/WWF under SEED Project	Visits	20	20000	400000
20.	Introduce fuel-efficient stoves in target villages	FES (subsidized)	200	4000	800000
21.	Establish/Repair and operationalize micro-hydel schemes in Hushey valley	MH scheme in Hushey repaired and operational	1	80000	80000
22.	Investigate infestation and insect pest on forest trees and adopt appropriate pest management practices	Research study	1	100000	100000
	Sub-total				3460000
5.5. Wildlife Conservation					
23.	Maintain VWGs in Hushey and appoint VWGs in Kanday	VWGs Honorarium (Man Months)	240	1000	240000
24.	Provide basic training to VWGs in monitoring of wildlife	Training workshop	1	100000	100000
25.	Monitor wildlife populations (number and structure) following standard survey protocols for CKNP	Wildlife surveys	20	50000	1000000
26.	Review existing trophy hunting programme in target CMCAAs (could be a research activity in collaboration with KIU)	Research study	1	200000	200000
27.	Manage trophy hunting programme as prescribed above in section 3.5.2	0	0	0	0

28.	Enhance allocations for Livestock Insurance Fund	Funds	2	350000	700000
29.	Train LIMC members and engage CKNP directorate in monitoring of LIMC	Training workshop	1	200000	200000
30.	Minimize livestock grazing in Ibex overwintering areas (linked to action # 5)	VWGs Honorarium (Man Months)	240	1000	240000
	Sub-total				2680000
5.6. Improvement of water courses					
31.	Construct water channels as prescribed in section 3.6	Channels (new)	4	1500000	6000000
32.	Repair water channels as prescribed in section 3.6	Channels (repaired)	4	700000	2800000
					8800000
5.7. Engage CBCDOs in Tourism Management					
33.	Review role of CBCDOs in tourism management	Review report	1	50000	50000
34.	Through CBCDO ensure tourism management in TFZ and LFTA	Community consultations	0	0	0
	Sub-total				50000
5.8 Institutional Strengthening of Community Organizations					
35.	Establish new CBCSDOs in Marzigond and Tallis and restructure CBCSDOs in Hushey and Kanday	Consultative meetings	8	4000	32000
36.	Develop new bylaws and operational procedures for in Marzigond and Tallis and revise the same for Hushey and Kanday	Bylaws	4	50000	200000
37.	Orientate CBCSDOs on new bylaws and operating procedures	Orientation sessions	4	10000	40000
38.	Facilitate CBCSDOs in establishing their offices	Office set up	3	200000	600000
39.	Enhance CSDF in Hushey and Kanday and establish the same in Marzigond and Tallis	Funds	4	500000	2000000
40.	Develop a network of CBCSDOs in Hushey valley	Consultative workshops	4	20000	80000
41.	Share Conservation and Sustainable Development Plan for Hushey valley for local communities and stakeholder to solicit their technical and financial support	consultative workshops (4 at community level and 1 at other stakeholder level)	5	30000	150000
		DCC meeting	1	15000	15000
	Sub-total				3,117,000
	Grand total				27,747,000

11. Appendices

Appendix-A Sampling plan for household surveys

Valley	Name of villages for survey	Population (HH)	Sample size (Household heads CI 5, CL 95%)	Number of days	FGD
Hisper-Hoper	Hipser	185	52	0.7	1
	Shakushal	60	17	0.2	1
	Hakashal	250	70	1.0	
	Ratal	150	42	0.6	
	Skamatang	60	17	0.2	
	Broshal	160	45	0.6	
	Goshashal	60	17	0.2	
	Halshal	70	19	0.3	
	Total	995	277	4	2
	%		27.8		
Hushey	Hushey	160	63	0.9	1
	Kanday	155	61	0.9	1
	Marzigond	64	25	0.4	1
	Tallis	209	83	1.2	1
	Total	588	233	3	4
	%		39.6		
Basha	Doghorro	130	45	0.6	2
	Bein	55	19	0.3	
	Zil	45	16	0.2	
	Saisko	125	43	0.6	
	Sibirdi	42	14	0.2	
	Doko	50	17	0.2	
	Bisil	110	38	0.5	
	Niaslo	40	14	0.2	
	Arindu	120	41	0.6	1

	Arindu gond	13	4	0.1	
	Total	730	252	4	3
	%		34.5		
Bagrote	Hamaran	80	13	0.2	1
	Taisote	350	59	0.8	
	Missingote	300	51	0.7	
	Sinaker	150	25	0.4	
	Hopey	120	20	0.3	
	Datuche	200	34	0.5	
	Farfo	300	51	0.7	
	Bulche	250	42	0.6	1
	Chira	150	25	0.4	
	Sub total	1900	320	4	2
	%		16.8		
	Grand total	4213	1082	15.0	11
	%		25.7		

Appendix-B Participants of FGDs in Huhey Valley

#	Hushey	Kanday	Marzigond	Tallis
1.	Ghulam Hussain, President HWDO	Ali Mohammad	Haji Mohammad Ali	Ghulam Hyder
2.	Mohammad Anwar, President VCC	Mohammad Ali	Mohammad Ibrahim	Mohammad Cho
3.	Mohammad Ismail	Mohammad Ibrahim	Mohsin Ali	Haji Mohammad Sadi
4.	Ghulam Mohammad	Mohammad Ibrahim s/o Mohammad	Ali Musa	Mosa Ali
5.	Little Karim	Yaqoob Ali	Mohammad Ali	Ali Hassan
6.	Ghulam Mehdi	Mohammad Nazir	Haji Ali Hussain	Mohammad Sharif
7.	Hassan Sheikh	Mohammad Kaleem	Mohammad Khan	Mohammad Ishaq
8.	Musa Ali	Ghulam Hussain	Mohammad Ishaq	Mohammad Hussain
9.		Mazahir Abbas	Ali Mohammad	Haji Mohammad Hassan
10.		Sakhawat Hussain		Zakir Hussain
11.		Manzoor Hussain		Ali Mohammad
12.		Fida Mohammad		Mohammad Hassan
13.		Anwar Ali		

Appendix-c Template for Monthly Report by VWGs

ماہانہ کارکردگی رپورٹ - ویلج وائیلڈ لائف گائیڈز

رپورٹ برائے ماہ _____ علاقہ _____

۱۔ جنگلی حیات کا مشاہدہ:

نمبر	وقت و تاریخ	قسم جانور	نام جگہ جہاں سے جانور دیکھے گئے	نام جگہ جہاں پر جانور دیکھے گئے	جانوروں کے گروپ کے بارے میں معلومات	ثوابی ساز (ز)	موسم کی صورتحال	مسکن کے بارے میں معلومات
شمار	سروے				نر	مادہ	بچے	میں کی مشاہدہ

نوٹ

- ☆ قسم جانور: آئی بیکس، مارخور، اڑیاں، برفانی چیتا، بھیڑیا، دیگر (نام)
- ☆ موسم کی صورتحال: دھوپ، ابر آلود یا بادل، بارش، بڑا باری برف باری
- ☆ مسکن کی صورتحال: برف سے ڈھکا ہوا، گھاس والی جگہ، بنجر یا پتھر کی جگہ

۲۔ اس مہینے علاقے میں جنگلی حیات اور دیگر قدرتی وسائل سے متعلق رونما ہونے والی غیر قانونی سرگرمیوں پر (ک) کا نشان لگائیں اور درج ذیل جدول کو پُر کریں:

نمبر	سرگرمی	تعداد اور قسم جانور	جگہ جہاں پر یہ واقعہ پیش آیا	کا پیکر کی طرف سے کارروائی	دی سی سی کی طرف سے کارروائی
۱	غیر قانونی شکار ہوا				
۲	جنگلات کی کٹائی میں آئی				
۳	آلود چرائی پر پابندی کی خلاف ورزی ہوئی				
۴	کوئی اور واقعہ				

۳۔ اس مہینے گوشت خورد جنگلی جانوروں کی وجہ سے مال مویشی کوئی نقصان پہنچا؟ ہاں _____ نہیں: اگر ہاں تو درج ذیل جدول کو پُر کریں:

نمبر	نام مویشی مالکان	تعداد اور قسم جانور	جگہ جہاں پر یہ واقعہ پیش آیا	مویشی مالک کا رجسٹر	دی سی سی کی طرف سے کارروائی
۱					
۲					
۳					

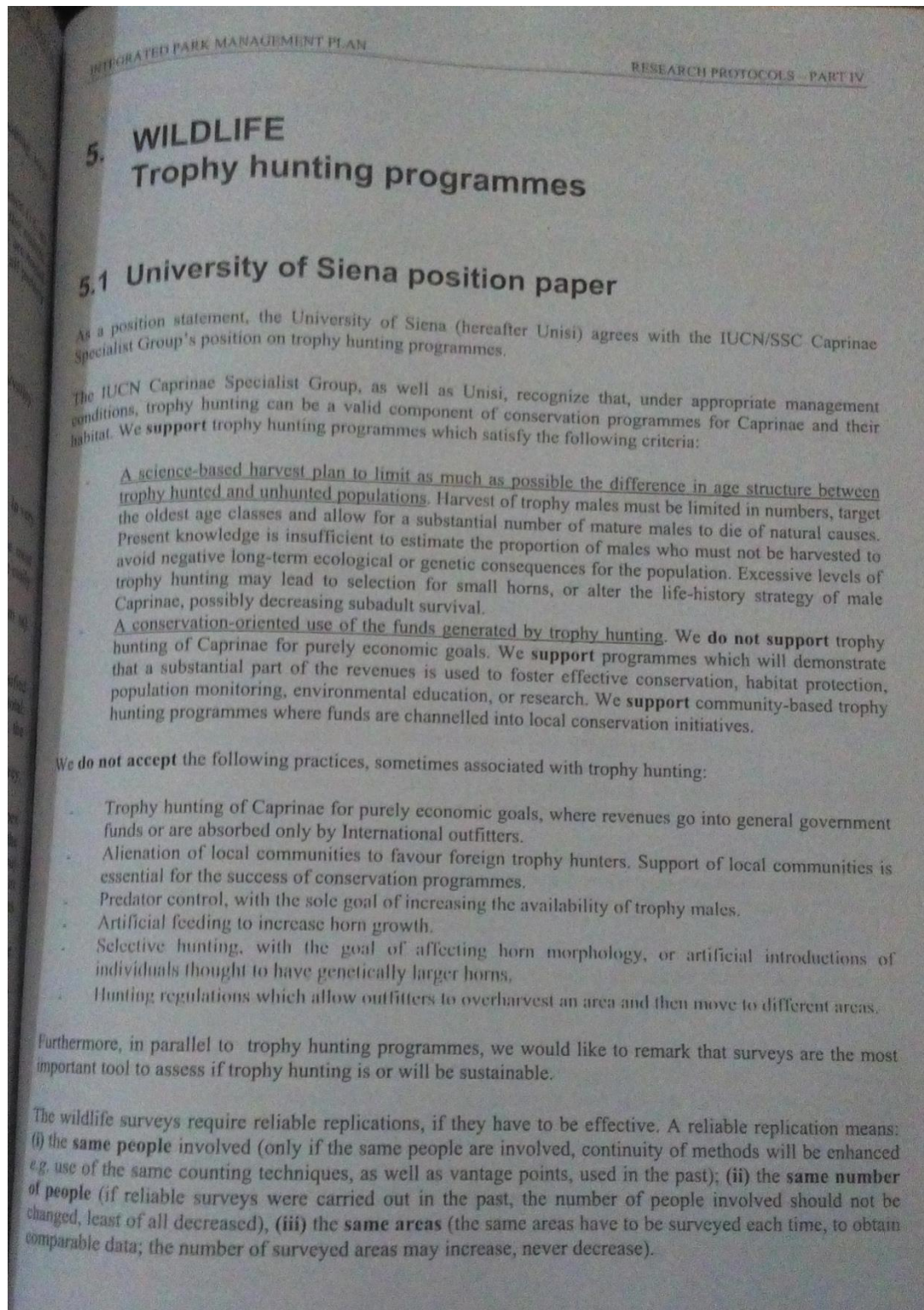
نام و دستخط گائیڈ ۱۔ _____ تاریخ _____ نام و دستخط گائیڈ ۲۔ _____ تاریخ _____

نام و دستخط گائیڈ ۳۔ _____ تاریخ _____

تصدیق کیجیاتی ہے کہ گائیڈ نے مقررہ فرائزش کی انجام دہی کی ہے۔ ہم اس کی کارکردگی سے مطمئن ہیں اور سفارش کیجاتی ہے کہ ان کا مشاہدہ ادا کیا جائے۔

چیرمین / صدر ویلی کنزرویشن کمیٹی _____ نام و دستخط _____ تاریخ _____

Appendix D. Position paper on trophy hunting developed by CKNP wildlife experts from UNISI duly endorsed by Caprinae Specialist Group of the Species Survival Commission of IUCN



Wildlife surveys: standardization of methods and periods for CKNP Area

3.1 Standardize data collection

In order to enhance collaboration among stakeholders working on Wildlife in CKNP area and to make data available for all partners, a standardized data collection should be considered. Therefore priority valleys for CKNP management should be agreed and for each valley specific action plans should be developed mentioning specific tasks, roles, sharing of resources and costs. Data collection and filing should be carried out in a standardized way.

Methods, data and objectives of surveys should be shared among all the stakeholders (i.e. if surveys are carried out to set up a trophy hunting programme, the goal of the survey has to be clear to all the interested organizations).

The basic concept is to operate with the same methodology and in the same periods for the wildlife surveys.

3.2 Proposed Wildlife Surveys

Survey team

Each survey team should be made up by groups composed by 1 to 3 members. For each valley to be surveyed the number of people involved will be function of the extension of the area to be surveyed.

Wildlife surveys require reliable replications, to be effective. A reliable replication means: (i) the **same people** involved (only if the same people is involved it will be easy to find out the same vantage points used in the past) – it is important that at least *1 person for each group* (team=all the people involved in the wildlife survey; group=part of the team attending specific areas of the selected valley) *is the same than in the previous survey*; (ii) **same number of people** (if reliable surveys were carried out in the past, the number of people involved should not be changed, least of all decreased), (iii) **same areas** (the same areas have to be surveyed each time, in order to obtain comparable data; the number of surveyed areas may increase, never decrease).

Planning

A good planning is essential to obtain reliable wildlife surveys, and then reliable data. Therefore, an effective organization of wildlife surveys (where to go, how many people and how many teams) should be planned well in advance, following the organisation of previous surveys.

For this purpose, a valley specific action plan should be drafted and shared 1-2 weeks before the surveys, in order to inform the other stakeholders working in the area about the planning. This document has to mention vantage points to be used (a map should be attached), people involved, days of the survey, specific tasks, roles, sharing of resources and cost by each partner.

Requirements during survey

The following items will be required during the wildlife survey: camera, binoculars, spotting scope, altimeter, compass, data sheet, GPS, tents, sleeping bags, food items, map of the area.

If the planning is well done and the number of groups and vantage points known well in advance (i.e. we know, by now, that 3 groups are needed for the Nar valley, therefore a team of 9 people), also the material retrieval (each group has to be provided by 1 compass, 1 GPS and 1 spotting scope; i.e. if 3 teams are needed to survey the Nar valley, 3 GPS, 3 spotting scopes and 3 compasses should be available) among all partners will be easier.

Objectives of the survey

1. To count and estimate the population of Himalayan ibex and Markhor in the catchment area/valley.
2. To record any other wildlife species observed in the area.

Methodology of the survey

1. Surveys should be normally carried out twice a year, on May and December (approximately). In very few areas, surveys will be carried out only in Autumn, because of difficult access in spring.
2. Surveys should be carried out early in the morning and/or late in the afternoon because most ungulates, *i.e.* ibex and markhor, are active and graze during these parts of the day and can be easily sighted.
3. Vantage points should be established taking GPS references (WGS84-UTM system; dd mm ss). Binoculars and spotting scope will be used to scan wildlife in the area.
4. A camera should be used to take photographs of pastures where observations are carried out.
5. Direct counts should be used to determine wildlife numbers. The herds seen will be further classified into different age and sex classes (males, females, yearling, kids and undetermined individuals, total; among males, a separate count on trophy size individuals will be made). In autumn counts, the number of kids will be a very useful population parameter to assess reproductive rate.
6. For all wildlife monitoring surveys, the same vantage points, established during the first field survey, should be used. It is paramount to get involved the same people.
7. While using the same vantage points each year, if a certain pasture in one year has an ibex population/herd and, in the next survey season, no ibex herd is seen in the same pasture, from the same vantage points (VP), we should note down that VP and pasture. We should not ignore that but we should write real zero in that place. This will show that the same pasture has been visited in consecutive years. This information will help to analyze data, e.g. the impact of different variables on the ibex population etc.
8. For each observation, also the distance (roughly estimated) and the angle to the North (using the compass) should be useful to locate the herd.
9. Investigation through a questionnaire and general discussions with the local people, shepherds and former hunters living in the village/valley (10% of the population of the Valley – randomly selected) should be carried out.

Conservation and Sustainable Development Plan 2016 – 2026

Daghoni Valley

Central Karakorum National Park

Gilgit Baltistan



CONSERVATION AND SUSTAINABLE DEVELOPMENT
PLAN 2016-2026
DAGHONI VALLEY
CENTRAL KARAKORAM NATIONAL PARK
GILGIT-BALTISTAN



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For Ghanche in..... meeting of DCC Ghanche
Held.....

Dated.....

CONTENTS

Abbreviations	i
1. Introduction Of Dagboni Valley.....	1
1.1. Ecological Profile of Dagboni Valley	2
1.2. Socio-economic Profile of Dagboni Valley.....	2
1.2.1. Demography of Dagboni Valley.....	2
1.2.2. Road Access.....	3
1.2.3. Education Facilities.....	3
1.2.4. Health Facilities.....	3
1.2.5. Veterinary Facilities.....	4
1.2.6. Electricity	4
1.2.7. Social Organization System.....	4
Assessment of Customary Practices for sustainable use of natural resources in.....	5
Context of Indigenous Knowledge	5
1.2.8. Gender Impact.....	5
2. Assessment of Customary Practices for sustainable use of natural resources.....	9
2.1. Requirement of Revitalization of Indigenous Knowledge	9
2.2. Water.....	9
2.3. Agriculture	11
2.4. Livestock.....	13
2.5. Pastures	16
2.6. Fuel Wood Collection/ Timber Harvesting.....	18
2.7. Mining.....	20
2.8. Tourism.....	20
3. Assessment of Climate change impact on natural resources	23
3.1. Climate Change in the Perspective of Indigenous Knowledge	23
3.2. Temperature Variability and Seasonal Shifts	23
3.3. Precipitation.....	24
3.4. Drought.....	24
3.5. Flood.....	25
3.6. Landslides.....	26
3.7. Pastures	28
3.8. Biodiversity	28
3.8.1. Agriculture and Fruits	28

3.8.2.	Forest.....	29
3.8.3.	Wildlife and Associated Biodiversity	30
3.8.4.	Fishery.....	31
3.9.	Water.....	31
3.10.	Tourism	31
4.	Management issues and problems.....	37
4.1.	Agriculture	37
4.2.	Pasture.....	38
4.3.	Water.....	39
4.4.	Forest and NTFP Issues	40
4.5.	Eco-tourism.....	41
4.6.	Mining.....	41
4.7.	Wildlife and Protected Areas.....	41
5.	Proposed Management Interventions.....	45
5.1.	Agriculture	45
5.2.	Pasture.....	47
5.3.	Water.....	49
5.4.	Forest and NTFP	49
5.5.	Eco-tourism.....	50
5.6.	Wildlife and Protected Areas.....	51
6.	StatuAry vs Customary Practices in Daghoni Valley	52
7.	Recommended Action Plan for Daghoni Valley	54
8.	Implementation and Monitoring Mechanism.....	62
8.1.	Implementation Mechanism.....	62
8.2.	Monitoring Mechanism.....	62
8.2.1.	CKNP Directorate	62
8.2.2.	District Conservation Committee Meetings.....	63
8.2.3.	Community Agreements.....	63
8.2.4.	CBCSDOs Audit and Record Keeping.....	63
8.2.5.	CBCSDO visitor diary	63
8.2.6.	Relevance in Assignments.....	63
8.2.7.	Network of CBCSDOs	63

LIST OF EXHIBITS

Exhibit 1: Drawing by school student	1
Exhibit 2: Map of Daghoni Valley.....	1
Exhibit 3: Village locations of Daghoni Valley.....	1
Exhibit 4: Stands of Juniper in Daghoni.....	2
Exhibit 5: Demographic profile of villages of Daghoni Valley, 2016.....	2
Exhibit 6: Demographics of Daghoni Valley, 2016.....	3
Exhibit 7: Socio-economic profile of Daghoni Valley.....	4
Exhibit 8: Flowing River to provide water to community	9
Exhibit 9: Land cover map of Daghoni Valley	10
Exhibit 10: Agriculture field terrace	11
Exhibit 11: Economic benefits of agriculture production in Daghoni Valley.....	12
Exhibit 12: Need fulfillment by agriculture in Daghoni Valley.....	13
Exhibit 13: Livestock in pasture shed	13
Exhibit 14: Contribution of livestock in economics of Daghoni Valley.....	15
Exhibit 15: Livestock population and income of Daghoni Valley, 2016	15
Exhibit 16: Assessment of grazing pressure from each livestock classes on pastures of Daghoni Valley.....	16
Exhibit 17: Grazing pressure by livestock on pastures of Daghoni Valley.....	17
Exhibit 18: Timber harvest from nearby forest reserve	18
Exhibit 19: Fuel harvest by local community.....	18
Exhibit 20: Timber harvesting and use at Daghoni Valley	18
Exhibit 21: A summary of fuel wood harvest and consumption at Daghoni Valley.....	19
Exhibit 22: Annual fuel wood harvest, Daghoni Valley	19
Exhibit 23: Details of fuel wood harvested per household from several sources (Mg/HH/yr).....	20
Exhibit 24: Snow fed channels with low water level	24
Exhibit 25: Dry weather conditions	25
Exhibit 26: Landslides in mountainous patches	26
Exhibit 27: Climate change at Daghoni Valley in the perspective of indigenous knowledge.....	27
Exhibit 28: Impact of climate change on pastures of Daghoni Valley.....	28
Exhibit 29: Forest of Daghoni Valley	29
Exhibit 30: Impact of climate change on biodiversity of Daghoni Valley.....	32
Exhibit 31: Unsustainable harvest of forest trees.....	40

Abbreviations

°C	Celsius
ABG	Annual Biomass Growth
CAI	Current Annual Growth
CKNP	Central Karakoram National Park
CPEC	China Pakistan Economic Corridor
E	East
EIA	Environmental Impact Assessment
FGD	Focus Group Discussion
GB	Gilgit-Baltistan
GLOF	Glacier lake outburst flood
HH	Households
INGO	International Nongovernmental Organization
Kg	Kilograms
KIU	Karakorum International University
LSO	Local Support Organization
m a.s.l.	Meter above sea level
Mg	Mega grams
MP	Management Plan
N	North
N/A	Not Applicable
NGO	Non-governmental Organization
NTFP	Non-Timber Forest Product
OP	Operational Plan
S	Summer
SEED	Social Economic Environmental Development
UC	Union Council
VCC	Valley Conservation Committee
VCF	Valley Conservation Fund
VCSDP	Valley Conservation and Sustainable Development Plan
VCSP	Valley Conservation Sustainable Plan
VO	Village Organization
W	Winter
WO	Women organization
Yr	Year

1. INTRODUCTION OF DAGHONI VALLEY

Daghoni valley of CKNP comprises of two main UC Daghoni and Kharkooo, Tehsil Khaplu in Ganche district. The valley is situated along the Indus River for some 15 km distance from the Khaplu district head quarter laying on an average altitude of some 2500 meters from the sea level. The two main villages (Daghoni & Kharkoo) cover a large plan area having some fifteen main settlements, and largely depends on agriculture.



Exhibit 1: Drawing by school student



Exhibit 2: Map of Daghoni Valley

Exhibit 3: Village locations of Daghoni Valley

Villages	Coordinates		Elevation (m asl)
	N	E	
Daghoni	35°38'36.5"	75°18'11.9"	2746
Kharkoo	35°36'59.5"	75°18'06.5"	2512

1.1. Ecological Profile of Daghoni Valley

Daghoni is a beautiful valley with lovely terraced fields developing a wide range of yields. It shapes the passage to the considerable mountain pinnacles of the Karakoram. The valley has an amazingly beautiful scene, and possesses large amounts of natural product, for example, grapes, peaches, pears, walnuts and apricots. The valley offers a stunningly contrasting landscape – rocky, barren cliffs, cultivated terraces, and orchards all around.



Exhibit 4: Stands of Juniper in Daghoni

The biodiversity of the valley is adapted to harsh and varied climatic conditions and topography. Besides this, there is a rich diversity of habitats e.g., Lakes, springs, small rivers and streams, sub alpine and alpine meadows, steep mountain slopes, cultivated fields, roadsides and permanent glaciers etc., Which supports a rich and equally diverse floristic wealth. Wildlife species such as Ibex is still in abundance. Moreover, *Picea smithiana* mixed with *Pinus wallichiana* and Juniper stands are still present in some lateral parts. These forests are the sources of consumptive and non-consumptive uses as reported by the local community. Unlike other communities these forests are co-managed between the villages.

1.2. Socio-economic Profile of Daghoni Valley

1.2.1. Demography of Daghoni Valley

According to the survey results conducted for VCSDPs of CKNP villages, total number of households is 1500 containing 13200 total population (51% female and 49% male) with an average household size 8.85 per household. All these villages are based around the buffer area of CKNP which spans 2757.88 m² and serves as reserves of natural resources for the local people and transitional area between the park and local communities. This local community depends heavily upon natural resources, both for subsistence and income.

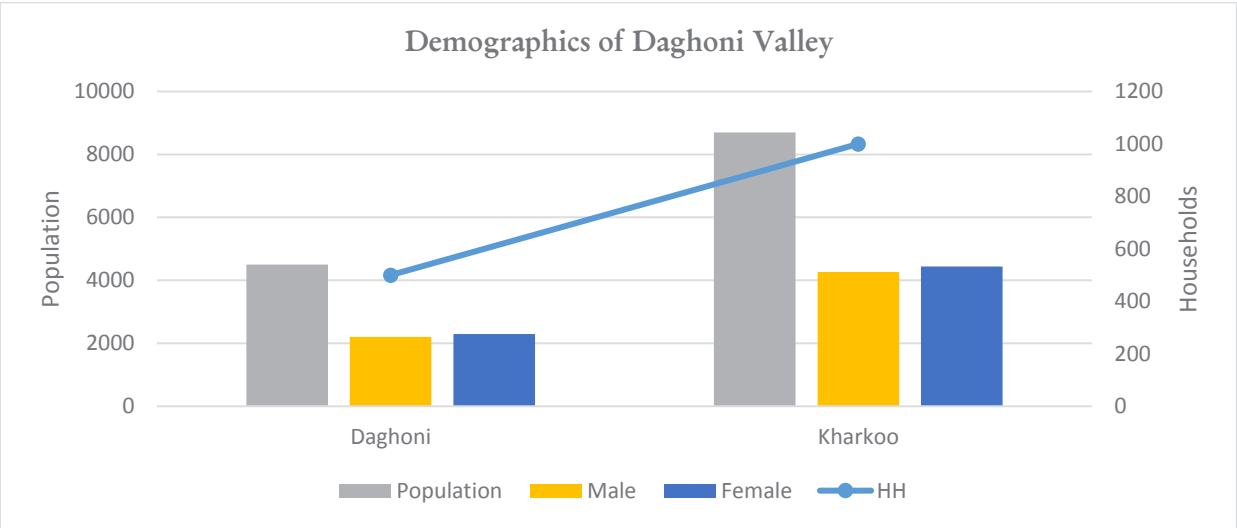
Exhibit 5: Demographic profile of villages of Daghoni Valley, 2016

Village	HH	Av. HH size	Population	Male	Female	Male: Female
Daghoni	500	9	4500	2205	2295	0.9:1.0
Kharkoo	1000	8.7	8700	4263	4437	0.9:1.0
Total	1500	8.85	13200	6468	6732	0.9:1.0

1.2.2. Road Access

In Dagthoni Valley the condition of the road is a bit different than that of the other CKNP valleys unlike other valleys is nearer to the main road, connected through a suspension bridge directly to the main road. The road was unpaved, but in the current year work is in progress to metal it, however, focal bridge connecting the valley to the outer world is a suspension bridge and is serving heavy vehicles to pass on, which is hindering smooth transportation of agriculture products to the local and domestic market.

Exhibit 6: Demographics of Dagthoni Valley, 2016



1.2.3. Education Facilities

Education facility in the Dagthoni valley in comparison to other CKNP valleys is better than other valleys. Government high schools are available in both villages and primary schools in different towns are available, while private schools up to class 8th are also serving the communities in both villages. However, Girls high schools is not available in Kharkoo and the female students have travel to the Dagthoni village by foot to access high school. Capacity building of teachers through various professional trainings is a key need in order to ensure quality education in the area.

1.2.4. Health Facilities

A ten-bed government hospital is established in a Dagthoni village in the recent past, equipped with basic equipment and paramedical staff. The hospital serves the population of both villages and other villages in the surrounding, such as Balghar village and the entire population of Thalay valley. A dispensary in Kharkoo village is actively serving the community for basic health need, but the insufficient availability of medicines in the dispensary always remains an issue, reported by the community. Though the facilities exist in the area, but the services are limited to pact with minor health cases only. Certainly, there is need of adding up a component in the hospital

and dispensary to promote awareness regarding health and Hygiene related practice in the valley.

1.2.5. Veterinary Facilities

There is no veterinary facility in the Daghoni village for an estimated 500 households, seeking veterinary facilities in the neighboring village Balghar. In Kharkoo village a single veterinary dispensary is serving one thousand households, which is insufficient for the entire population. Goat pox, Enterotoxaemia (Goat, sheep and cattle), Black quarter, Mange (Large animal's cattle, yak, zozomo) are the common disease reported in livestock. According to the FGD interviewees, community members most often carry out vaccination of their livestock by themselves.

Exhibit 7: Socio-economic profile of Daghoni Valley

Village	Education facilities				Health facilities		Veterinary facilities	Electricity
	Category / Level	Ownership	Geographic Location	Gender	Facility	Geographic Location		
Daghoni	High school	Govt.	35°14'40.6" N 75°11'59.5" E 2484 m asl	Both	Hospital	–	No	Yes
Kharkoo	High school	Govt.	35°14'51.1" N 75°13'39.9" E 2481 m asl	Boys	Dispensary	35°14'27.9" N 75°14'07.5" E 2494 m asl	Dispensary	-do-

1.2.6. Electricity

All the villages in Daghoni valley have the access to electricity facility provided and managed by Water and Power Department, GB but supply-demand lapse is managed by load shedding. The frequency of load shedding increases in winter with increase in demand to maintain the indoor temperature and decreased production due to water scarcity. Local community residing around CKNP manages this electricity shortage by harvesting wood as a fuel source from the National Park.

1.2.7. Social Organization System

Traditional Governance system unfolds two tiers; within the households and within the village. Within the ambit of the social structure at household level, the basic residential/economic unit is the joint family. Typically, this unit includes an elder's household with his married sons' families. Married sons generally live in their father's household, with the latter or the eldest brother exercising authority over the extended family. The authoritative head of the household has the responsibility and authority to make decisions on behalf of the entire household.

members. It is within the joint family that the primary solidarities lie for daily economic activities. This customary practice of joint family system fairly justifies the lower average increase in households and higher average increase in population.

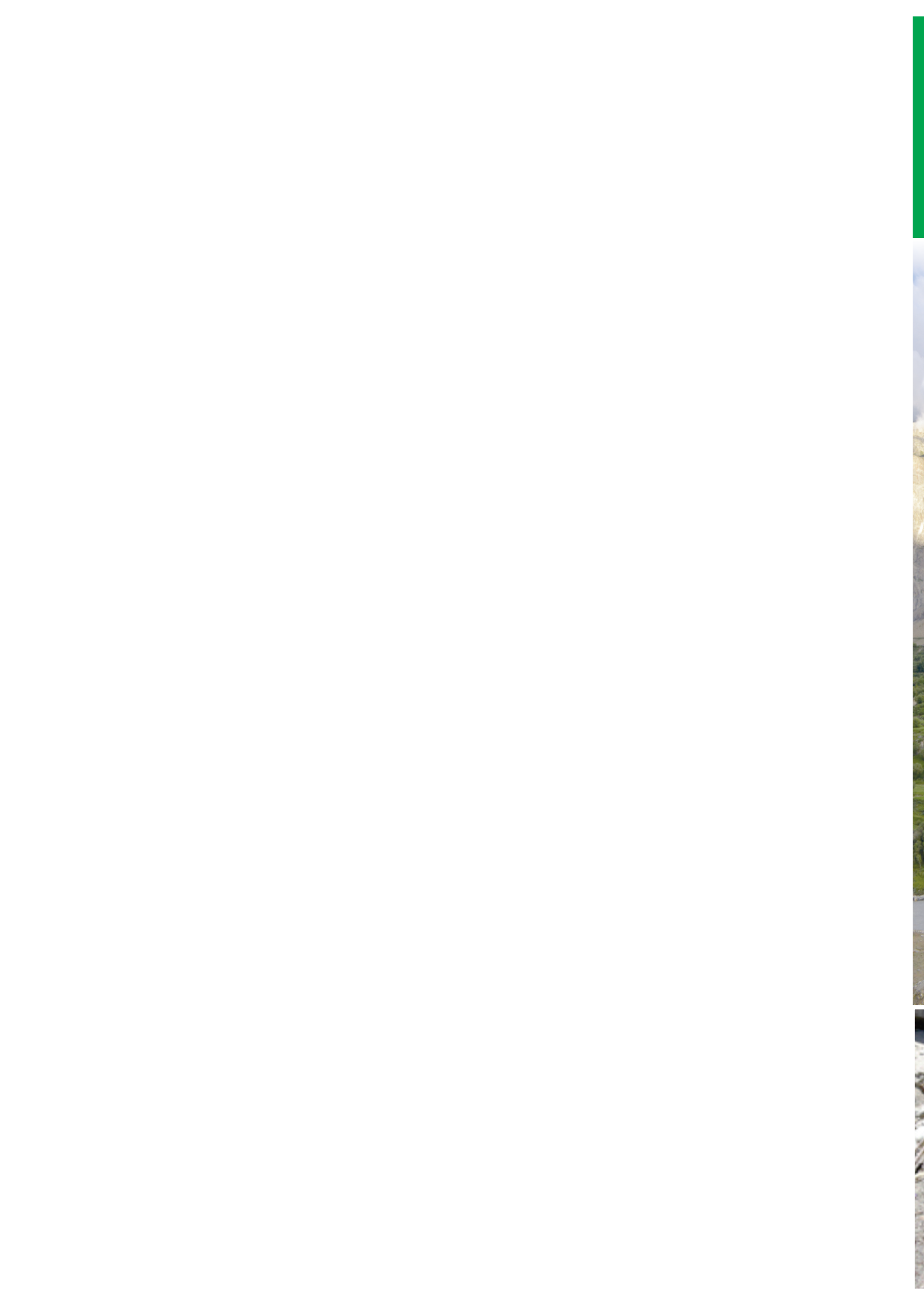
The whole buffer zone of CKNP is full of villages having rugged topography, jagged mountains, harsh climate and disaster-prone areas. In this situation, local community helped themselves by establishing and maintaining the local support organization in order to explore and enhance the developmental opportunities for the areas. They were established back in 1980 under the awareness and efforts of working NGO's and INGO's at time, but maintained and managed by the local communities as an integral social component. It serves as an umbrella for VCCs, VOs, and WOs. This organization contains the members from all the regional organizations and jurisdiction spans upon the watersheds at the village/valley level. Their function is equivalent sharing and support of the developmental opportunities in the area.

Social organizations such as LSO and its sub organizations V/WOs exists in the valley with active status. Daghoni LSO considered among the best LSOs in Baltistan, which has implemented several successful projects in collaboration with different agencies and the management have obtained considerable exposure through participating in national and international level workshops and conferences. The success of the LSO is highly dependent on the active participation of W/WOs, the successful implementation of projects by LSO reflects activeness of the V/WOs working under it supervision. Community rates performance of the social organization as satisfactory. Community is of the view that the LSO has yet not gained the technical and financial capacity to hunt funds on its own but only implements the projects outsourced by other agencies. Conservation related initiatives by the social organization is yet insufficient, though different ideas are crafted in the five-year plan of the LSO but almost zero implementation took place. It was recommended by the FGD participants that technical capacity of the LSO management needs to be developed in proposal writing in order to access funds through assessing problems and needs of the valley with special focus on conservational activities.

1.2.8. Gender Impact

Daghoni valley offers of very restricted mobility leading them to limited participation in socio-economic activities. Education attainment was not common for females, but now the scenario is changing and social environment of the valley is supporting girls and women to seek education. In comparison to the past a decade, women's involvement in socio-economic activities have improve currently and with increasing access to education the opportunities are expected to flourish more in the future. With the tremendous change now females can also earn for families by joining job that does not involve lots of interaction with male society e.g. teaching, nursing.

Role of women's role is very similar to that of the surrounding valley, whereas women's primary responsibilities at house is to look after livestock, cooking and working in the farm field, wood and water collection – more so within their own yards.



ASSESSMENT OF CUSTOMARY PRACTICES FOR SUSTAINABLE USE OF NATURAL RESOURCES IN CONTEXT OF INDIGENOUS KNOWLEDGE



2. ASSESSMENT OF CUSTOMARY PRACTICES FOR SUSTAINABLE USE OF NATURAL RESOURCES

Local community inhabited this land since forefathers and practices their own set of rules known as customary/custodian rules/practices which were formed before the statutory laws even before the creation of Pakistan. These laws passed from generation to generation by words and hardly been written anywhere.

Local communities have long histories of interaction with the natural environment. With the passage of time the land use priorities changed and resulted in differential dependence upon natural resources by each community and even varied personally. Allied with many of these communities is a collective organization of knowledge, expertise, practices and emblematic depiction. These refined sets of understanding, elucidation and connotation are an integral component of a cultural complex that incorporates language, nomenclature, resource use practice, cultural and world view. This local and indigenous wisdom is a key resource for empowering communities to exploit natural resources in sustainable manners to ensure its continuation for next generations.

2.1. Requirement of Revitalization of Indigenous Knowledge

Indigenous people are the custodian of customary systems. These people are well informed about their own circumstances, their resources, what works and what does not work. They are also aware of the possible impact of a change in one factor on the other parts of the environment, but the issue highlighted by the local community during the interviews is that they are unable to assess and adapt to environmental changes as fast as its happening. This provokes the need of awareness raising and revitalizing the indigenous knowledge in a way that allows these people to adapt to their environment and let them able to reciprocate the disastrous changes steadily

2.2. Water

Daghoni valley has adequate water supply from the main stream in the middle and small water streams from both sides of mountainous terrain. The overall water availability is sufficient to cater required need of the valley; but during the peak season flood and landslides damage the irrigation channels and create water shortages.



Exhibit 8: Flowing River to provide water to community

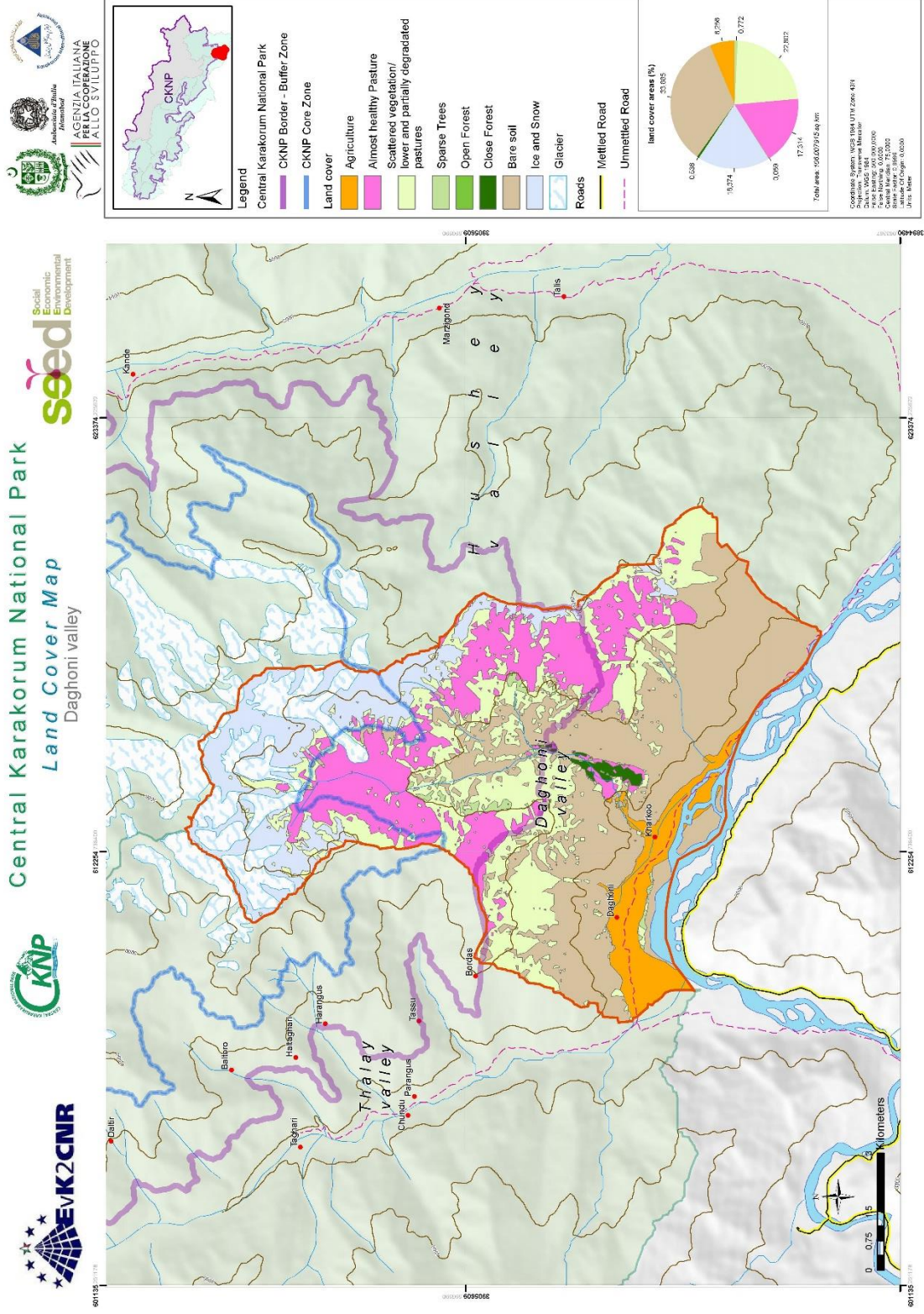


Exhibit 9: Land cover map of Daghoni Valley

The customary laws are not regularly practiced due to the abundance of water in the area for irrigation, but a very different rule is being followed while the shortage of water in case of irrigation channel blockage, which is unique of its kind in all CKNP valleys. The customary rule allows households near the water sources to use water of area without prior intimation and this their customary right. Owing to the poor edifice of existing irrigation channels and absence of irrigation channels near agriculture area's productivity is affected. Since water channel blockage is due to flood in the source stream, the suggested actions are to improve the structure of water channels near the sources and construct concrete walls on the sides of the stream.

2.3. Agriculture

Agriculture and livestock herding are two most preferred economic activities in Dagboni valley. A significant proportion of the part time farmers in some villages earn supplementary income from off-farm income sources such as government & private sector employment, small scale business and tourism. The role of women is significant in agriculture farms. Division of labor exists between both genders throughout the summer. Men



Exhibit 10: Agriculture field terrace

mostly performs the cultivation activities (land preparation, sowing, and preparation of irrigation channels) with minor assistance from women while in harvesting season both works. Agriculture activities, such as irrigation of farms, fodder collection and storage for the winter season are performed by females of the house.

Dagboni valley falls in double cropping zone. The main crops in this zone are Wheat, Potato and Barley, however fodder is cultivated as a second crop. Owing to dependence on agriculture for subsistence, large landholding richly supplied by water is common, still wheat production hardly fulfill consumption per household for six to seven months and the gap is filled by purchasing wheat from government wheat reserve/subsidiary or the market. Potato is the only cash crop which is sold in the market to cash earns income.

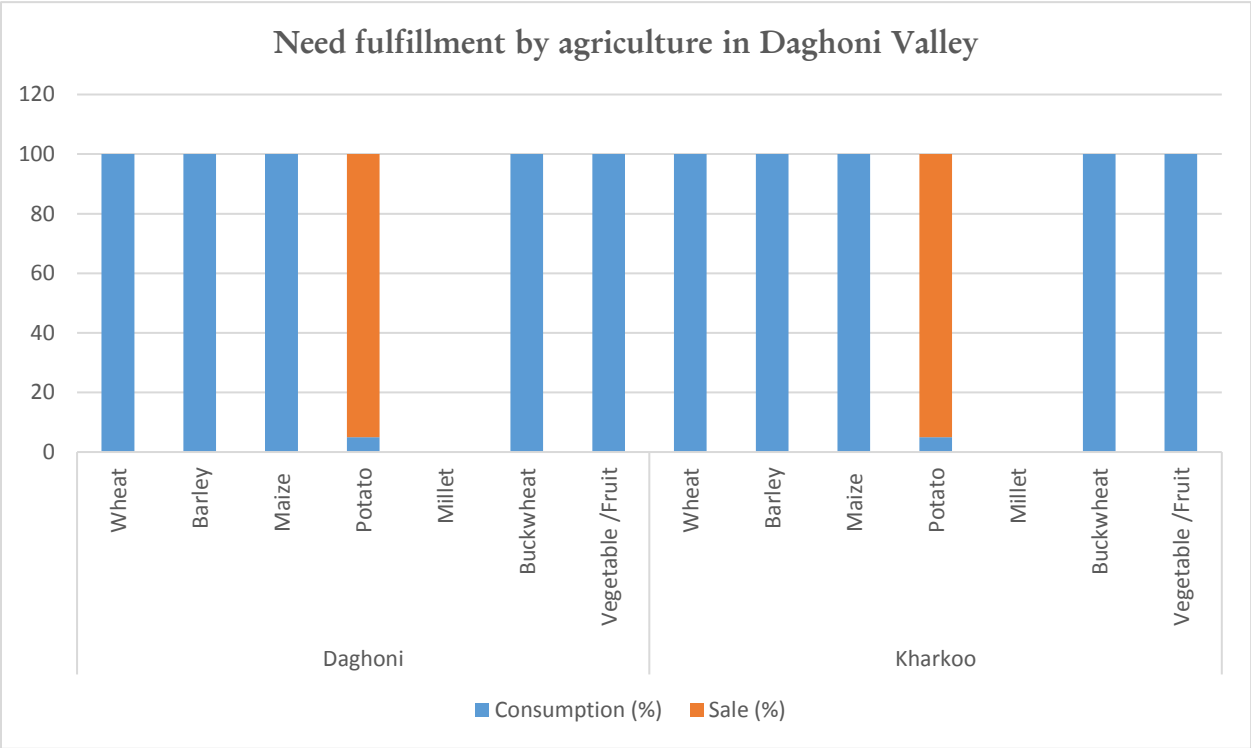
Exhibit 11: Economic benefits of agriculture production in Dagthoni Valley

Village	Kind of Crops	Consumption (%)	Sale (%)	Av. Income/HH
Dagthoni	Wheat	100	0	50000
	Barley	100	0	
	Maize	100	0	
	Potato	5	95	
	Millet	0	0	
	Buckwheat	100	0	
	Vegetable /Fruit	100	0	
Kharkoo	Wheat	100	0	50000
	Barley	100	0	
	Maize	100	0	
	Potato	5	95	
	Millet	0	0	
	Buckwheat	100	0	
	Vegetable /Fruit	100	0	

Almost in all villages significant portion (approximately 75%) of potato is sold while the rest is stored for household consumption. Buckwheat is currently as growing as an emerging cash crop, though in some villages of the valley farmers grow it, but use it for domestic purpose too, however there is high potential for buckwheat as a cash crop as high demands in the domestic exists. A part of the received income is spent on purchase of wheat from market to fill the gap. Although there is great potential available for fruit production in the valley, but due to lack of awareness on value addition, packing and marketing fruit products and vegetable are not mostly not sold.

Though the valley is rich in water resources supplied by the Indus River and nearby streams, but due to poor irrigation infrastructure in many villages water is not largely available. Water wherever available mostly utilized in the day time for farm irrigation and in the night time it is used to irrigate orchards, plantation areas and farm fodder lands. A considerable area of cultivable/barren land is available in the core valley and some side areas, but the community is lacking communal efforts, coupled with the scarcity of financial resources to bring it under cultivation. With increasing livelihood needs, individual households are working on land reclamation by expanding agriculture by altering land use. Land under natural forest and vegetation cover are being cleared for agriculture practices.

Exhibit 12: Need fulfillment by agriculture in Daghoni Valley



2.4. Livestock

Animal rearing serves as a "living bank" in terms of food and cash. Investment in livestock herding has a wide portfolio of animals: cattle, goats, sheep, donkeys, mules and poultry. This is supplemented in some areas with domestication of yak and hybrid yak. Livestock mobility, dispersion, shifting of households, utilization of pastures are adaptation strategies for livestock herding. However, the livestock population highly depends on alpine & subalpine pastures, and rangeland due to insufficient fodder from the agriculture fields. Moreover, the pastorals also collect fodder from pastures during spring summer season and store it for the over-wintering.

Livestock rearing trend decreased considerably during last ten years owing to less economic return for the following reasons.

- 1. Most working class of today has grown up and been educated. Many of them never return, but stay in town and join alternative livelihood options.
- 2. Daghoni valley has prolonged winters and very short summer and spring season. The temperatures drop below the



Exhibit 13: Livestock in pasture shed

freezing point resulting dried out vegetation cover and snow-covered pastures. Pastorals face scarcity of fodder for livestock due to which animals produce a reduced amount of meat. Weak animals cause the economic capsizal for the owner.

3. Pastorals know about the changing climate, but they are neither adapted to it, nor do they know how to adapt and mitigate the effects of climate change for sustainability. New veterinary diseases are befalling in the villages at exponential rates during the last 10 years due to climate change. Aided to this lack of sufficient vet facilities, medicines and vaccines increased livestock mortality. Pastorals have almost no or very little information about the precautionary measures and vaccines and faces economic loss ultimately.
4. Customary practices are not very efficient to control disease spread among herds. Infectious agents spread from common grazing areas such as pastures, water points and other such places. Pastorals that rear livestock often lack the information about the zoonotic diseases and get infected from diseased animals.

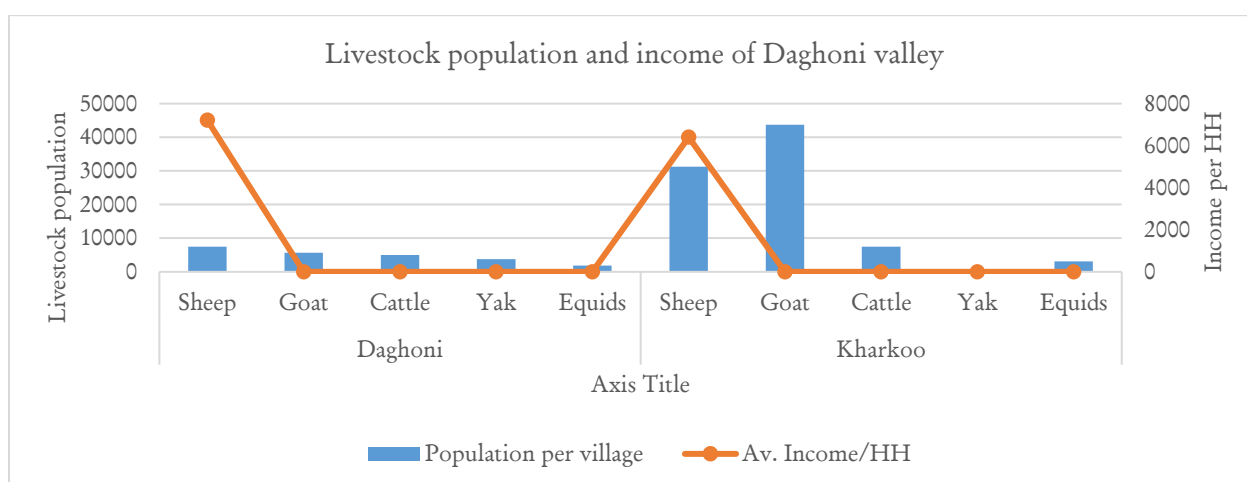
There is a huge dependence of livestock on the pastures for fodder. With the increase in human population and ultimately livestock population the pressure has been increased, the subsequently health of pastures is decreasing. There is no assessment about the carrying capacity of pastures and therefore no rules exist about the maximum number of livestock in the pastures neither in customary rules nor in statutory laws.

Exhibit 14: Contribution of livestock in economics of Dagdhoni Valley

Villages	Kind of livestock	Population per village	Av. Income/HH	Rearing trend
Dagdhoni	Sheep	1200	45000	Decrease
	Goat	900		
	Cattle	800		
	Yak	600		
	Equids	300		
Kharkoo	Sheep	5000	40000	Decrease
	Goat	7000		
	Cattle	1200		
	Yak	100		
	Equids	500		

The observed decrease in the livestock rearing has both positive and negative impacts. The need is to assess the direction of adaptations towards the actions that are more suitable for natural resources and its components. On one hand, decreasing trend in livestock rearing is useful as it reduces the pressure on the pastures, by leaving space and food for the wild ungulate of the area such as Ibex, and several small rodent species and ultimately increasing prey density for wild carnivores. But on the other hand, decreased economic incentives by livestock in annual income per household increases the dependence of the local community on the wood and non-wood products. This dependence of the local community on natural resources needs to be evaluated in terms of monetary benefits during each season and their economic value in the area to make research-based decisions for ecosystem sustainability. No previous research addresses the comparison of the monetary share of natural resources for household and its own economic value in terms of sustainable ecosystem services has been explored. Therefore, it is the need of time to strengthen the management plan by such research and specifically its implementation in the operational plan to ensure sustainable use of land and its products.

Exhibit 15: Livestock population and income of Dagdhoni Valley, 2016



2.5. Pastures

Animal rearing dominates land use with pastures and water management being guided by customary rules in Daghoni Valley. Pasture sharing within two or more villages ensuring the common access rights also guided by customary rules. Shared pasture often borders two or more villages. Local community depends upon pastures for livestock herding, fuel wood collection, medicinal plants harvest, honey and other consumable products on the basis of rights to access. Most of the pastures are located at the more or less same elevation and surrounds both sides of water sheds in the villages so in such cases same number of animals from each village have the chance to graze on all the pastures at same time which advocates the unique and un-peculiar structure of Exhibit No. 16.

Local community of Daghoni valley reported only vertical transhumance patterns in the area during FGD interviews with seasonal movements from top mountain pastures to the downside. Vertical transhumance either guided by shepherd or family members is customary practice to avoid grazing of livestock on fields. During spring, when the fields are ploughed and grains are sowed. Consequently, household's livestock is moved out of villages to the lower pastures, free of snow, to protect cultivated areas from animal browsing. As the season advanced, livestock is gradually moved at higher elevation to the summer pasture (July-August) above the timberline (4500 m a.s.l.). In the meantime, crops are grown and finally harvested. Then, livestock gradually returns to lower pastures and to stables at village levels (November). There, they stay during all winter (November – March) until successive spring, feeding on the crop residuals and hay collected during summer stored and dried by the households. For the farm protection from browsing prior to its movement during early spring, linear hedge of Russian olives are common on the terraces of agriculture patches.

Exhibit 16: Assessment of grazing pressure from each livestock classes on pastures of Daghoni Valley

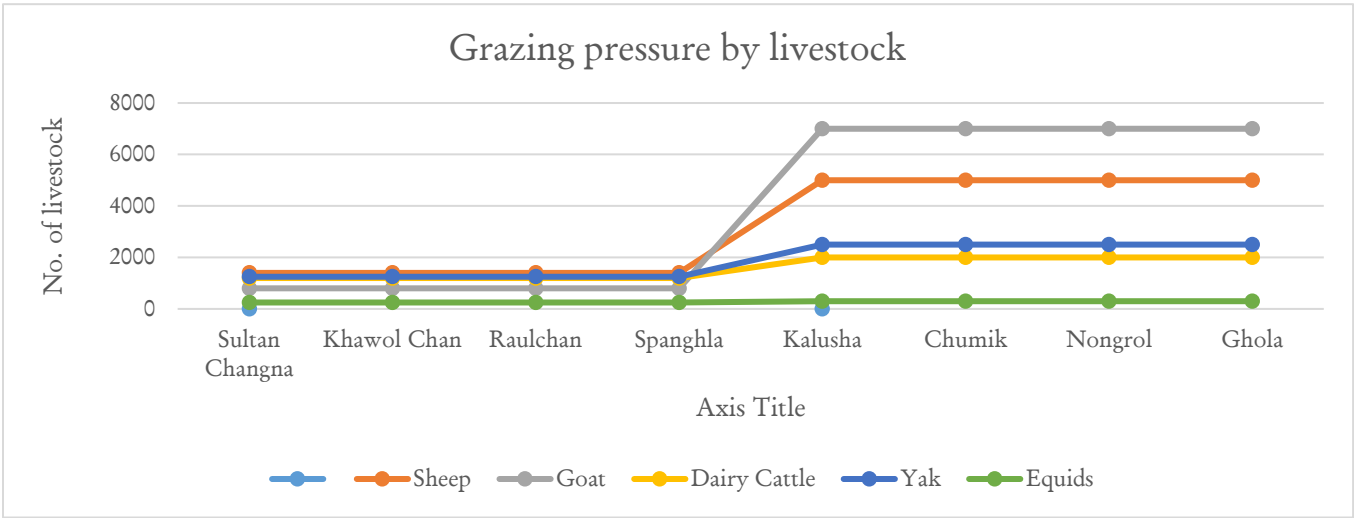
Pastures	Village	Other Uses	Status	Grazing Period	Kind of Livestock					
					Sheep	Goat	Dairy Cattle	Yak	Equids	Tot.
Sultan Changna	Dagho ni	Medical plant	PD	May-Jun	1400	800	1200	1250	250	4900
Khawol Chan		Medical plant	PD	Jun-Aug	1400	800	1200	1250	250	4900
Raulchan		Medical plant	PD	Aug-Sep	1400	800	1200	1250	250	4900
Spanghla		Medical plant	PD	Sep-Oct	1400	800	1200	1250	250	4900
Kalusha	Khark oo	Medical plant	PD	Apr-May	5000	7000	2000	2500	300	16800
Chumik		Medical plant	PD	Jun-Sep	5000	7000	2000	2500	300	16800
Nongrol		Medical plant	PD	Nov-Dec	5000	7000	2000	2500	300	16800
Ghola		Medical plant	PD	Nov-Dec	5000	7000	2000	2500	300	16800

It is customary to keep all the dairy products as a payment or exchange the 50% for a certain amount of grains in the case when livestock is herd by shepherds in the pasture. Such pastures have only few huts in them. Contrary to it, villages where the number of animals is not very large, several families might join together their livestock, each keeping them for one/two weeks or pre-settled time. Usually several huts are located in such pasture zones.

Another customary practice exercised to avoid the livestock of the neighboring villages which don't have access rights on particular pasture is the penalty. If livestock of one village moves to pasture of the neighboring village intentionally then penalty has been fixed by the village community according to the loss.

The FGD interviews indicate that all pastures are degrading gradually. Decline in health of pastures is a direct indicator of unsustainable harvesting practices due to increasing local population fueled by climate change.

Exhibit 17: Grazing pressure by livestock on pastures of Daghoni Valley



Uncontrolled grazing and other consumable products irrespective of decreasing productivity, allow them to earn handsome amount for subsistence. Indirectly it also indicates the less snow and shift of rainy seasons, which contributes to its low productivity. Barren patches among the pastures are notable features indicating the removal of top soil as a result of flooding and landslides. Collecting all the facts mentioned by local community and commonly reported in literature provokes the need of managing zones of rotational grazing in the pastures and determining the maximum number of each kind of livestock according to carrying capacity of pastures while keeping pace for wild herbivores reptiles and rodents to thrive.

2.6. Fuel Wood Collection/ Timber Harvesting

Daghoni valley which lies at the humid north east side of CKNP has comparatively rich forest with approximately 0.7 km² vegetation cover and its average ABG is 270.5 MgKm⁻² and CAI of 1.6Mg/year (Ferrari, 2014). Vegetation cover is only 53.7% (28.3% grasslands, 0% close forest, 0.1% open forests, 25.3% for both scattered and sparse vegetation).

As a consequence of increasing population expansion of villages is a common phenomenon in the Daghoni valley like other valleys and thus construction of settlements/houses is also on the rise. The timber for construction purposes is either purchased from the local timber market or from artificial plantations. The trees harvested for timber in each village of Daghoni valley.

Among the alternative fuel wood resources, electricity, is the only source to alleviate pressure on forest for fuel wood. According to the survey result, households partially use electricity and on average, which saves 650 kg firewood. The inhabitants of Daghoni valley highlighted available potential and interest of local government in small- and large-scale electricity generation schemes on nearby river to reduce pressure on natural forest.



Exhibit 18: Timber harvest from nearby forest reserve



Exhibit 19: Fuel harvest by local community

Exhibit 20: Timber harvesting and use at Daghoni Valley

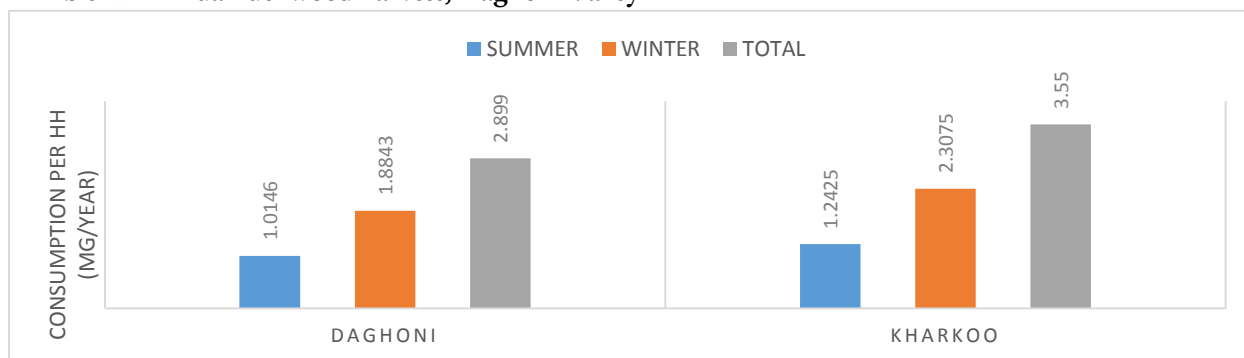
Village	Houses constructed in last 5 years (2010-2015)	No. of trees used	Tree species used
Daghoni	40	50	Poplar and willow
Kharkoo	100	60	Poplar and willow

Customary laws are being followed in the valley for exploitation of natural resources. Community is allowed to collect only dead and fallen trees for fuel wood and timber up to need basis only. Although it does not allow the sale of timber but also not address the maximum amount of wood harvest from the buffer area. Willow in addition to poplar is harvested extensively by local community due to its frequent availability near the settlements in a Daghoni valley without taking into consideration its slow growth.

Exhibit 21: A summary of fuel wood harvest and consumption at Daghoni Valley

Village	HH	Consumption Per Household (Mg yr ⁻¹)			Consumption Per Village (Mg yr ⁻¹)		
		W	S	Total	W	S	Total
Daghoni	500	1.0146	1.8843	2.899	507.3	942.2	1449.5
Kharkoo	1000	1.2425	2.3075	3.55	1242.5	2307.5	3550.0

Exhibit 22: Annual fuel wood harvest, Daghoni Valley



Customary laws do not address the way of harvest. It is specific to each floral class and needs to be followed as proposed in the CKNP management plan. Following are the CKNP MP guidelines to ensure ecosystem intactness while harvesting.

1. Community use Juniper both as fuel wood and timber, however, its use is strictly prohibited as per MP of CKNP. If its harvest is necessary than only branches should be removed instead of whole tree due to its resilience. Local community uproot Juniper and use it as fuel and timber source.
2. Riparian vegetation e.g. Sea-buckthorn and Willows, community usually remove the whole plant/tree from the soil which disturbs the ecosystem. It is suggested in CKNP MP to cut single basal shoots from each plant to preserve in its root system. By doing so, new shoots can re-grow rapidly producing new biomass to be harvested.
3. There are several other gaps in customary laws which provoke the need of revitalization of these laws in addition to the reinforcement of statutory laws essential for natural resources conservation and restoration. There is a strong need to quantify the magnitude of the chronic small-scale disturbances as well as large scale disturbance as a key component of landscape quality and incorporate the findings into laws to ensure sustainable and healthy environment in order to mitigate the haphazard changes of climate.

Exhibit 23: Details of fuel wood harvested per household from several sources (Mg/HH/yr)

Source	Artemisia		Sea buckthorn		Juniper		Shrubs		Dang		Riverbank		Nat. Forest		Fruit Trees		Plantation		Other Riparian	
Village	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
Daghoni	0.1	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.1	0.0	0.0	0.4	0.8	0.1	0.26	0.2	0.0
Kharkoo	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.8	1.5	0.2	0.4	0	0.0

2.7. Mining

The presence of unique and specialized geological features designates the entire region of GB having most suitable geological environments as compared to the rest of the world where mineral deposits of economic grade are being extracted. These include metallic, non-metallic, energy minerals, precious/dimension stones and different rocks of industrial use. Adequate deposits of dimension stones are found in Ghizer, Skardu, Hunza/Nagar and Gilgit Districts, besides serpentinite deposits at District Skardu. Presently these are being mined using indiscriminate blasting techniques which not only destroy this natural resource, but also result wastage of more than 75% of the total yield. Presence of gemstones is yet to confirm in Dagdhoni valley; therefore, people are not associated to this field.

2.8. Tourism

Tourism can be a vital source of revenues and employment if appropriate revenue-sharing mechanisms are put in place to enhance the benefits for local communities and pro-poor impacts of tourism. Dagdhoni valley has no tourist resorts or historical settlements to attract tourist, therefore tourist activities doesn't exist in the area. However, on average, 35 to 40 people annually move to Hushay or other valleys to serve tourists as porter and earn on average PKR 25,000/- in one or two trips.

The only opportunity to earn from tourism can be possible through establishment of camping sites and other residential infrastructure in Dagdhoni village which is very close to the main touristic routes leading to Hushay and Thalay valleys. Community floated idea about establishment of Fruit Park during FGD comprising camping sites with water and toilet facilities to attract tourism in the area.

ASSESSMENT OF CLIMATE CHANGE IMPACT FOR SUSTAINABLE USE OF NATURAL RESOURCES IN CONTEXT OF INDIGENOUS KNOWLEDGE



3. ASSESSMENT OF CLIMATE CHANGE IMPACT ON NATURAL RESOURCES

Climate change is projected to have a significant effect upon the future rate of biodiversity loss. There is a growing global consensus that the rate of climate change has already exceeded the capacity of some species and ecosystems to adapt naturally, and is close to exceeding that of many more. There is therefore an urgent need to identify the key mechanisms underpinning climate change impacts on natural resources in order to best select climate change adaptation strategies. It is also essential that the scale of these changes is clearly communicated to policy and decision-makers. Furthermore, it is recognized that climate change will have increasingly significant direct impacts on local communities, biodiversity and that increased rates of species extirpations are likely. The growth of many crops and weeds is being stimulated. Migration of plant and animal species is changing the composition and structure of the local ecosystem. This will have negative consequences in terms of services provided by these species and ecosystems provide, especially in areas where the majority of the human population are the rural poor and dependent on direct exploitation of these ecosystem services.

3.1. Climate Change in the Perspective of Indigenous Knowledge

People at Daghoni valley are well aware of changes coming as result of climate change. The main concern of local community discussed during the FGD's was the adaptations strategies that are required to mitigate the effect of climate changing. Data obtained shows that the local climate is changing, but these changes are not very pronounced and can be reversed if we do proper and timely actions. Change in length of season has been reported by the local community with increased temperatures and prolonged summer. The local community has also reported an increase in the frequency of disastrous activities. According to scientific investigations these higher temperatures are degrading the permafrost layers, causing slope instability, rock falls, landslides and avalanches.

Although climate change has both positive and negative impacts, the issue is that the negative consequences may be more pronounced in the mountains, both for the communities and for their environments, requiring more awareness, more attention and quicker reaction than elsewhere. Equally, the consequences of negative impacts may go beyond the boundaries of the mountains and affect people and ecosystems in the surrounding lowlands.

3.2. Temperature Variability and Seasonal Shifts

Gradual increase in temperature has been reported by the local community during the last 30 years the most visible evidence of temperature increase is the earlier melt out of snow cover and glaciers across the region which has become more rapid over last one decade. Trend analyses of the historical data for the period 1955-2010 show that winter season temperatures have increased in this region during the past 55 years (Raza, 2015). This increasing temperature is responsible for disastrous activities and glacier recession, which is getting frequent day by day according to the local community. Increased temperatures often lead to a complex mix of effects such as

altered timing of bird migrations, increased evaporation, and longer growing seasons for wild and domestic plant species, increased summer drought stress, vulnerability to insect pests. Like other valleys, survey result shows a swift increase in temperature has been observed over the last decade of the Daghoni. According to the locals, increasing temperature is the reason for the increasing summer season length. Local community assesses these changes through daily and seasonal activities e.g. ripping of crops, melting snow/glacier, human diseases etc.

3.3. Precipitation

In addition, changes in climate, such as reduced snowfall and increased rainfall, are reported across the area by the local community, but solid evidence of the impact is difficult to ascertain. Changes in precipitation level and the size of storms affect plant-available moisture, snowpack and snowmelt, stream flow, flood hazard, and water quality. Rainfall variability and periodicity has changed since last 30 years with the most profound effect since last ten years. High speed and late rains have been observed by the local



Exhibit 24: Snow fed channels with low water level

community which accelerates the crop diseases and infections. It shows that pests are getting adaptable to seasonal shift and variability more than other organisms and contribute to increased economic loss of crops and fruit trees.

According to the local community frequency of snowfall has significantly declined and diminishing year by year. As a resultant decline in natural vegetation growth at sub-alpine pastures more than alpine pastures. Besides, it leads to declined water quantity and quality.

3.4. Drought

The drought is considered as the most damaging and costliest type of natural disaster, especially in mountainous regions where water quality and quantity is regulated solely by the precipitation with a far-reaching economic, environmental and social impact leading to food and water insecurity, reduced agricultural productivity, damage to forests, pastures, wildlife, livestock, fish and food price hikes. In Daghoni valley drought does not have much impact on agriculture, but it is alarmingly affecting alpine and sub-alpine pasture, where drought situation is being faced. It has been observed that due to warmer temperature the snow deposits are melting before time and in an increasing speed. Altered timing of rain is presenting a cumulative effect on drought, which results into the huge quantity of water by the start of summer. This quantity decreases

and ultimately dries out as the season proceeds. The irregular availability of water not halts only natural riparian species but also causes scarcity of drinking water for animals in the pastures.



Exhibit 25: Dry weather conditions

The local community so far is unable to assess the intensity of drought and to adapt it accordingly. Therefore, to enhance the resilience of the local community and ecosystem it is necessary to incorporate the following actions for CKNP operational plans.

- a) Devise the research to determine natural indicators to measure the intensity of drought for local community.
- b) Evaluate the proper management actions/ interventions to improve preparedness of community for drought.

3.5. Flood

Changes in the climate have had an influence on the magnitude and frequency of flooding in rivers in Gilgit-Baltistan. With respect to snow and glacier melt, the magnitude of temperature changes during the spring and summer are sufficient to have caused a major change in the flood-potential of catchments. Changes in winter temperatures have influenced the amount and altitudinal distribution of snow available for melt in the subsequent season and this has increased the magnitude of the flood which is on average 28%, the flood frequency has also increased by 15%. Since sharp change has been experienced by local community over the last half decade therefore infrastructure damage, land erosion cum damaging crops and plantations is more

frequent now than last 30 years. Communities suggested actions are to mitigate damage, flood risk through mature the irrigation system with building concrete walls and also protective walls on the main river. It is also important to mitigate the high risk of flood through construction of protective wall along the arable land and side. The communities suggested actions are to mitigate flood risk through mature the irrigation system with building concrete protective walls on the main Thalay river on the upper side and Indus river on the lower part of both Daghoni and Kharkoo.

3.6. Landslides

Floods are the regulating factors of the landslides. With increase in the temperature and rain intensity, the soil patches lose their compactness. The increased Aeolian movements remove the top layer of soil and rain washes this layer from the mountains and move it to the nearby rivers and ultimately it becomes the part of the Indus basin.



Exhibit 26: Landslides in mountainous patches

According to the survey conducted to gather information about the driving factors of climate events by the local community, it is observed that landslides have increased considerably 15% since last 30 years. These landslides wither soil from the mountains, pastures and less vegetated areas and make the land barren. It destroys the infrastructure facilities such as roads, bridge, and sometimes buildings along the edges. Agriculture is the most negatively impacted sector by land sliding because landslides often cut down water supply by blocking/ damaging irrigation channels which are built on the mountainous slopes.

Exhibit 27: Climate change at Dagboni Valley in the perspective of indigenous knowledge

Factors	Status	Change (days/ %age)	Trend		
			10 y ago (2006)	30 y ago (1985)	Future prediction
Rain	Decrease	18	Decreased	Normal/No change	Decrease
Snow	Decrease	58	Decreasing Sharply	No Change Observed	Huge decrease in snow fall observed over last few years, which indicates the trend decreasing in the future
Temperature	Increase	13	Increased	Normal	Trend in last one decade shows increasing temperature in the future
Summer season duration	Increase	8	Increase	No Change Observed	Increasing length of summer is being observed over last few years and the trend shows increase in summer season in the future
Winter season duration	Decrease	8	Decrease	slightly decreasing but no considerable change seen	Length of summer season is increasing which is evidencing decreasing winter season in the future
Glacier recession	Decrease	17	Decrease	No visible change observed	Most of the glaciers are sharply melting and the glacier reserves are declining
Land slides	Increase	15	Increase	Normal	Based on the experience of locals in all villages the trend of land sliding increases and will increase in the future
Flood frequency	increase	28	increase	Normal/No change observed	Flood frequency sharply increased over last three years which indicates increasing flood in the future
Flood magnitude	Increase	15	Increase	Flood magnitude is doubled over last two years	Annually the flood magnitude is increasing and is quite obvious that it will increase in the upcoming years
Drought	Increase	15	Increase	Normal but slight increase observed	Drought is frequently observed in the pastures. The Indigenous knowledge of locals shows expected increase in drought in the future.
GLOF frequency	Increase	NA	NA	NA	NA
GLOF Magnitude	Increase	NA	NA	NA	NA

3.7. Pastures

Regional climate scenarios for CKNP valleys shows prolonged growing seasons and shifts in temperature and precipitation as currently happening in the valleys around CKNP are likely to affect plant phenology and growth. Despite the better and prolonged growth seasons range lands that serve as pastures and grazing lands are degrading annually. In the alpine pastures 5% degradation has been observed while mid and low land grazing areas have declined 20%. Locals are of view that with high decreasing snow fall the low land/rangeland grazing area receives less snow and thus more degradation takes place. Relatively amount of snow remains comparatively high on the alpine pastures and vegetation status is though degrading but relatively better off.

It can be assumed that many plant species are migrating vertically for lower temperature increasing the plant diversity at higher alpine regions and growing competition by highly productive species at low lands. The local community reported probable causes for pasture degradation as vertical shifts in plant growth and unsustainable livestock management.

On the other hand, warmer temperatures and increased microbial activity are likely to contribute in the loss of carbon from alpine soils. Since a higher amount of carbon is stored in soils than in the aboveground biomass above tree line this indicates that alpine ecosystems may turn into carbon sources rather than sinks.

Exhibit 28: Impact of climate change on pastures of Dagboni Valley

Pastures	Status	Change (days/ %age)	Trend			Adaptation measures by local community
			30 yr ago (1985)	10 yr ago (2006)	Future prediction	
Alpine and sub-alpine pastures	Degrading	5	Less degraded as compared to present	Degrading	More degradation is expected	Rotational grazing
Mid and low land grazing	Degrading	20	Less degraded as compared to present	Degrading	More degradation	Irrigation through construction of irrigation channels

3.8. Biodiversity

3.8.1. Agriculture and Fruits

Climatic factors such as temperature, precipitation, CO₂ concentrations, and water availability directly impact the health and well-being of fruit trees and agricultural crops. With increased temperature and CO₂, crops such as wheat, maize, barley, buckwheat, fodder etc. and fruit trees are likely to grow more rapidly due to increased photosynthesis. It is also influencing insects, disease, and weeds, which in turn decreases agricultural production as currently happening in Dagboni. Aided to these additional stresses is offered by variable precipitation and irrigation water. Early and rapid snow melting accompanied by irregular rainfall followed by drought declines the productivity.

Farmers reported rapid increase in weeds and pests during the last 10 years which shows positive correlation with the increase in temperature. Thriving chances increases for the pests in warm climate. Disease pressure on crops is continuously at increase with earlier and prolonged summers and warmer winters, which allowed proliferation and higher survival rates of pathogens and parasites. The marketable yield of many commercial crops e.g., potatoes, walnut, apricot, mulberry, almonds etc. is declined for Daghoni valley and become more sensitive to climate change than agriculture crops.

Local farmers observed the productivity and economic decline which shows that they are aware of climate change impacts but at the same time these people have no idea about the climate resistant seed varieties. To keep the tinge of organic farming and pristine local ecosystem the community must be trained about the natural and biological removal of pest and weed species.

3.8.2. Forest

Climate change directly and indirectly affects the growth and productivity of forests. Direct effect embraces the change in atmospheric carbon dioxide due to increased temperature and change in precipitation.

The indirect effects account for the complex interactions in forest ecosystems. Climate also affects the frequency and severity of many forest disturbances such as cutting, removal of fruits etc. Daghoni valley lacks common forest species, such as Juniper and Pine except some riparian species exist along Artemisia in rangeland area. Regeneration of the existing species are also on larger decline. Scientific research must be conducted to evaluate the status of natural forest and suggest remedial solutions in accordance with obtained results.



Exhibit 29: Forest of Daghoni Valley

Regeneration of the existing species are also on larger decline. Scientific research must be conducted to evaluate the status of natural forest and suggest remedial solutions in accordance with obtained results.

The local community has reported the following impacts of climate change on the forest:

- a) Rising temperature and CO₂ as a consequence of climate change has impacted the local forest ecosystem of Daghoni by providing a prolonged growth season which seems to enhance its productivity apparently. But this rising temperature can lead to phonological shifts of the alpine species and they will become locally or regionally extinct since they are unable to shift to higher altitudes. The increased CO₂ is becoming useless with increased

temperature because of water unavailability throughout the season due to early and rapid melt out of snow and shift in rain season.

- b) The nullahs branching out from glaciers and springs are the major irrigating channels for the agriculture crops and the forest species. With increasing temperatures these channels dry out and cause water stress augmenting the forest degradation.
- c) Along with this, warmer springs has the chance to extend the range and lifetime of many pests that stress trees and crops and at the same time it decreases the available water quantity throughout the year.

Considering all these facts, it can be concluded that the local community knows about the impact of climate change on the forest/Natural vegetation but don't know about the mitigation strategies. These strategies are needed to be designed by thorough research and impact. With the increasing temperature and drought, it is obvious that some species will not be able to adopt and flourish in the ecosystem so there is a need to assess that how long the present floral species will survive and which species should be planted to continue the forest sustainability. All these questions need research-based answers and capacity building of the community accordingly to ensure the ecosystem viability.

3.8.3. Wildlife and Associated Biodiversity

The multiple components of climate change are anticipated to affect all the levels of biodiversity, from organism to biome levels. The impact of Climate change is projected to become a progressively more significant threat in the coming decades. In addition to warming temperatures, more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity.

In Daghoni valley, condition of faunal diversity is declining over the past few years due to conservational practices carried out by CKNP and active participation of the community through the LSO. Ibex is the only common ungulate in the valley, but its population is small and reported on decline with the amplified pace over last one decade. The community referred the declining to both climate change affect as well as lack of conservational practices in the valley. The community is still absent to take any concrete steps toward to the, yet the LSO has included conservational activities in its Plan but due to lack of capacity and knowledge no substantial steps taken on conservational practice. Statuary law regarding wildlife poaching is put into operation through employing watch and ward mechanism in the area by CKNP, but the insufficient involvement of the local community in the process is holding back effective implementation of the process. It is important to ensure involvement of the local community as the best guardian of their natural resources through formation of VCCs under supervision of LSO.

It indicates that either climate is posing pressure on the survival of species or species may have the difficulty in adapting to the changing climate. In either case comprehensive study is required to assess the breeding potential and adaptability of the species in a changing climate.

Considering the birds and butterflies it has been reported by the local community that these species were common a long time ago, but now several of them are not common and experiencing a decline. The apparent reasons are the absence of a favorable climate for the prey

species, decline in seed crops, removal of forests and floral species. No assessment has yet been done, which provides the complete biodiversity information about Daghoni valley. Therefore, it is difficult to prioritize the species for conservation actions and to monitor the effect of climate change on the small and large animals.

3.8.4. Fishery

Climate change is likely to affect fisheries and aquaculture, their dependent communities and related economic activities along three main pathways. Many fisheries-dependent communities already live a precarious and vulnerable existence because of poverty, lack of social services and essential infrastructure. The fragility of these communities is further undermined by overexploited fishery resources and degraded ecosystems. Daghoni valley is not dependent on the fishery for subsistence and therefore local community has no idea about the impact of climate change on the fishery. The implications of climate change for food security and livelihoods in the neighboring community of Daghoni are need to be evaluated.

3.9. Water

GB is the largest fresh water reservoir of Pakistan due to high precipitation rates. Owing to the recent climate changes the water availability has been changed. Snow fall has declined up to 58%, according to the perception of the local community but rain fall is abnormal increase. The altered precipitation pattern has caused the differential availability of water during different seasons. In the Daghoni valley though water shortage is not common, but during start of cultivation season and end summer water become scarce in some hamlets of Kharkoo and leads to unsustainable water management, while in the summer season flood in Thalay stream increases and damage irrigation channels, cause landslides and subsequently road blockage all resulting into water scarcity.

3.10. Tourism

Mountain areas are sensitive to climate change. The implications of climate change include less snow, altered rain timings, receding glaciers, melting permafrost and more extreme events like landslides. However, climate change is a severe threat to snow related sports such as skiing, snowboarding and climbing. Lower earnings in winter tourism are reinforcing economic disparities between the dependent communities and compel them to depend upon the natural resources of area as a mean of their livelihood.

Daghoni valley is not a tourism dependent valley due to lack of tourist spots and unavailability of required facilities. However, Daghoni is situated on the main routes of Thalay and Hushay tourist spot therefore a window of opportunity is available to develop camping site in the area, which is emerging need with explosive domestic tourism in flow in GB over a couple of years.

Exhibit 30: Impact of climate change on biodiversity of Dagboni Valley

Biodiversity	Status	Altitudinal Shift	Trend			Adaptation measures by local community
			10 yr. ago	30 yr. ago	Future prediction	
Agriculture crops and fruit trees	Degrading	N/A	Agriculture production are declining due to increasing diseases as primary factor and many others. Fruit production is also declining due strong wind in the blossom season.	No considerable change reports.	If the weather remains the same experienced over last couple of years, Fruit production is expected to be decreasing.	The decreasing production is as result of weather changes effect such as abnormal wind in the blossom season and abnormal rain causes damage crop in the early stages. The most common factor was reported various diseases and traditional farming method. To increase the production training of farmers in using pesticides and modern farming techniques are required, which the community cannot do itself

Natural forest	Degrading	Increasing	Decreasing	Though the forest in Dagboni valley is meager but however the situation compare to the current Scenario was better	Dagboni village has reported the forest almost not existing but the very meager forest is on decline, similarly in Kharkoo village forest is reported on decline	No considerable initiatives taken by the community.
Wildlife						
Ibex	The Ibex population is in Dagboni valley is small and reported on decline by the community	Increasing	The Ibex population almost depleted	Population was relatively good in number but illegal poaching proved a disaster	Population will be increasing if conservation practices adapted strictly, otherwise complete depletion is expected.	No concrete step taken by the Community
Urinal	N/A	--	--	--	--	--
Markhor	N/A	N/A	N/A	N/A	N/A	N/A
Birds	Decreasing	Increasing	Decreasing	Visible reduction is seen in population of birds such as Snow cock/ Partridge.	If conservation practices within the community are not improved, ibex population will decrease	Community is showing little awareness about decreasing in ungulates wildlife population but yet not concern about reduction in bird's population

Butterflies	Decreasing	Increasing	Many butterfly's species cannot be seen since last 10 years	Different varieties of butterflies existed and the population was much improved relatively then the current scenario	The population was normal	No adaptation has been done yet
Fishery	NA					

CONSERVATION MANAGEMENT ISSUES & PROBLEM OF DAGHNOI VALLEY



4. MANAGEMENT ISSUES AND PROBLEMS

The present scenario of Daghoni valley has reflected several issues in customary practices and adaptation to climate change. These issues directly or indirectly affect the economic situation of each household and increase their dependence on natural resources which are free of cost and in vicinity to the community as compared to market. Therefore, in order to develop an effective strategy for adaptation, it is necessary to develop the capacity of local community to adapt to the changes in a way that reduces their dependency on natural resources. These adaptation approaches must then be disseminated to the communities and relevant laws up-gradation. In Daghoni valley customary laws are not being practiced for natural resource usage and conservation, these laws are also unable to sustain and address the suitable practices and continuously generating issues, therefore needs an up-gradation. Though village committees are formed and performing up to their capacity toward the set objectives, but the customary laws needs to be well aligned with required conservations objectives to ensure ecosystem sustainability.

4.1. Agriculture

A smaller area of arable land is cultivated in the Daghoni valley by traditional varieties of fodder, crops, fruit trees and commercial trees. The following issues are being reported by the local community. These issues, although belongs to several sectors, but all are aiding in decline of agriculture production.

1. **Small land pieces for agriculture:** Daghoni valley consist of two main villages lying along the bank of Indus River. Both villages spread over a plain area having large arable land. During the last few decades, with increasing population and emerging nuclear family system, arable land fragmentation is rapidly taking place and area of land holding per household is shirking year by year. On top of that, increasing flood in Indus River grounds for land erosion on the lower part of both villages and flood Thalay river/stream on upper side of Daghoni village erode agriculture land. The barren land is fully covered in the vicinity of the main towns and very rare barren land is available to bring under it under cultivation, however, arable land is accessible in the sub-valleys which can be brought under cultivation for fodder and plantation purpose. To protect the arable land, agri-forest and crops from eroding protective walls is required to build on both lower part of the village on the Indus River and in the upper side on Thalay River.
2. **Irrigation and water rights:** Customary rights about water sharing between villages and among the households is not documented anywhere. This generates confusion and rivalry among the land holders for water needed for irrigation.
3. **Low productivity:** Farmers, technical personnel, and interviewee from relevant fields unanimously reported low productivity per unit area. The common issues underlying this fact are small land, thin soil cover due to erosion, increasing pest prevalence over the crops, low fertility, water unavailability, erratic and unpredictable precipitation times, warm temperature, disasters such as landslides, floods and several other. The most important among them is the use of traditional methods and seeds for cultivation.
4. **Weeds and pest:** Organic farming is an important aspect that is valued all over the world for nutrition. Local farmers are lucky enough to manage the crops and fruit production without using pesticides, insecticides and inorganic fertilizers. Animal manure and ash to be used to enrich the soil

with minerals. Moreover, water in the streams also provides sufficient quantities of mineral to sustain agriculture practices. Despite of these, farmers are facing difficulties now a days due to several insect and flies' pest species which feed on the grains, fruits and other such products. Indigenous people and their knowledge are blaming climate change for increasing pest infection on fresh as well as dry seeds and fruits.

5. **Traditional practices and non-certified seed varieties:** Local farmers rely upon the traditional farming and cultivation methods. Growing crops from farm saved seed is common practice around the world and same in Daghoni Valley. Farmers prefer this practice due to several reasons which includes certainty of quality, convenience, timeliness/availability, and cost. They also prefer this practice because farmers don't want to take a risk on their productions. But with the progress of time keeping though cultivar performance remained same, but productivity declined, which demands the practices of modern farming techniques and new seed varieties.
6. **Climate change:** Climate change is exacerbating the challenges faced by the agriculture sector, negatively affecting both crop and livestock systems in Daghoni Valley. Climate change induced increases in temperatures, rainfall variation and the frequency and intensity of extreme weather events are adding to pressure on the local agriculture system – which is already struggling to respond to rising pathogenic infections. The changing climate is also contributing to resource problems beyond food security, such as water scarcity, pollution and soil degradation. As resource scarcity and environmental quality problems emerge, so does the urgency of addressing these challenges. The farmers are really feeling helpless against the inconsistent weather even they are thinking to abandon growing maize and wheat, and cultivate cash crops like potato because that are short-duration.

4.2. Pasture

The majority of the pastures Daghoni valley is reported declining. The pasture sustainability is also facing a lot of pressures from livestock more than carrying capacity, medicinal plant extraction, landslides and floods. The most significant factor over the last ten years similar to surrounding valleys is an infrequent snow fall, which declined growth of natural vegetation in alpine & sub-alpine pastures and rangeland, and largely contributing to declining livestock rearing trend in the valley. One major factor is an increase in population expansion contributing to pasture degradation. Though the overall status of per household shows decreasing trend, but with increasing nuclear family system number of livestock reportedly increasing.

1. **Baseline of flora and phenological shift:** There is no documented baseline data or inventory about the floral species of the pastures, their status and use. So it is the need of time to develop such basic dataset which prioritize the species for conservation actions to mitigate the socioeconomic and environmental pressures. It is especially recommended on priority basis to monitor and conserve the floral species and medicinal plants affecting by climate change and showing phenological shifts. Only medicinal plants are explored and listed, but there is no information on the predicted impacts of climate change over these medicinal plants and their adaptations.
2. **Gaps in customary practices:** Livestock grazing is an ecosystem service provided by the pastures. All pastures of Daghoni valley partially are degrading or showing decline in productivity due to unsustainable livestock grazing practices. There are no established rules

about the maximum number of livestock heads in the customary rules. Carrying capacity of these pastures have never been estimated and that's why unsustainable pressures are fueling the degradation. Diseased animals are advised to keep away from the pastures, but their water points are shared which can induce the infection in whole herds and also there is a chance of disease transmissions.

3. **Grazing timing:** The vegetation growth is eventually getting slow in the pastures for two major reasons, 1) due to mounting pressure and 2) due to decrease in snow falling as pasture areas are mostly dependent on rain and snow. Early grazing is another burning issue as peak growing season starts from June while villagers start herding in the pasture from May which doesn't allow vegetation to grow normally. Lasting pastures can be improved only when herders understand plants' recovery needs and practice good grazing land husbandry to maintain plant health. The local community of Daghoni reported the problems like weed invasion, less productivity and weakened soil health. All these issues are indicators of impatient grazing by the herders i.e. they start to graze their animals before pastures are fully grown. Herders do so to provide animals with a high-quality diet, but they are unaware that short plant growth reduces the bite size and the nutrient intake. Moreover, it contributes to decline in pasture productivity, which is lose-lose situation only.
4. **Livestock insurance scheme:** Livestock insurance scheme is an incentive equal to the loss for the herders if their livestock gets killed or attacked by the wildlife. The livestock insurance scheme is an incentive equal to the loss for the herders if their livestock gets killed or attacked by the wildlife. Project based effort resulted in development of the scheme, but terminated as soon as the project ended. Livestock kills by predators is a burning issue although no retaliatory killing has been reported by the community, but in the absence of insurance scheme retaliatory killing of wildlife is expected. Such schemes are need to be revitalized with some revolving fund for its sustainability.
5. **Lack of zonation:** Pastures are degrading continuously, but the customary laws don't have any hint of abandoning such pasture areas which hastens its decline. It is essential that grazing on pastures in the buffer area of CKNP should be controlled to maintain adequate vegetative cover that reduces erosion and permits adequate growth rate after each grazing period to ensure the health of grazed plants.
6. **Harvest of medicinal plants:** Daghoni Valley pastures and forest areas also have these herbs. Local community uses them for disease cure. These drugs have anti-pyretic, analgesic, anti-cancerous, anti-diabetic and several other uses. Local community is fully aware of their uses, but they don't have any concept of its extraction without damaging the whole herb. Training of the local community for the collection, drying and usage is important.

4.3. Water

. Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community at Daghoni depends directly on snowfall and indirectly rain. Due to delayed rain timings and less annual snowfall, the local community is frequently facing the drought and water shortage due to increasing glacier melting and flood causing blockage of irrigation system. Moreover, torrential rains are now more frequent which on one hand increases water quantity but also cause floods and landslides in

disaster prone areas thereby creating socio-ecological stress. Water pollution is increasing due to lack of sanitation /drainage system and animal sheds nearby water channels and drinking water sources. Grey water from the local community is also getting mixed in to fresh water and degrading its quality.

1. **Drinking water:** Local community depends on fresh water supplies from glaciers and springs for drinking purposes. Sediments are continuously increasing the water supply due to weathering of rocks and mixing of soil and grit in the area. High mineral content can induce disease in local community and their livestock. The water testing facility already established at the Karakoram International University provides the free testing, but local community is not very interested in the procedure due to lack of awareness.
2. **Irrigation deficit:** Irrigation system is very poor like other valleys. Existing irrigation channels are unstable, as well as there is a need for new irrigation channels with concrete side walls.
3. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water, ensuring that it do not mix into the freshwater streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.
4. **Disaster management:** Climate change is deeply reshaping the landscape of disaster risk. Weather extremes such as drought, flood and landslides cause the huge economic depressions in all sectors ranging from transport to land farms. No protocols are developed, yet for the villages in the surrounding of CKNP.

4.4. Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other and therefore, there is a strong need to assess and enhance the adaptive capacity of the forest and biodiversity.

1. **Mortality:** Decrease in snowfall has increased tree mortality and resulted degradation and reduced distribution of the entire forest ecosystem. It increased the wood harvesting opportunity for the local community from Daghoni for subsistence purposes at the cost of degenerating forest.
2. **Harvest pressure:** Heavy collection of timber and non-timber products from the forests allow the community to fulfill their needs. With the continuously increasing population dependence of local



Exhibit 31: Unsustainable harvest of forest trees

community is also increasing on these natural resources. The majority of the area in Dagboni has open canopy coniferous tree species which are unable to cope with natural changes in climate and also facing threat due to the fuel wood and wild fruits collection. This harvesting is not limited to here only, but includes the removal of foliage, branches and plants cutting for livestock forage as well. Unsustainable practices and unguided approaches towards harvesting lead the ecosystem imbalance.

3. **Forest regeneration:** Climate change has shown differential approaches for the propagation dependent upon the species ecology. Warmer temperatures and increased CO₂ increased the rate of photosynthesis and thus growth, but increased the pest attack is seriously stressing the forest regeneration.

4.5. Eco-tourism

Ecotourism is nature-based tourism that fosters environmental appreciation and awareness. Gilgit-Baltistan which is considered as the hub of eco-tourism incorporates a considerable number of tourists every year to generate the huge amount of revenues and alternative livelihood opportunities.

In Dagboni valley eco tourism opportunities are very rare due to the following reasons;

1. **Tourist accommodation:** Limited accommodation facilities compel the tourists to opt for camping in open areas. This option becomes unsuitable during the adverse weather.
2. **Visitor facilities:** Site maps, designated camping areas, information boards, sign board and other facilities are rarely available. Dagboni do not provide tourism services and therefore they don't have the opportunity to earn the livelihood from tourism.
3. **Climate change:** Climate is a key resource for tourism and the sector is highly sensitive to the impacts of climate change and global warming, many elements of which are already being felt. Climate change is having adverse impacts on the number of tourists.

4.6. Mining

In and around CKNP in the sedimentary rocks of the mountains, huge reservoirs of gemstones and precious rocks are deposited. Local level mining is being carried out in and around CKNP. Mining area can be identified by having the holes in its mountains just like bee web. Mining activities do not exist in the area due to unavailability of the gemstone, which is not existing completely or has remained unexplored.

4.7. Wildlife and Protected Areas

Institutional structures to manage wildlife and protected areas experience lot of issues due to increasing urbanization, degrading forest and natural areas. The biodiversity of CKNP and its buffer zones has the species, which are of international and national importance. Wildlife plays an important role in both ecosystem sustainability and community economics. Although trophy hunting is a controversial subject, yet it enabled the community to earn millions of dollars since its start and contributed to conservation as well.

1. **Population trends:** The investigation of issues related to wildlife and protected areas normally consider the number of heads of animals irrespective of their health, annual recruitment. The overall trend of two trophy species; i.e. Markhor and Ibex seem to increase in their population according to the relevant government departments but there is no assessment on the reproductive output. There is chance of reproductive deficit in mountain ungulates such as Ibex and other species due to the history of population surge.
2. **Population surge:** During the recent years of conservation, wild species has increased considerably. The sudden increase from small population are often culprits of inbreeding depression, which is most expected in the case of mountain ungulates and birds which are decreasing continuously.
3. **Unidentified species:** GB hosts the diversity of wild fauna and flora most of which are unidentified and even un-discovered yet. The rapid environmental degradation is causing the extermination and extinction of the specialist species. It shows that biodiversity of the species is declining without recognizing their ecological and economic roles.
4. **Habitat degradation and isolation:** Human population is continuously increasing in Daghoni is increasing and encroaching into the natural areas for settlements and agriculture. This land use changes affected wildlife both positively and negatively depending upon the species ecology. Habitat degradation has also pushed the species to isolated and low-quality habitats that caused additive stress on the wildlife health, reproductive potential and genetic health and so on. There is no assessment for the impact of habitat degradation on the genetic health of wildlife species.
5. **Genetic reserves of wildlife species:** Most wildlife surveys are based on the numerical assessment of the animals and do not account for their genetic viability. Designated areas such as national parks and sanctuaries are notified irrespective of the idea that particular area is either genetic bank of the particular species or not. Genetic reserves of forests and wild species are not identified and protected yet.

PROPOSED MANAGEMENT INTERVENTION FOR DAGHONI VALLEY



5. PROPOSED MANAGEMENT INTERVENTIONS

5.1. Agriculture

In particular, there are different adaptation options in agriculture, according to the involvement of different agents (producers, industries, governments); the intent, timing and duration of employment of the adaptation; the form and type of the adaptive measure; and the relationship to processes already in place to cope with risks associated with climate stresses finally the development of provincial climate change policy.

The adaptation options required for the local community need four tiers. (i) Technological developments, (ii) government programs and insurance (iii) farm production practices, and (iv) farm financial management.

1. **Population expansions:** Similar to other areas of GB, with increasing population construction is rapidly increasing and mostly houses, cattle shed and other required constructions are being built around the settlement and agriculture area, which is continuously shrinking arable land. To avoid this issue new settlements must be built on barren or abandoned parts of the land. This will keep the arable land available for cultivation.
2. **Certified seed varieties and crop insurance:** Certified seed is the only input that can get farmer more than just higher yields. Such varieties are resistant to climate related and pesticide issues. To introduce the concept and usage of certified seed varieties, relevant stakeholders must provide them on subsidized rates and premium insurance packages. Along with this one-time training of farmers of each village around CKNP is recommended to increase the agriculture production per unit area.
3. **Integrated farming and agriculture products:** Farmers are traditionally inclined to mono-cropping systems and earn the revenues from raw products. In Dagboni valley the farmers do not sale both fresh and dried fruits due lack of awareness on post harvesting techniques, processing techniques and proper storage facilities. The little economic innovation lies in the sale of potato only, while million rupees' worth of fruit is being wasted annually due to lack of awareness, and skill for value addition and facilities for storage. Many end-users require specifically processed products such as Marmalades, Jams, Vinegar and Honey. Farmers need guidance on the value addition of products in order to be economically stable.
4. **Soil analysis:** It was unanimously reported by all the communities that land they are cultivating is never tested in the laboratory and scientifically they don't know which crop and fruit varieties are best for their soil type. Each crop is sensitive to soil type and productivity heavily depends upon the suitable soil. Practically there is requirement of soil testing facility within each agriculture information cell. This facility will provide information about several structures, especially addressing the common question of farmers such as suitable seed varieties, microbiota of soil and its capacity of crop growth and several others.

5. **Secure water availability:** Water is central to agriculture productivity. Adaptation of climate-smart inputs and shifting to more efficient irrigation methods will help local farmers to maintain productivity levels. Water tanks for the storage purpose of agriculture are required to reduce the drought effects at some village.
6. **Training on climate friendly agriculture practices:** Farmers should be trained with the emphasis on targeted ingenuities such as outcome-based farmer incentives and knowledge transfer systems – that enhance farmer capacity to achieve sustainable productivity growth through mitigating and adaptive practices keeping the pace with climate change. These climate friendly and climate proof practices particular to each valley must be incorporated into the operational plan. As there are no previously approved practices so they are needed to be designed by methodically modelling the practices with climate change models.
7. **Introduction of climate resistant seed varieties:** Farm decision-making is seen as an on-going process, whereby producers/farmers are continually making short-term and long-term decisions to manage risks emanating from a variety of climatic and non-climatic sources. In this sense, adaptation is the result of individual decisions influenced by forces internal to the farm household (i.e. risk of income loss, environmental perception) will become reasonable and let them earn revenue to decrease the pressure of the local community on natural resources. To resist or at least minimize the pressure of ever-changing climate patterns and issues in relation to climate change, there is a need to develop an agriculture information cell for the farmers in each village. This information cell will raise the job opportunities for local community and will guide them about the climate resistant breeds, ways of cultivation, harvesting in detail. This information cell must have the tested varieties of climate resistant seeds and seedlings. Seed storage for potato in the harsh climatic condition is a challenge in the CKNP area, therefore input store for seed must be provided at least among every three villages.
8. **Spread of infestation to the wildlife:** Buffer area of CKNP harbor 230 villages. All of these villages have agriculture crops and trees which are getting infected manifolds since last decade. These pest species have the chance of transmission towards the wild medicinal herbs, forests, nests of birds and ultimately enter in fauna. This pathogenic transmission can induce infections in the flora and fauna and has a considerable potential to depress the specialist species. However, this issue has not yet been explored and needs a well-prepared monitoring procedure to estimate the estimate the annual economic laws.
9. **Research projects:** Without research, adaptation to climate change is generally problematic for agricultural production and for agricultural economies and communities; but with adaptation, vulnerability can be reduced and there are numerous opportunities to be realized. Adaptation must be supported by the research of relevant components. Productivity is declining at a rapid pace due to some known and unknown reasons. Apparently, climate change seems responsible for this decline aided with ever increasing pest attacks during the last 10 years. The recent changes in the climate are so unpredictable that it is becoming impossible for the farmers to work in agriculture farms for profit. Customary practices for agriculture sustainability are losing their functionality. These practices must be

updated by designating specific studies of seed variety, soil analysis, crop suitability analysis, bio-control of pests, the projected impact of climate change on the crop's productivity and transport, optimum economic benefits from every suitable crop and several other interrelated components. As it is evident that the impacts of climate change on agriculture will vary depending on precipitation changes, soil conditions, and land use, therefore these impacts are required to be evaluated independently for each valley in the buffer zone of CKNP. This vast research is possible if included in the operational plan of the CKNP to provide support for an updated management plan of CKNP.

10. **Key policy reforms:** Key policy reforms across three pillars are needed to strengthen farmer incentives to achieve productivity growth sustainably, and without sacrificing climate change mitigation and adaptation objectives. These three pillars are i) Farmer level, ii) Agriculture sector level, iii) Provincial level. The agriculture policy needs an up gradation to mitigate the effects of changing climate and devising the climate friendly strategies at an urgency to minimize the agriculture induced impacts on climate ultimately to protect the protected areas of GB, particularly its largest park the CKNP. The management plan which is already established has a huge gap about the laws of employing climate friendly approaches in villages residing in buffer areas for agriculture. Moreover, the climate is not only changing, but it is also on stationary which means old knowledge can't be the thing to rely upon. So gap of climate friendly approaches must be assessed via operation plan for CKNP and then addressed in to the revised version of CKNP management plan.

5.2. Pasture

Upgradation of customary laws: Customary practices should be amended in such a way that ensure the sustainable use of pastures. Diseased animals must be kept away from the pastures to avoid the zoonosis and must be vaccinated. Extraction/cultivation of medicinal plants by the local community must account only for household purpose and should be cultivated in the amount equal to its removal. Encourage stall feeding/minimize grazing till the improvement of pastures.

These strategies must be field tested and then included in the customary and statutory laws and CKNP revised management plan.

1. **Grazing management:** To enhance pasture productivity timing of grazing and grazing sites in each pasture are need to be designated to develop holistic grazing strategies with farmers/herders that include rotational grazing or intensively managed grazing as a regular grazing routine.
2. **Fodder cultivation:** Regionally adapted and high nutrition value fodder crops should be cultivated for fodder instead of traditional species. This will remove the stress of early grazing from the pastures and allow them to grow.
3. **Training of herders:** Herders have no information about the sustainable practices of livestock grazing. They just sent their livestock with guards to feed upon the pastures. Timing of grazing is integral for livestock. There are several other factors that need to be cared for the sustainable livestock grazing.

4. **Seeding of local flora and training of Farmers:** Local flora should be collected and cultivated on the barren patches among the pastures. This will increase the pasture areas and productivity. Research on cultivating these species is required. After it dissemination of knowledge through training sessions, manuals and brochures will convince the farmers about the re-seeding of pastures.
5. **Local botanical garden to ensure the existence of local flora:** Adaptable plants should be identified among the plants. These plants should be kept in the botanical gardens to provide backup in case of avalanches, landslides, floods and barren land cultivations.
6. **Encourage the pasture extension services by other line departments:** Many forestry and livestock enterprises run by private farmers and the government depend on efficient, economical, and environmentally beneficial pasture use. Farmers need technically competent advisors to help them accomplish their objectives. Unfortunately, no advisory services for the pastures exist in the villages because of lack of pasture specialist technical advisor. Therefore, there is a strong need to train the forest relevant personnel from each village or valley as a pasture specialist. CKNP biodiversity directorate staff can be a potential candidate for this training as they are both aware of natural resource use in and around CKNP.
7. **Cultivation and marketing of medicinal herbs:** Cultivation of these herbs should be promoted as an alternative economic resource with appropriate site assessment and training on its cultivation, harvesting, marketing and utilization. Economic uplift of the community will actually decrease their dependence on CKNP resources and allow them to grow.
8. **Ethno-botanical database:** Development of consumer linked ethno-botanical databases of each village will not only enhance the market for the local farmer but also fosters the direct link to the consumer.
9. **Pasture awareness programs:** Hands-on training and field experience are two of the best, most rapid ways to increase farmer's/shepherd's awareness and local university students about the optimum pasture use for healthy livestock. Final outcomes will be best when this training is guided by technically competent professionals who can accurately answer questions and help solve problems. This training will allow the local community to employ sustainable practices and secure these resources for their future generations.
10. **Research problems:** Phenological shift of floral species and their impact on biodiversity must be assessed on a priority basis so that extirpations can be avoided. The ecological baseline of the pastures to keep the biodiversity of the area must be developed. Similarly, potential farming sites for each medicinal plant should be identified. The predicted impacts of climate change on the pasture productivity are not known and need to be evaluated due to their high valued ecosystem services. Most utilizable and ecologically resilient entry points are needed to be identified and designated.

5.3. Water

The water laboratory at KIU has carried out a water quality assessment in all villages of CKNP, the result shows that people living in CKNP buffer zone afflict with different kinds of water contagious diseases because of the scarce access to clean drinking water. Even though glacier water is present in many areas, however easy access to clean water is very difficult for most of the population.

1. **Quality of drinking water:** The water testing facility already established at the Karakoram International University provides the free testing, but local community is not very interested in the procedure due to lack of awareness.
2. **Construction of small and medium sized reservoirs:** Construction of small or medium-sized reservoirs in the foothills and plains are quite necessary, so that water from streams can be harvested for use during the dry season and the winter, both for farming and domestic purposes.
3. **Common drinking water storage tank:** Shared water storage tanks should be built upon among the households to help them adapting drought conditions.
4. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water, ensuring that it do not mix into the freshwater streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.
5. **Early warning system:** But to give relief to the local community of the Daghoni Valley there must be system to give them timely alerts about their crops and livestock protection. This will accentuate the economic resilience of the community and natural resilience of the buffer area.

5.4. Forest and NTFP

1. **Up gradation and regulation of forest laws:** Forest resource is scarce in Daghoni valley due to which available species need protection through improved customary practices and the inclusion of the most implementable rules from statutory law. Conservation related customary practices exist symbolically for protection of forest and wildlife and need to be implemented, therefore allow collection of fuel wood, timber and non-timber forest products unlike statutory laws, which increase their favor towards the customary laws. If this practice is continued, then the community will shortly run out of their forest reserves. To ensure sustainability, an up-gradation of customary rules is recommended. Otherwise, implementation of statutory laws is the integral which can be more enhanced by fostering statutory laws by the concern line department
2. **Promotion of farm forestry:** Resources should be provided and farmers should be trained to have small-scale farm forests, which, along with revenue generation allow them to be independent of forests. This practice exists in a valley but very limited. The training will allow the farmers to take self-initiatives and entrepreneurship in forestry sector.
3. **Climate change and conservation friendly forestry projects:** To generate credible forestry and conservation offsets, projects must be additional to what would have occurred without

the incentive supplied by the carbon market; they must be verifiable (i.e., measurable and enforceable); they must control or adjust for leakage; and they must address the issue of permanence. Forward crediting is proposed by some to accommodate the long period of carbon accumulation in forests, but others are concerned about assuring payments only for actual carbon sequestration.

4. **Restoration cum conservation:** Several sustainability practices are being carried out in Daghoni valley, but any of them hardly meet the conservation targets. Keeping in view the present environment sustainability changes, restoration is required along with conservation. Therefore, the upcoming forestry projects must come up with the forward crediting instead of required crediting.
5. **Research projects:** Projected annual greenhouse gas emission counts provide a baseline to identify required CO₂ sequestration offset. On the basis of this, it will be identified that which species is required and in how much amount to keep the climate stable for each valley in the buffer zone of CKNP and its surrounding areas. Remote sensing to monitor the land use changes is very essential because of the location of valley around CKNP. In future due to CPEC, land use is expected to be altered and its environmental consequences seem negative. To neutralize these expected issues, baseline data about land use will quantify the environmental impacts and truly determine the required type of actions with high accuracy.

5.5. Eco-tourism

Following interventions are recommended on the basis of the survey conducted for VCSDPs development.

1. **Interpretation of resources:** In order to increase the revenues by tourism there is a need to provide interpretation programs that are relevant to the public, further information is required. This information can be obtained through visitor surveys.
2. **Destination vulnerability hotspots:** The integrated effects of climate change will have far-reaching consequences for tourism businesses and destinations. Importantly, climate change will generate both negative and positive impacts in the tourism sector and these impacts will vary substantially by market segment and geographic region. The Daghoni valley is a disaster proven area which is not mapped and disseminated to the tour operators. This inventory should be developed along with measured risks and challenges that tourist can face.
3. **Infrastructure:** Surging flow of tourist in Gilgit-Baltistan over the last 2 years has increased opportunity for the unexplored valleys from touristic point of view. Daghoni valley has not much potential for tourism due to lack of touristic spots in the valley, however, it is the junction point for other touristic areas and the potential for related infrastructure such as accommodation, ecotourism facilities are required and needed to be developed to ensure the provision of facilities for tourist influx by public and private department.

5.6. Wildlife and Protected Areas

1. **Population assessment:** Database should be established to keep the systematic annual population assessment of all the near threatened and endangered animals. The protocols for population assessment of each species should be determined on ecological basis and kept same every year.
2. **Species recovery plan:** There is a growing consensus that habitat fragmentation has caused wildlife decline. However, what is the impact of this fragmentation is still unknown. There is a need to study to study how the urbanization, habitat isolation, decline in vegetation has stressed the wildlife. How these impacts can be mitigated, which habitat areas need priority conservation actions such as habitat connectivity? All this information is possible from the properly designed studies unique to each class of wildlife based on which species recovery plan will be designed.
3. **Genetic reserves:** Genetic reserves inside the protected areas of the threatened and endangered species are needed to be identified for their restoration. If the designated protected areas do not have by chance these genetically healthy populations, then their boundaries should be adjusted according to these reserves.
4. **Climate change indicators:** Several fungi and amphibian species are considered as an indicator of climate change. These species are experiencing decline in the population, such as Deosai toad, which was once abundant in clean waters of the area. This species is now hard to find because of water pollution. These indicators are needed to be identified and used as a climate change detection for the areas. This research will provide the real assessment unlike models, which sometimes fails to give real estimate.

6. STATUARY VS CUSTOMARY PRACTICES IN DAGHONI VALLEY

S. No.	Consumptive Uses of Park Resources.	Community Practices	CKNP MP/OP Rules	Recommendation
1.	Harvest of Forest and other natural vegetation	Juniper trees are cut and used as fuel wood and timber	Harvest of Juniper is banned; if harvest is necessary than only only branches should be removed instead of whole tree	Awareness of community is required
		Riparian vegetation e.g. Sea-buckthorn and Willows, community usually remove the whole plant/tree from soil	Cut single basal shoots from each plant to preserve in its root system. By doing so, new shoots can re-grow rapidly producing new biomass to be harvested	-do-
		Community harvests wood at unsustainable level both from buffer and core zone	Wood and shrub collection are allowed only in the buffer zone up to sustainable level	Afforestation, alternative fuel options and sustainable forest management areas are need to be designated. Along with this harvest rate compatible to annual growth of forest should be determined
2.	Medicinal Plants	Community harvests local medicinal herbs and aromatic plants from park for household purpose	Harvest is completely banned in core zone and allowed at sustainable level from buffer areas under license.	Community must be awarded the license and concerned department restrict the harvest without license.
3.	Livestock Grazing	Herd grazing is allowed only in buffer zone and tourism focused zones of the park.	Community graze their livestock in packs along with dogs inside core zone. Dogs and packs are not allowed inside parks	Improvement in watch and ward mechanism along with community awareness is necessary at urgency
		Equines (horses, mules, donkey) occasionally found in core zone of the park	Equines are allowed only in tourism focused zone	--

		Yaks and its hybrids freely graze in the park	Grazing of traditional free roaming yaks and yak-cow breeds is buffer and core zone is acceptable	--
		Herders graze livestock in pasture and core zones dispose plastic bags, bottles in nearby streams and also use burn wood from forest	Use of plastic bottles, glass bottles, plastic bags and match box is not allowed inside parks.	Movement must be restricted for the grazers.
4.	Pastures	Community graze livestock in the pastures which are located in and around buffer zones.	Grazing is allowed only in buffer zone	--
		Indigenous system of grazing was sustainable. During previous times herders ensured to take livestock into the pastures, when vegetation becomes knee-length. Currently, herders have abandoned this practice and take their livestock to pastures even before its sprouting.	Indigenous grazing system should be revived	Awareness and training of herders is important
5.	Wildlife hunting	Community take advantage of inaccurate population counts of wildlife and poach/hunt wildlife at family gatherings, holy occasions and on other such events	Reliable wildlife count by DNA analysis is recommended and also to track poaching for core zone management. Hunting except for “trophy hunting” is banned both for buffer zone and core zone.	Community awareness can serve the purpose. Moreover, genetic approach should be employed for accurate population counts and tracking of poaching

1.

7. RECOMMENDED ACTION PLAN FOR DAGHONI VALLEY

S. No.	Sector	Management Objectives	Conservation/ Development Issues/Gaps	Root Cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time Scale
1.	CKNP Directorate	1.1. Improve CKNP functionality	Lack of enough support of local community for CKNP	Conflicts over the use of park resources Community awareness is insufficient due to deprivation meetings, and awareness campaigns by CKNP Directorate	1.1.1. Manage the conflicting issues ensuring park conservation 1.1.2. Awareness campaigns /training of local community about the significance, rules and regulations of the park and sustainable use of natural resources.	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All All	Urgent Urgent	Short term Short term
2.	Local Social Organizations	2.1. Develop Structural/ Institutional framework of social organizations 2.2. Develop capacity for Financial sustainability of local social originations	Insufficient support of LSO to CKNP directorate Poor implementation of conservation interventions implementations and subsequent sustainability	Weak communication linkages Lack of effective conflict management mechanisms Lack of awareness about sustainability avenues	2.1.1. Develop appropriate networking for existing social organizations under the umbrella of concerned LSO/CKNP 2.2.1. Preview the existing capacity of relevant LSOs for the identification of gaps 2.2.2. Capacity building of Social organizations to ensure conservation of park resources and sustainable resource used	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities Activity 5.2.1	All All All	Urgent Urgent Urgent	Short term Short term Short term

					2.2.3. Capacity building of LSO to generate funding for their sustainability	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
3.	Health	3.1. Promote health facilities	Prevalence of Diseases	Lack of basic health facilities in existing dispensaries Lack of sufficient dispensaries	3.1.1. Capacity building of existing staff	Suggested for inclusion in community development planning system	Kharkoo, Dagboni	Urgent	Long term
					3.1.2. Provision of Medicines				
					3.1.3. Provision of new diagnosis equipment				
4.	Energy	4.1. To meet energy demand	Depletion of natural resources	Preference of fuel wood from forest by the local community due to free commodity Lack of alternative fuel options	3.1.4. Awareness conferences about hygienic practices	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
					3.1.5. Dissemination of brochures and pamphlets to educate community about prevention from sporadic diseases				
					3.1.6. Promotion of healthy and hygienic practices by women and children through workshops, campaign and social organizations	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in community development planning system	All	Urgent	Priority
					4.1.1. Promotion of fuel-efficient stoves at high altitudes				
4.	Energy	4.1. To meet energy demand	Depletion of natural resources	Preference of fuel wood from forest by the local community due to free commodity Lack of alternative fuel options	4.1.2. Develop and Motivate usage of alternative sources	Activity 14.2.1	All	Urgent	Short term
						Activity 14.2.1.			

5.	Education	5.1. Curb illiteracy	Prevalence of unsustainable practices due to unawareness and misunderstanding purpose of conservation	Lack of needful development infrastructure and human resource	5.1.1. Increase the capacity of existing schools	Suggested for inclusion in community development planning system	All	Medium	Long term
					5.1.2. Creation of new educational facilities	Suggested for inclusion in community development planning system	Kharkoo	Medium	Long term
			Poor acceptability of messages/solution of conservation	Lack of awareness	5.1.3. Awareness of school staff and children about sustainable use of resources, respect of statutory laws and changing climate scenarios	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
6.	Agriculture	6.1. Lack of sufficient food and future food security	Out-migration Malnutrition and related disease	Lack of financial and technical capacity to enhance agri-productivity	6.1.1. Introduction of Improved seed varieties for agriculture and other related crops adaptable to local climatic conditions 6.1.2. Capacity building of farmers about modern techniques to enhance productivity. 6.1.3. Fruit park	Suggested for inclusion in revised MP/OP activities Activity No. 17.1.1. Suggested for inclusion in community development planning system	All All All	Medium Medium Medium	Medium term Medium Term Medium Term
				Water Scarcity	6.1.4. Construction and repair of water channels and for barren lands	Suggested for inclusion in revised MP/OP activities	Daghoni	High	Medium Term

				Pests and diseases	6.1.5. Integrated pest management techniques	Suggested for inclusion in revised MP/OP activities	All	High	Medium Term
				Improper crop storage	6.1.6. Promotion of small-scale solar driers	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
				Lack of jobs and economic opportunities in agriculture and related crops	6.1.7. Improvement of existing economic opportunities 6.1.8. Creation of new job to enhance economic capacity of the local community 6.1.9. Provision and Installation of fruit processing unit	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All All	Medium Urgent	Medium Term Long term
				Less arable land per household	6.1.10. Development of barren land patches	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
7.	Livestock	7.1. To enhance income opportunities for locals from livestock	Livestock mortality due to diseases	Disease spread Poor breeds with lesser dairy productivity Lack of proper grazing management	7.1.1. Improvement of existing vet facilities 7.1.2. Establishment of new vet facilities	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term

			Depredation of livestock by wildlife	regeneration with lesser productivity	7.1.3. Livestock insurance scheme	Activity No. 9.4.2	All	Medium	Medium Term
			Poor breeds with lesser productivity		7.1.4. Training regarding animal husbandry	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
			Disease out break		7.1.5. Training of herders to restrict zoonosis	Suggested for inclusion in revised MP/OP activities	All	Urgent	Medium Term
8.	Pastures and Rangelands	8.1. To maintain ecologically healthy ecosystem	Loss of floral diversity Loss of pollinators	Water scarcity	8.1.1. New snow fed channels for pastures irrigation	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
			Over grazing Degraded pastures resulting in loss of food for Wildlife	Uncontrolled number of livestock Insufficient growth time for pastures Poor and dangerous accessibility to pastures	8.1.2. Promotion of supplementation with stall feeding 8.1.3. Promotion of fodder cultivation on suitable land patches 8.1.4. Awareness of herders/professional shepherd about sustainable herding practices Revive the use of indigenous grazing system	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All All All	High Moderate Urgent	Medium term Medium term Short term

			Unknown Carrying capacity	Lack of Research studies	<p>8.1.5. Research studies about the carrying capacity and adaptability of Pasture to climate change</p> <p>8.1.6. Establishment of enclosure to measure productivity with surrounding pastures</p>	Activity No. 9.2.1.	All	Urgent	Long Term
						Suggested for inclusion in revised MP/OP activities	One healthy/least degraded pasture in whole valley	Urgent	Long Term
9.	Forest	9.1. To maintain appropriate forest cover	<p>Run-off and landslides</p> <p>Less biodiversity</p> <p>Less fuel wood availability for local community</p>	<p>Lack of alternative fuel resources</p> <p>Lack of capacity to use fuel resources</p> <p>Lack of awareness on values and function of forests</p>	<p>9.1.1. Enhance productivity through Reforestation and afforestation</p> <p>9.1.2. Promotion of farm forestry</p> <p>9.1.3. Develop restricted forest zones to ensure regeneration</p> <p>9.1.4. Training of farmers for farm forestry</p> <p>9.1.5. Up gradation and regulation of customary practices</p> <p>9.1.6. Improved Watch & ward (Capacity building and induction of more game watchers or community guards) to minimize illegal harvest</p>	<p>Suggested for inclusion in revised MP/OP activities</p> <p>-do-</p> <p>-do-</p> <p>Activity No. 9.1.3.</p> <p>-do-</p> <p>-do-</p>	<p>All</p> <p>Kharkoo</p> <p>All</p> <p>All</p> <p>All</p> <p>All</p>	<p>Urgent</p> <p>Urgent</p> <p>Urgent</p> <p>All</p> <p>All</p> <p>All</p>	<p>Long Term</p> <p>Medium Term</p> <p>Medium</p> <p>Short Term</p> <p>Short Term</p> <p>Long Term</p>

10.	Wildlife	10.1. To improve and maintain healthy wildlife population	<p>Unsustainable hunting</p> <p>Habitat degradation</p> <p>Diseases from livestock resulting in un-natural mortality</p>	<p>Habitat fragmentation and degradation</p> <p>Poaching</p> <p>Lack of awareness about significance of biodiversity of area</p> <p>Lack of eco- tourism opportunities</p>	<p>10.1.1. Dedicated zones for wildlife, restrict grazing in those areas</p> <p>10.1.2. Improve habitat connectivity in existing fragmented habitats</p> <p>10.1.3. Habitat modelling for near threatened wildlife species</p> <p>10.1.4. Identification of healthy population of endangered species reintroduction</p> <p>10.1.5. Establishment of water point</p> <p>10.1.6. Improve watch and ward mechanism with inclusion of local SOs</p> <p>10.1.7. Awareness raising through seminars, and wildlife clubs in schools</p> <p>10.1.8. Dedicated research projects</p>	<p>Suggested for inclusion in revised MP/OP activities</p> <p>-do-</p> <p>-do-</p> <p>-do-</p> <p>-do-</p> <p>Activity No. 6.1</p> <p>-do-</p> <p>-do-</p>	All	High	Long term
							All	High	Long term
							All	High	Medium term
							All	High	Medium term
							All	High	Short term
							All	High	Long Term
							All	High	Medium term
							All	Moderate	Long term
11.	Tourism	11.1. Promotion of tourism as a sustainable economic avenue	<p>Loss of economic opportunities</p> <p>Loss of support for conservation and</p>	<p>Insufficient facilities of road and stay</p> <p>Lack of interpretation of</p>	<p>11.1.1. Maintenance of road throughout the touristic season</p> <p>11.1.2. Development and dissemination of</p>	<p>Suggested for inclusion in revised MP/OP activities</p>	All	High	Short term

			development opportunities	resources i.e. Hot springs Lack of mechanism to attract tourist/visitor	brochures for interpretation of tourist opportunities 11.1.3. Water supply, waste disposal and improvement in washroom condition 11.1.4. Community based residence and restaurants 11.1.5. Establishment of a fruit park with bath rooms and rest area	-do- -do- -do- -do-	Daghoni All All Daghoni	High Urgent Medium Medium	Short term Medium term Medium term Medium term
12.	Water	12.1. To maintain quality and quantity of water	Pollution Water shortage at source and point of end-user	Climate change Waste disposal into water channels	12.1.1. Water quality testing from all water channels 12.1.2. Awareness of local community with focus to keep water resources clean and its minimal usage	Suggested for inclusion in revised MP/OP activities -do-	All All	High High	Long term Long term

8. IMPLEMENTATION AND MONITORING MECHANISM

8.1. Implementation Mechanism

The whole process needs to be facilitated by Conservator- Baltistan in collaboration with CKNP Directorate and NGOs such as AKRSP, AKPBS, EvK2CNR, WWF etc. Following steps are important in this regard:

The first step should be the restructuring of the community organizations in the form of Community-based conservation and sustainable development organization's (CBCSDOs). Agreements should be signed with CBCSDOs for their proactive participation in conservation and sustainable use of natural resources. The local communities are now well mobilized in support of CKNP and the restructuring should not be a problem.

The second step is participatory conservation planning in which the draft CSDP should be shared with the respective communities (involving VCCs, UC members, President of VOs and WOs (where possible)): line departments at district level (Agriculture, LS&DD, Forest, Wildlife and Park, Tourism) and concerned NGOs such as AKRSP, AKPBS, EvK2CNR) to solicit their technical opinion and possible support during implementation of the plan.

The third step is approval of VCSDP from DCC Ghanche, and facilitation of subsequent DCC meetings to facilitate and monitor implementation on VCSDP.

There are two cross-cutting themes. First is capacity-building involving awareness raising, trainings and exchange programmes. The second is financial sustainability which comes from various sources, primarily from government allocations and subsequently at community level from various sustainable use initiatives such as trophy hunting, ecotourism, CKNP entry fee etc. Community based organizations can also initiate small projects for that the capacity of the CBCSDOs can be enhanced so to conceive, develop, hunt and implement small initiative on their own. However, this kind of the implementation will be done in consultation with the CKNP directorate to avoid any duplication in the activities.

8.2. Monitoring Mechanism

8.2.1. CKNP Directorate

The major responsibility of monitoring all action of a CBCSDO carried out under the framework of VCSDP should be jointly with DFO Ghanche and CKNP Directorate. The DFO Ghanche and CKNP Directorate can monitor their progress in the following steps:

- Visiting individual CBCSDOs and checking their records and verifying physical progress on activities
- Attending DCC meetings and reviewing progress of CBCSDOs annual plans
- Monitoring CBCSDOs performance against their annual plans in the meetings of the CKNP Management Committee
- CKNP can call in meetings of the representatives CBCSDOs at the directorate on a periodic or need basis to review the progress against the tasks

8.2.2. District Conservation Committee Meetings

The VCSDP should be presented in DCC Ghanche and endorsed by the chairman of DCC with recommendations from CKNP Director and DFO Ghanche. The DCC Ghanche in its bi-annual meeting should review the progress of implementation on VCSDP. Each village should have an annual plan to be presented and subsequently reviewed in DCC.

8.2.3. Community Agreements

DFO Ghanche, CKNP Directorate or any supporting agency intending to initiate any activity with a CBCSDO should sign a letter of agreement explaining the roles and responsibilities of all parties involved in undertaking the activity. A copy of such an agreement should be made available in CBCSDOs office records.

8.2.4. CBCSDOs Audit and Record Keeping

DFO Ghanche, CKNP Directorate or any supporting organizations should emphasize on proper record keeping of all activities undertaken by CBCSDOs. This can be done by checking monthly minutes' sheet, proceedings of the special meetings and financial records of CBCSDOs. It should be mandatory for every CBCSDO to have their annual audit report. Any financial support to a CBCSDO should be linked to availability of annual audit report. The community must have a separate file for all major activities to be undertaken as part of the VCSDP.

For all major initiatives the CBCSDO should constitute two committees: a) project execution committee and b) project audit committee. Most of the local communities are familiar of this system due to the projects of several organizations.

8.2.5. CBCSDO Visitor Diary

CBCSDO should maintain a visitor diary for noting comments, feedback and observations of all visitors coming to a village in connection with conservation and sustainable development initiatives. The CKNP Directorate, DFO Ghanche and supporting agencies or organizations should clearly instruct their employees visiting any village/ valley to write down their notes in CBCSDO visitor diary. This way the supporting agencies can avoid duplicate of efforts and it will be helpful in carrying out the activities systematically and logically.

8.2.6. Relevance in Assignments

The CBCSDOs should find the relevant person for carrying out tasks including the finance and record keep, meeting minutes etc. The relevant persons will thus be able to keep a proper record that is a prerequisite for the sustainability of the community organizations. Channels should be found out, wherever possible for the capacity building of the technical persons closely coordinating with the government and private organizations.

8.2.7. Network of CBCSDOs

In order to learn from each other's best practices, it is worthwhile to develop a network of CBCSDOs. They may opt to meet led by some representatives facilitated by CKNP to discuss

the successes and failures. The learning can be shared that can help in avoiding failures, adopting models that lead to successes considering the relevancy.

Visitors Diary
Name of CBCSDO.....
Name of Visitor
Organization/institution
Date of visit
Purpose of visit
Venue of meeting
Meeting participants.....
Key discussions or decision points
.....
.....
.....
.....
.....
Required follow up actions
.....
.....
.....
.....
Signature of the visitor.....

Conservation and Sustainable Development Plan 2016 – 2026

Thalay Valley

Central Karakorum National Park

Gilgit Baltistan



CONSERVATION AND SUSTAINABLE DEVELOPMENT
PLAN 2016-2026
THALAY VALLEY
CENTRAL KARAKORAM NATIONAL PARK
GILGIT-BALTISTAN



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PLAN EDORSEMENT

Signed by President LSO Thalay

Endorsed Director CKNP

Approved by Deputy Commissioner/
Chairman, District Conservation Committee
For Ghanche in meeting of DCC Ghanche
Held

Dated.....

CONTENTS

Abbreviations.....	i
1. INTRODUCTION OF THALAY VALLEY	1
1.1. History of Thalay Valley	1
1.2. Location of Thalay Valley	1
1.3. Ecological Profile of Thalay Valley	3
1.4. Socio-economic Profile of Thalay Valley.....	4
1.4.1. Demography of Thalay Valley	4
1.4.2. Road Access	6
1.4.3. Education Facilities.....	6
1.4.4. Health Facilities	6
1.4.5. Veterinary Facilities.....	8
1.4.6. Electricity	8
1.4.7. Traditional Governance System	8
1.4.8. Gender Impact	9
2. ASSESSMENT OF CUSTOMARY PRACTICES FOR SUSTAINABLE USE OF NATURAL RESOURCES	11
2.1. Requirement of Revitalization of Indigenous Knowledge	12
2.2. Water	12
2.3. Agriculture.....	14
2.4. Livestock.....	18
2.5. Pastures	21
2.6. Fuel Wood Collection/ Timber Harvesting	26
2.7. Mining	28
2.8. Tourism	28
3. ASSESSMENT OF CLIMATE CHANGE IMPACT ON NATURAL RESOURCES...32	
3.1. Climate Change in the Perspective of Indigenous Knowledge.....	32
3.2. Temperature Variability and Seasonal Shifts	33
3.3. Precipitation	33
3.4. Drought	33
3.5. Flood.....	34
3.6. Landslides.....	34

3.7.	Pastures	37
3.8.	Biodiversity	37
3.8.1.	Agriculture and Fruits.....	37
3.8.2.	Forest	38
3.8.3.	Wildlife and Associated Biodiversity.....	39
3.8.4.	Fishery	40
3.9.	Water.....	40
3.10.	Tourism	40
4.	MANAGEMENT ISSUES AND PROBLEMS.....	46
4.1.	Agriculture.....	46
4.2.	Pasture.....	47
4.3.	Water.....	48
4.4.	Forest and NTFP Issues	49
4.5.	Eco-tourism.....	50
4.6.	Mining.....	50
4.7.	Wildlife and Protected Areas.....	51
5.	PROPOSED MANAGEMENT INTERVENTIONS	54
5.1.	Agriculture.....	54
5.2.	Pasture.....	56
5.3.	Water.....	58
5.4.	Forest and NTFP	58
5.5.	Eco-tourism.....	59
5.6.	Wildlife and Protected Areas.....	60
6.	STATUARY VS CUSTOMARY PRACTICES IN THALAY VALLEY	61
7.	RECOMMENDED ACTION PLAN FOR THALAY VALLEY	63
8.	IMPLEMENTATION AND MONITORING MECHANISM	74
8.1.	Implementation Mechanism	74
8.2.	Monitoring Mechanism.....	74
8.2.1.	CKNP Directorate.....	74
8.2.2.	District Conservation Committee Meetings	75
8.2.3.	Community Agreements	75
8.2.4.	CBCSDOs Audit and Record Keeping	75

8.2.5.	CBCSDO Visitor Diary.....	75
8.2.6.	Relevance in Assignments.....	75
8.2.7.	Network of CBCSDOs.....	76

LIST OF EXHIBITS

Exhibit 1: View of Valley	1
Exhibit 2: Map of Thalay Valley	2
Exhibit 3: Village locations of Thalay Valley	3
Exhibit 4: Trees of Thalay Valley	3
Exhibit 5: Demographic profile of villages of Thalay Valley, 2016.....	4
Exhibit 6: Demographics of Thalay Valley, 2016.....	4
Exhibit 7: Demographic map of Thalay Valley.....	5
Exhibit 8: Socio-economic profile of Thalay Valley.....	7
Exhibit 9: Snow fed water stream	12
Exhibit 10: Land cover map of Thalay Valley.....	13
Exhibit 11: Men working at agriculture field at valley.....	14
Exhibit 12: Economic benefits of agriculture production in Thalay Valley.....	15
Exhibit 13: Need fulfillment by agriculture in Thalay Valley (Baltoro - Taghari), 2016.....	17
Exhibit 14: Need fulfillment by agriculture in Thalay Valley (Kashumik - Prangu), 2016	17
Exhibit 15: Contribution of livestock in economics of Thalay Valley.....	19
Exhibit 16: Livestock population and income of Thalay Valley (Baltoro-Taghari).....	20
Exhibit 17: Livestock population and income of Thalay Valley (Kashumik - Parangus)	21
Exhibit 18: Assessment of grazing pressure from each livestock classes on pastures of Thalay Valley	23
Exhibit 19: Forest cutting at Valley	26
Exhibit 20: Timber harvesting and use at Thalay Valley	27
Exhibit 21: Summary of fuel wood harvest and consumption Thalay Valley (Mg yr ⁻¹).....	27
Exhibit 22: Annual fuel wood harvest, Thalay Valley	29
Exhibit 23: Details of fuel wood harvested per household from several sources (Mg/HH/yr) 29	
Exhibit 24: Barren land patches.....	32
Exhibit 25: Climate change at Thalay Valley in the perspective of indigenous knowledge	35
Exhibit 26: Impact of climate change on pastures of Thalay Valley.....	37
Exhibit 27: Impact of climate change on biodiversity of Thalay Valley	41

Abbreviations

°C	Celsius
ABG	Annual Biomass Growth
CAI	Current Annual Growth
CKNP	Central Karakoram National Park
CPEC	China Pakistan Economic Corridor
E	East
EIA	Environmental Impact Assessment
FGD	Focus Group Discussion
GB	Gilgit-Baltistan
GLOF	Glacier lake outburst flood
HH	Households
INGO	International Nongovernmental Organization
Kg	Kilograms
KIU	Karakorum International University
LSO	Local Support Organization
m a.s.l.	Meter above sea level
Mg	Mega grams
MP	Management Plan
N	North
N/A	Not Applicable
NGO	Non-governmental Organization
NTFP	Non-Timber Forest Product
OP	Operational Plan
S	Summer
SEED	Social Economic Environmental Development
UC	Union Council
VCC	Valley Conservation Committee
VCF	Valley Conservation Fund
VCSDP	Valley Conservation and Sustainable Development Plan
VCSP	Valley Conservation Sustainable Plan
VO	Village Organization
W	Winter
WO	Women organization
Yr	Year

1. INTRODUCTION OF THALAY VALLEY

1.1. History of Thalay Valley

The exact date of when the valley settled is very difficult to trace. The local communities narrate different stories linking it with the King Qissar. However, it is an old settlement as people are dwelling for many generations. The name Thalay is a Balti word with several contextual definitions by the local habitants.

THALAY VALLEY IS KNOWN
AS VALLEY OF PASTURES

Firstly, the word Thalay is said to be name of a shrub with small fruits used as sweets in ancient days. This shrub grew everywhere and out of it; the area was called Thalay.

Secondly, a Ladakh king travelled through the valley and he found that people very rich in food items and demonstrated hospitality offering sufficient food to him and his team while he was passing through the valley. Inspired with the hospitality of the people with provision of food, he named the valley Thalay which means “EXTRA” in Balti language.

Historically, Thalay valley remained trade route between Ladakh and the rest of the Baltistan region via Thalay La Shigar and Skardu and China through Shing khang La (pass) which connects Baltoro glacier and Muztagh glacier. According to local story people from China Yarkan, attacked the valley and some time in summer they used to come to play polo at Saraq Sa polo ground in Thalay as the ruin of the Polo ground is still found in the Thalay pasture. The YarKan or Khutan people used to take away the livestock and even young men.



Exhibit 1: View of Valley

1.2. Location of Thalay Valley

Thalay valley known as the valley of pastures is situated about 110 km from Skardu city and 40 km from Khaplu, the head quarter of district Ghanche at an elevation of 2623m. It is divided into two parts, upper Thalay and lower Thalay. Hushey lies on the eastern side and Askoli lies on its west. It has an unpaved link road to approach and daily transport service to Skardu and Khaplu. Valley is supplied by Thalay River, formed by the convergence of glacial melt from the northern glaciers and the side valleys, drains the main valley and discharges to the Shyok River in the south. Khanqas (shrines) dating back to the early seventeenth and eighteenth centuries are the center of attraction for tourists and anthropologists.

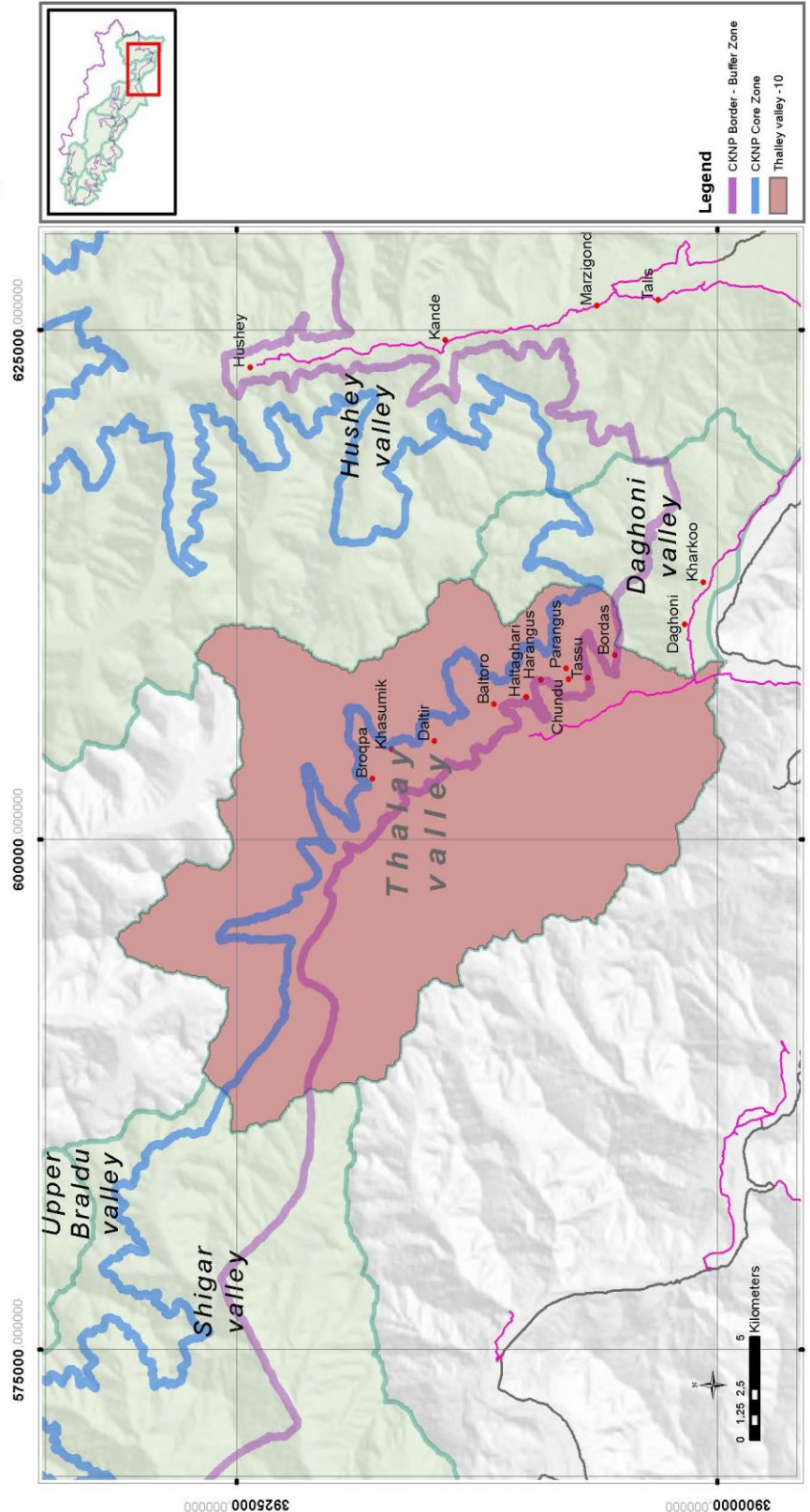


Exhibit 2: Map of Thalay Valley

Exhibit 3: Village locations of Thalay Valley

Villages	Coordinates		Elevation (m asl)
	N	E	
Baltoro	35°20'18.9"	076°08'29.6"	2996
Harrangus	35°18'57.9"	076°09'12.9"	2860
Chundu	35°18'59.3"	076°09'05.3"	2874
Yarkhor	35°19'21.0"	076°09'15.4"	2915
Taghari	35°19'27.3"	076°09'10.6"	2929
Kashumik	35°22'38.6"	076°07'12.3"	3270
Bordas	35°17'16.6"	076°10'18.9"	2731
Daltar	35°21'36.3"	076°07'43.5"	3184
Bloqpa	35°20'05.0"	076°08'52.2"	2977
Parangus	35°18'11.3"	076°09'50.5"	2811

1.3. Ecological Profile of Thalay Valley

Thalay is located among the southwestern side of Central Karakoram National Park due to which it has dense vegetation as compared to the valleys at north east side. Vegetation of the area is the mix of sub-tropical scrub type at lower elevations and dry temperate coniferous forest zone at higher elevations. Thalay valley is representative of 2.4 % broad-leaved, 4.5% coniferous forest and 93% juniper trees (Ferrari, 2014). These forests are the sources of consumptive and non-consumptive uses as reported by the local community. Unlike other communities these forests are co-managed between the villages.

The biodiversity of Thalay valley is adapted to harsh and varied climatic conditions and topography. Besides this, there is a rich diversity of habitats e.g., lakes, springs, small rivers and streams, sub alpine and alpine meadows, steep mountain slopes, cultivated fields, road sides and permanent glaciers etc., which support a rich and equally diverse floristic wealth. Wildlife species

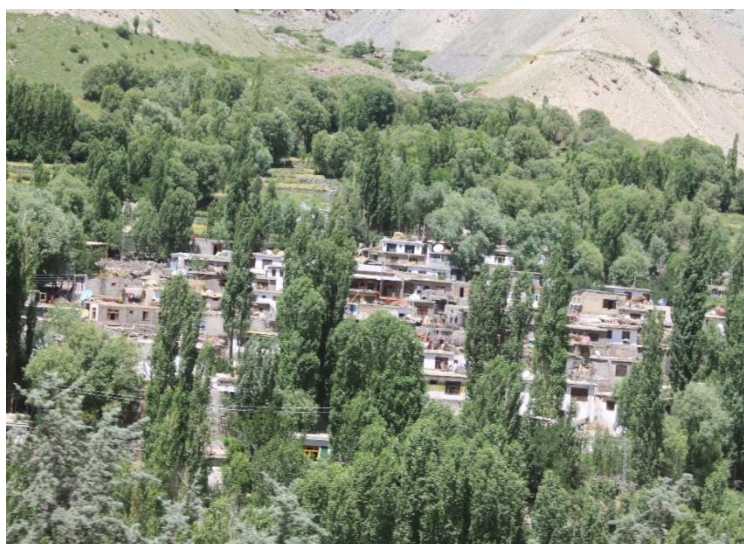


Exhibit 4: Trees of Thalay Valley

such as Markhor was once common but now it is no more in the area. Ibex is common among wild ungulates. The climate is arid and moist but because of lying at the outskirts it receives approximately 120-240mm average annual rainfall. This rain water is significantly important for the farmers which also rely on snow melt water feed into the streams and water channels from glaciers.

1.4. Socio-economic Profile of Thalay Valley

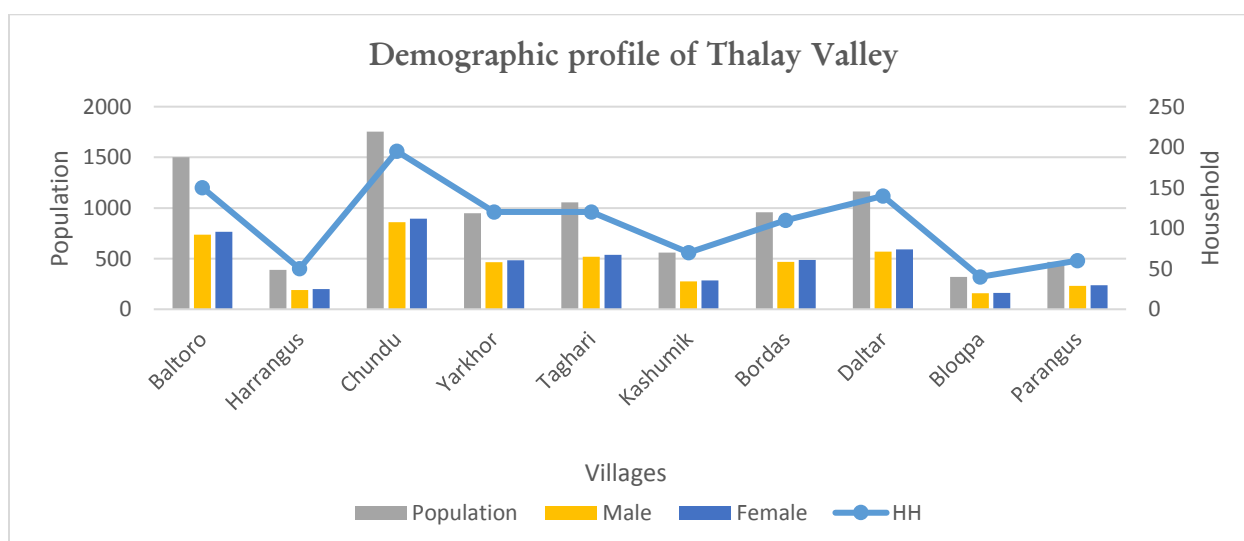
1.4.1. Demography of Thalay Valley

According to the survey results conducted for VCSDPs of CKNP villages, total number of households is 1055 containing 9116 total population (49.4% female and 50.96% male) with an average household size of 8.43 and male to female ratio is 0.963:1.038. All these villages are based around the buffer area of CKNP which spans 2757.88 m² and serves as reserves of natural resources for the local people and transitional area between the park and local communities. This local community depends heavily upon natural resources, both for subsistence and income.

Exhibit 5: Demographic profile of villages of Thalay Valley, 2016

Village	HH	Av. HH size	Population	Male	Female	Male: Female
Baltoro	150	10	1500	736	764	0.963: 1.038
Harrangus	50	7.8	390	191	199	0.959: 1.041
Chundu	195	9	1755	861	894	0.963: 1.038
Yarkhor	120	7.9	948	465	483	0.962: 1.038
Taghari	120	8.8	1056	518	538	0.962: 1.038
Kashumik	70	8	560	275	285	0.964: 1.036
Bordas	110	8.7	957	469	488	0.961: 1.040
Daltar	140	8.3	1162	570	592	0.962: 1.038
Bloqpa	40	8	320	157	163	0.963: 1.038
Parangus	60	7.8	468	230	238	0.966: 1.034
Total	1055	8.43	9116	4472	4644	0.963:1.038

Exhibit 6: Demographics of Thalay Valley, 2016



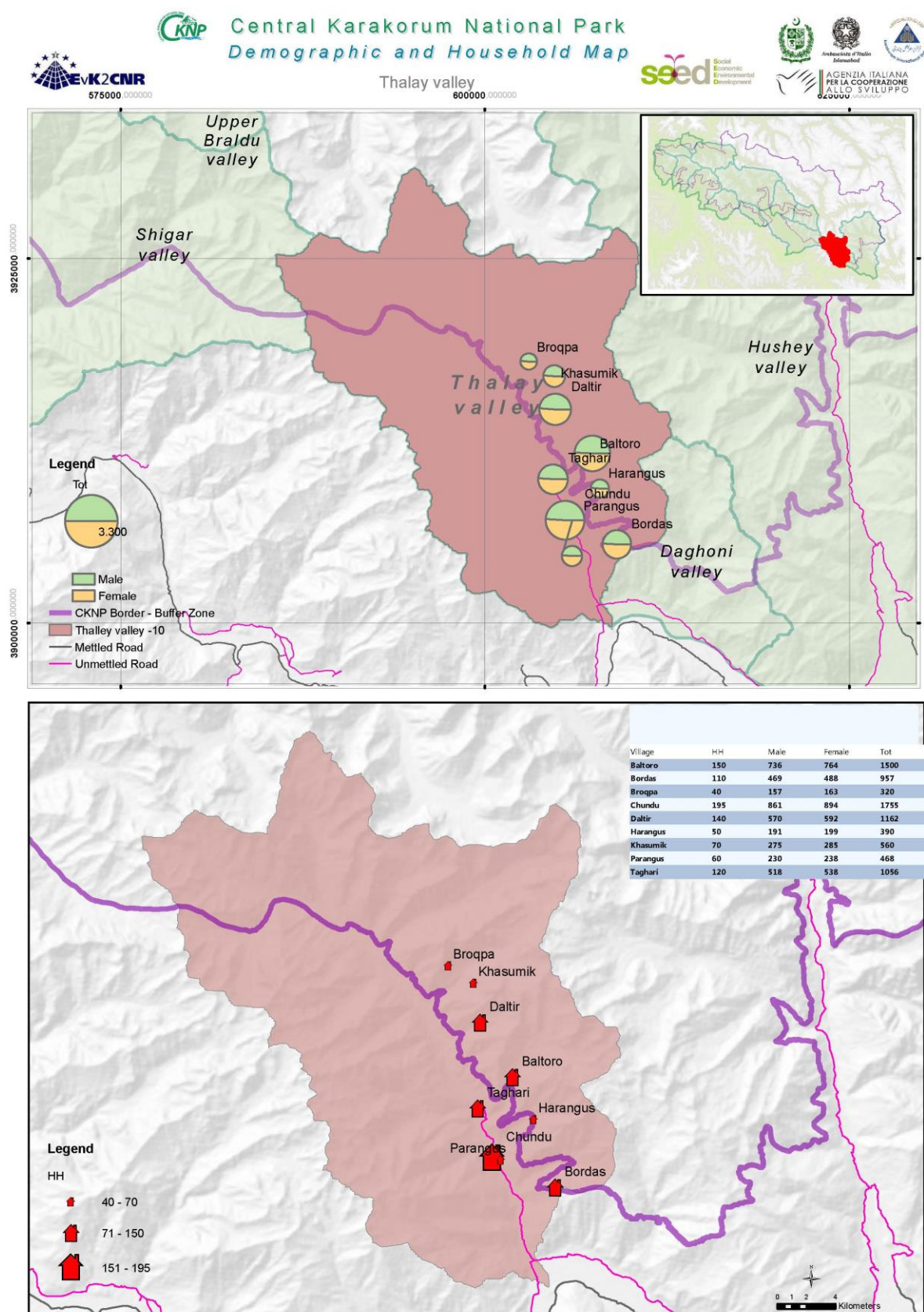


Exhibit 7: Demographic map of Thalay Valley

1.4.2. Road Access

Thalay valley is connected via an unpaved narrow road from Bordas for approximately 30 km to the Ghanche main road. The same road passes through the entire valley up to Bloqpa. All these villages are interconnected through unpaved bumpy roads. Though accessibility is a key issue in mountain landscapes and goes far beyond access to basic infrastructures such as health services, schools, roads, transport, markets and communicate with the outside world. This lack can be attributed to difficult topography and low population densities relative to lowland areas, factors that increase investment and maintenance costs. As the road leads ahead along with main water stream and passes through rough mountain ranges, it always remains prone to flood and landslide. Road blockage is common in the rainy days and during peak summer when due to high snow melt flood level increase in the stream and cause land erosion.

1.4.3. Education Facilities

Schools are available in the valley, but secondary level students are facing problems. There is only one high school in Parangus for students from whole valley. This school is basically for boys only, but due to unavailability of girls' high school in the valley, it serves as a co-education system. Relatively, access to a middle level school is easy as three middle schools exist in the valley. A boys' high school in Daltir village and a girls' high school in Baltoro and another in Yarkhorare serving the students. These schools exist in the upper middle and lower part of the valley and provide relatively easy access to the surrounding villages. The survey data shows that for high school students have to cross on average 5 km distance and for middle school on average 3.7 km, which shows that villages are at larger distance and more high and middle level schools are required in the valley. Primary school is almost available in all villages and in some areas one primary school exists between two bordering villages.

1.4.4. Health Facilities

A dispensary in Harnagus village, a first aid post in Baltoro and another in Kashumik village are the health facility for the whole population. The facilities are functional with some staff available in but communities face difficulties due to insufficient facilities, equipment and staff. Villages scatter on larger distances, such as Kashumik, bloqpa (a seasonal area) and Daltir villages in the upper valley faces significant issues to access the Dispensary in Harangus due to unavailability of smooth transportation in the area. Five primary level private schools in Daltir, Baltoro, Thagari, Yarkhor and Pharangs are also operating. For major cases the community access a 10-bed hospital in the neighboring valley Dagboni and DHQ hospital Skardu, but this access in the rainy days and peak summer season becomes difficult due to road blockage.

Exhibit 8: Socio-economic profile of Thalay Valley

Villages	Education facilities				Health facilities		Veterinary facilities	Electricity
	Category / Level	Ownership	Geographic Location	Gender	Facility	Geographic Location		
Baltoro	Middle	Government	N35°20'12.3" E76°08'40.4" 2993 m asl	Girls	Basic Health Unit	N35°20'24.6" E76°08'24.6" 3041 m asl	--	Yes
Harrangus	--	--	--	--	Dispensary	N35°19'01.6" E76°09'10.7" 2871 m asl	Dispensary	Yes
Chundu	Primary school	Private	N35°19'08.5" E76°09'06.1" 2901 m asl	Both	--	--	Dispensary	Yes
Yarkhor	Middle	Govt.	N35°19'13.7" E76°09'10.1" 2895 m asl	Girls	Dispensary	N35°19'13.7" E76°09'10.1" 2895 m asl	--	Yes
Taghari	Primary school	Private	N35°19'30.0" E76°09'04.9" 2940 m asl	Both	Dispensary	N35°19'30.0" E76°09'04.9" 2940 m asl	--	Yes
Kashumik	--	--	--	--	Dispensary	N35°22'34.6" E76°07'18.0" 3267m	--	Yes
Bordas	Primary school	Govt.	--	Both	Dispensary	N35°17'20.6" E76°10'12.9" 2720 m asl	--	Yes
Daltar	Middle	Government	N35°21'40.1" E76°07'43.9" 3185 m asl	Girls	Dispensary	N35°21'43.3" E76°07'42.3" 3198 m asl	--	Yes
Bloqpa	Primary school	Primary School		Both	--	--	--	Yes
Parangus	High	Government	N35°18'29.5" E76°09'40.7" 2819 m asl	Both	--	--	--	Yes

1.4.5. Veterinary Facilities

Thalay is among those valleys in Baltistan that devour high dependence on services provided by livestock but rapidly facing decline in its number due to unavailability of reasonable veterinary services and recurrent disease spread. Veterinary dispensary is located in Harangus only and presents very paltry picture in terms of services to local community. Most commonly reported livestock diseases are Goat pox, Enterotoxaemia (Goat, sheep and cattle), Black quarter, Mange (Large animals' cattle, yak, zozomo) as mentioned during FGD interviews. As an alternative to lack of vet facilities people of community purchase the vaccines without prescription from Skardu District or Gilgit city and inject them by themselves devoid of proper training.

1.4.6. Electricity

All the villages in Thalay valley has the access to electricity facility provided and managed by Water and Power Department, GB but supply-demand lapse is managed by load shedding (Exhibit No. 5). The frequency of load shedding increases in winter with increase in demand to maintain the indoor temperature. Local community residing around CKNP manages this electricity shortage by harvesting wood as a fuel source from the National Park.

1.4.7. Traditional Governance System

Traditional Governance system unfolds two tiers; within the households and within the village. Within the ambit of social structure at household level, the basic residential/economic unit is the joint family. Typically, this unit includes an elder's household with his married sons' families. Married sons generally live in their father's household with the latter or the eldest brother exercising authority over the extended family. The authoritative head of the household has the responsibility and authority to make decisions on behalf of the entire household members. It is within the joint family that the primary solidarities lie for daily economic activities. This customary practice of joint family system fairly justifies the lower average increase in households and higher average increase in population.

The whole buffer zone of CKNP is full of villages having rugged topography, jagged mountains, harsh climate and disaster-prone areas. In this situation, local community helped themselves by establishing and maintaining the local support organization in order to explore and enhance the developmental opportunities for the areas. They were established back in 1980 under the awareness and efforts of working NGO's and INGO's at time but maintained and managed by the local communities as an integral social component. It serves as umbrella for VCCs, VOs, and WOs. This organization contains the members from all the regional organizations and jurisdiction spans upon the water sheds at the village/valley level. Their function is equivalent sharing and support of the developmental opportunities in the area.

Social organization system is pretty much strong in Thalay valley as compare to other valleys in Baltistan region. The LSO and its sub organizations VOs and WOs and VCCs exist in the valley and working actively within the available capacities and resources. Thalay LSO is known as the best LSO in Baltistan for its good governance and management system coupled with

instigation of innovative practices. The LSO has implemented a number of successful projects in collaboration with different agencies and vigorously playing effectual role in conservation practices, through intensification of customary practices from the platform of social organizations including its sub-components V/WOs. All the conflicts within the valley are being resolved through using customary laws (Jirga System) from the platform of LSO. Over last five years LSO has dealt many successful community and family conflicts related cases.

Another innovative initiative by LSO is update and sound implementation of customary laws through LSO for natural resource management, such as water distribution, forest management and wildlife etc. Suitable changes in inherited customary laws are made time to time and different committees are formed under the supervision of LSO who strictly follow the deliberate rules and attempt to control deforestation, wildlife poaching, disastrous extraction of riparian plants etc. A visible result of the effort in terms of increase in wildlife population and forest regeneration can be seen in the valley.

1.4.8. Gender Impact

In Thalay valley gender roles are very similar to other CKNP valleys in the neighboring where a household usually comprises of two gender authorities, the oldest male member of a household is head of the household and the oldest women can be said as subordinate to the head. The division of labor is basically gender-based, the male members of the family including head of the family are responsible for both external and internal matters such as representing the household in the village as well as ensuring income earning and its management, such as decision making related to agriculture and livestock production, use and distribution of tasks. The women head of the house is responsible for defining and organizing the tasks and handling household economic affairs, including managing storerooms, kitchen and handling/use the agriculture and livestock production.

Primarily women are engaged in agriculture activities and other reproductive roles due to lack of income earning opportunity within the village and rare mobility opportunities outside the village. The primary reason for women's current role is lack of education and skill in women. A few women who earn cash income are either primary or secondary level teachers in the school or midwives in health facilities. Currently increasing enrolment of women in the schools is expected to increase number of educated women in few years, which will ultimately become a reason for changing women role.

ASSESSMENT OF CUSTOMARY PRACTICES FOR SUSTAINABLE USE OF NATURAL RESOURCES IN CONTEXT OF INDIGENOUS KNOWLEDGE



2. ASSESSMENT OF CUSTOMARY PRACTICES FOR SUSTAINABLE USE OF NATURAL RESOURCES

Local community inhabited this land since forefathers and practices their own set of rules known as customary/custodian rules/practices which were formed before the statutory laws even before the creation of Pakistan. These laws passed from generation to generation by words and hardly been written anywhere.

Local communities have long histories of interaction with the natural environment. With the passage of time the land use priorities changed and resulted in differential dependence upon natural resources by each community and even varied personally. Allied with many of these communities is a collective organization of knowledge, expertise, practices and emblematic depiction. These refined sets of understanding, elucidation and connotation are an integral component of a cultural complex that incorporates language, nomenclature, resource use practice, cultural and world view. This local and indigenous wisdom is a key resource for empowering communities to exploit natural resources in sustainable manners to ensure its continuation for next generations.

2.1. Requirement of Revitalization of Indigenous Knowledge

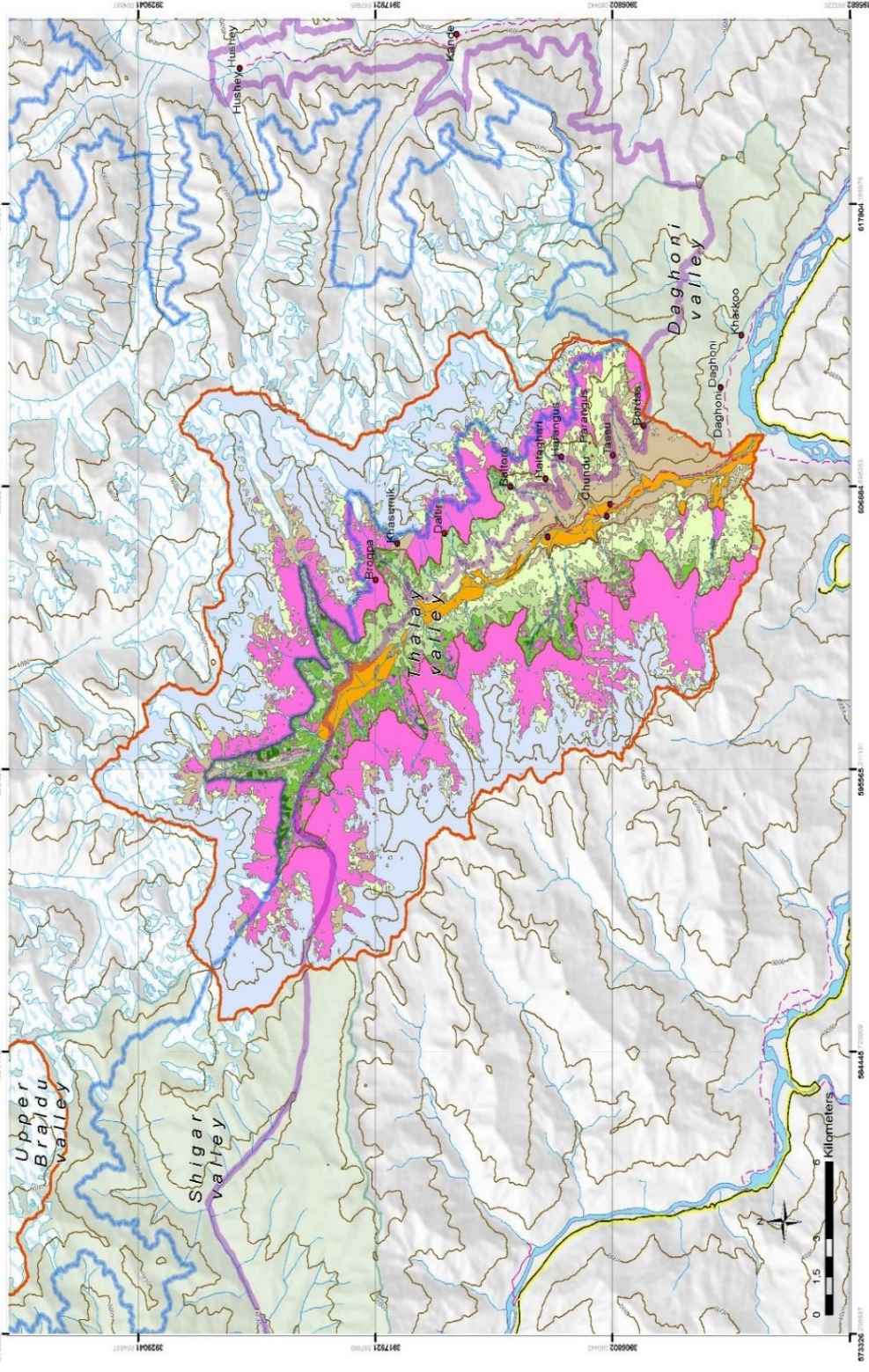
Indigenous people are the custodian of customary systems. These people are well informed about their own circumstances, their resources, what works and what does not work. They are also aware of the possible impact of a change in one factor on the other parts of the environment, but the issue highlighted by the local community during the interviews is that they are unable to assess and adapt to environmental changes as fast as its happening. This provokes the need of awareness raising and revitalizing the indigenous knowledge in a way that allows these people to adapt to their environment and let them able to reciprocate the disastrous changes steadily.

2.2. Water

Thalay valley has adequate water supply from the main stream at the middle and small water streams from both sides of mountainous terrain. The overall water availability is sufficient to cater required need of the valley; but during the peak flood season and landslides damage the irrigation channels and create water shortage. Water distribution is dealt by customary laws which hardly had any changes since generations.



Exhibit 9: Snow fed water stream



The common distribution occurs, family wise in turns for varied time ranging from four to eight hours depending upon water availability, while other villages' shares is open due to an abundance of water. Other villages lying close to water channels do not practice these distribution rules due to its abundance. Owing to the poor edifice of existing irrigation channels and absence of irrigation channels near agriculture areas productivity is affected.

2.3. Agriculture

Agriculture and livestock herding are two most preferred economic activities in Thalay valley. Open canopy forest, especially in the upper sections of the valley provides enough arable land for crop and fodder cultivation. A significant proportion of the part time farmers in some villages earn supplementary income from off-farm income sources such as government & private sector employment, small scale business and tourism. The role of women is significant in agriculture farms. Division of labor exists between both genders throughout the summer. Men mostly performs the cultivation activities (land preparation, sowing, and preparation of irrigation channels) with minor assistance from women while in harvesting season both work. Agriculture activities, such as irrigation of farms, fodder collection and storage for the winter season are performed by females of the house.

Lower part of the Thalay valley falls in the transitional cropping zone. The main crops in this zone are Wheat, Potato and Barley, however fodder is cultivated as a second crop. Owing to dependence on agriculture for subsistence, large landholding richly supplied by water is common, still wheat production hardly fulfill consumption per household for six to seven months and the gap is filled by purchasing wheat from



Exhibit 11: Men working at agriculture field at valley

government wheat reserve/subsidiary or the market. Potato is the only cash crop which is sold in the market to cash earn income. Almost in all villages significant portion (approximately 75%) of potato is sold while the rest is stored for household consumption. Buckwheat is currently as growing as an emerging cash crop, though in some villages of the valley farmers grow it, but use it for domestic purpose too, however there is high potential for buckwheat as a cash crop as high demands in the domestic exists. A part of the received income is spent on purchase of wheat from market to fill the gap. Although there is great potential available for fruit production in the valley, but due to lack of awareness on value addition, packing and marketing fruit products and vegetable are not mostly not sold.

Though the valley is rich in water resources supplied by the Indus River and nearby streams, but due to poor irrigation infrastructure in many villages water is not largely available. Water wherever available mostly utilized in the day time for farm irrigation and in the night time it is used to irrigate orchards, plantation areas and farm fodder lands. A considerable area of cultivable/barren land is available in the core valley and some side areas, but the community is lacking communal efforts, coupled with the scarcity of financial resources to bring it under cultivation. With increasing livelihood needs, individual households are working on land reclamation by expanding agriculture by altering land use. Land under natural forest and vegetation cover are being cleared for agriculture practices.

Exhibit 12: Economic benefits of agriculture production in Thalay Valley

Village	Kind of crops	Consumption (%)	Sale (%)	Average Income/HH/yr	Average Value/HH/yr
Baltoro	Wheat	100	0	80000	120000
	Barley	100	0		
	Maize	100	0		
	Potato	5	95		
	Millet	0	0		
	Buckwheat	100	0		
	Vegetable /Fruit	100	0		
Harrangus	Wheat	100	0	80000	130000
	Barley	100	0		
	Maize	0	0		
	Potato	5	95		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	100		
Chundu	Wheat	100	0	50000	90000
	Barley	100	0		
	Maize	0	0		
	Potato	10	90		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	0		
Yarkhor	Wheat	100		30,000	60000
	Barley	100	0		
	Maize	100	0		
	Potato	0	0		
	Millet	10	90		
	Buckwheat	0	0		
	Vegetable /Fruit	0	0		

Taghari	Wheat	100	0	60,000	100000
	Barley	100	0		
	Maize	0	0		
	Potato	10	90		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	0		
Kashumik	Wheat	100	0	70,000	125000
	Barley	100	0		
	Maize	0	0		
	Potato	100	0		
	Millet	0	0		
	Buckwheat	100	0		
	Vegetable /Fruit	100	0		
Bordas	Wheat	100	0	40000	80000
	Barley	100	0		
	Maize	100	0		
	Potato	5	95		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	0		
Daltar	Wheat	100	0	--	100000
	Barley	100	0		
	Maize	0	0		
	Potato	0	0		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	0		
Bloqpa	Wheat	100	0	50000	70000
	Barley	0	0		
	Maize	0	0		
	Potato	100	0		
	Millet	0	0		
	Buckwheat	0	0		
	Vegetable /Fruit	100	0		
Parangus	Wheat	0	0	30000	600000
	Barley	100	0		
	Maize	0	0		
	Potato	5	95		
	Millet	0	0		
	Buckwheat	100	0		
	Vegetable /Fruit	100	0		

Exhibit 13: Need fulfillment by agriculture in Thalay Valley (Baltoro - Taghari), 2016

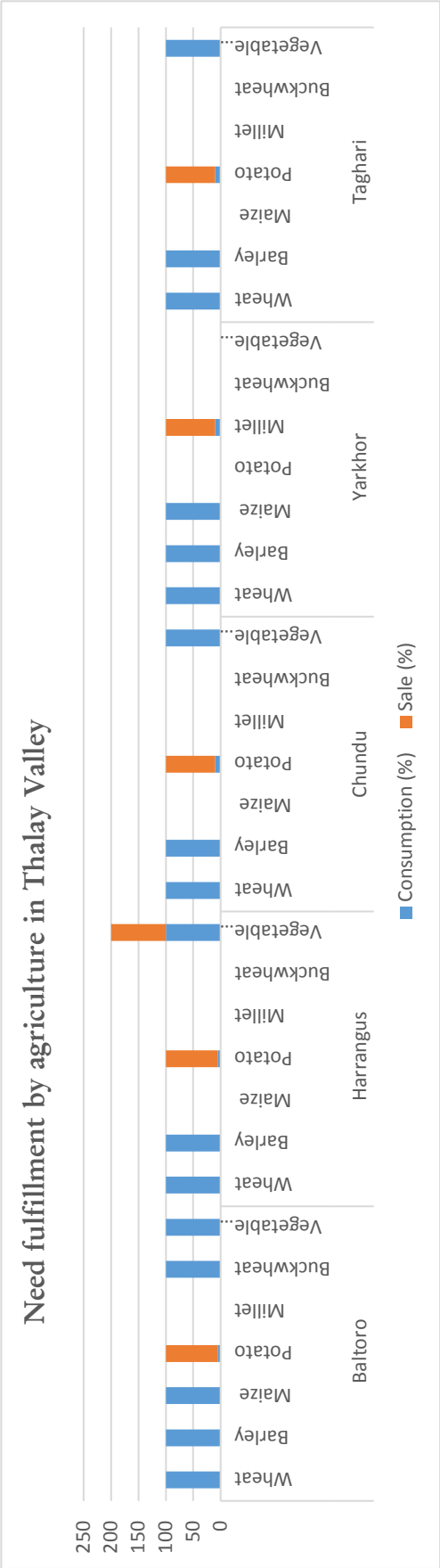
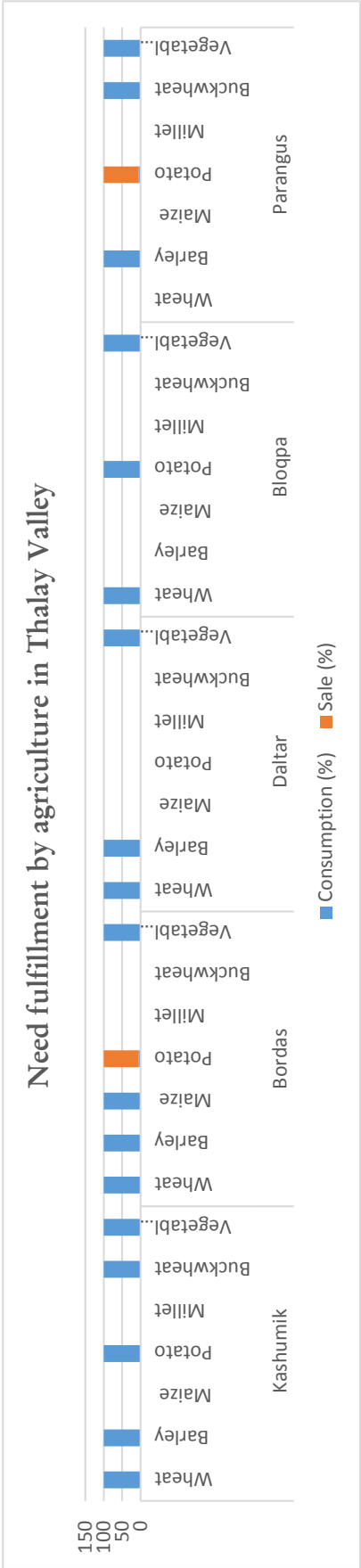


Exhibit 14: Need fulfillment by agriculture in Thalay Valley (Kashumik - Prangu), 2016



2.4. Livestock

Animal rearing serves as a "living bank" in terms of food and cash. Investment in livestock herding has a wide portfolio of animals: cattle, goats, sheep, donkeys, mules and poultry. This is supplemented in some areas with domestication of yak and hybrid yak. Livestock mobility, dispersion, shifting of households, utilization of pastures are adaptation strategies for livestock herding. However, the livestock population highly depends on alpine & subalpine pastures, and rangeland due to insufficient fodder from the agriculture fields. Moreover, the pastorals also collect fodder from pastures during spring, summer season and store it for the over-wintering.

1. Most working class of today has grown up and been educated. Many of them never return, but stay in town and join alternative livelihood options.
2. Thalay valley has prolonged winters and very short summer and spring season. The temperatures drop below the freezing point resulting dried out vegetation cover and snow-covered pastures. Pastorals face scarcity of fodder for livestock due to which animals produce a reduced amount of meat. Weak animals cause the economic capsizal for the owner.
3. Pastorals know about the changing climate, but they are neither adapted to it, nor do they know how to adapt and mitigate the effects of climate change for sustainability. New veterinary diseases are befalling in the villages at exponential rates during the last 10 years due to climate change. Aided by this lack of sufficient vet facilities, medicines and vaccines increased livestock mortality. Pastorals have almost no or very little information about the precautionary measures and vaccines and faces economic loss ultimately.
4. Customary practices are not very efficient to control disease spread among herds. Infectious agents spread from common grazing areas such as pastures, water points and other such places. Pastorals that rear livestock often lack the information about the zoonotic diseases and get infected from diseased animals.
5. There is a huge dependence of livestock on the pastures for fodder. With the increase in human population and ultimately livestock population the pressure has been increased, the subsequently health of pastures is decreasing. There is no assessment about the carrying capacity of pastures and therefore no rules exist about the maximum number of livestock in the pastures neither in customary rules nor in statutory laws.

The observed decree in the livestock rearing has both positive and negative impacts. The need is to assess the direction of adaptations towards the actions that are more suitable for natural resources and its components. On one hand, decreasing trend in livestock rearing is useful as it reduces the pressure on the pastures, by leaving space and food for the wild ungulate of the area such as Ibex, and several small rodent species and ultimately increasing prey density for wild carnivores. But on the other hand, decreased economic incentives by livestock in annual income per household increases the dependence of the local community on the wood and non-wood products. This dependence of the local community on natural resources needs to be evaluated in terms of monetary benefits during each season and their economic value in the area to make research-based decisions for ecosystem sustainability. No previous research addresses the

comparison of the monetary share of natural resources for household and its own economic value in terms of sustainable ecosystem services has been explored. Therefore, it is the need of time to strengthen the management plan by such research and specifically its implementation in the operational plan to ensure sustainable use of land and its products.

Exhibit 15: Contribution of livestock in economics of Thalay Valley

Villages	Kind of livestock	Population per village	Av. Income/HH/yr	Rearing trend
Baltoro	Sheep	2000	70000	Decrease
	Goat	1000		
	Cattle	100		
	Yak	200		
	Equids	100		
Harrangus	Sheep	600	30000	Decrease
	Goat	300		
	Cattle	60		
	Yak	100		
	Equids	30		
Chundu	Sheep	2500	24000	Decrease
	Goat	2000		
	Cattle	0		
	Yak	300		
	Equids	120		
Yarkhor	Sheep	1500	24000	Decrease
	Goat	800		
	Cattle	90		
	Yak	130		
	Equids	80		
Taghari	Sheep	400	15000	Decrease
	Goat	150		
	Cattle	80		
	Yak	145		
	Equids	70		
Kashumik	Sheep	1500	35000	Decrease
	Goat	700		
	Cattle	150		
	Yak	50		
	Equids	50		
Bordas	Sheep	500	40000	Decrease
	Goat	250		
	Cattle	200		
	Yak	160		
	Equids	70		

Daltar	Sheep	400	25000	Decrease
	Goat	200		
	Cattle	150		
	Yak	100		
	Equids	500		
Bloqpa	Sheep	250	15000	Increase
	Goat	300		
	Cattle	150		
	Yak	50		
	Equids	70		
Parangus	Sheep	150	25000	Decrease
	Goat	100		
	Cattle	90		
	Yak	40		
	Equids	40		

Exhibit 16: Livestock population and income of Thalay Valley (Baltoro-Taghari)

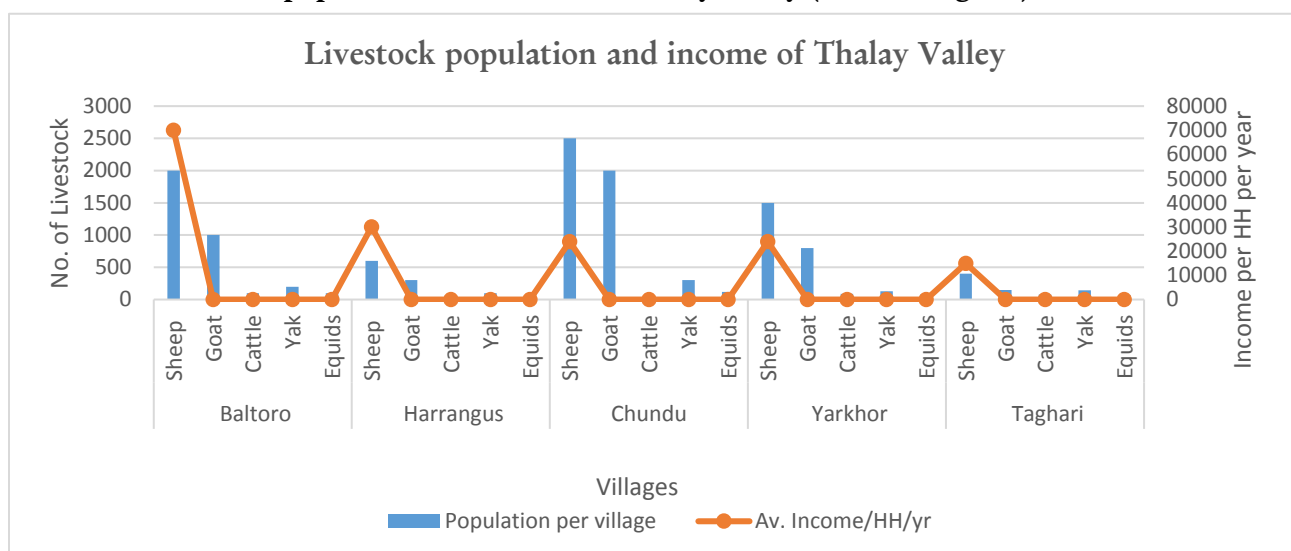
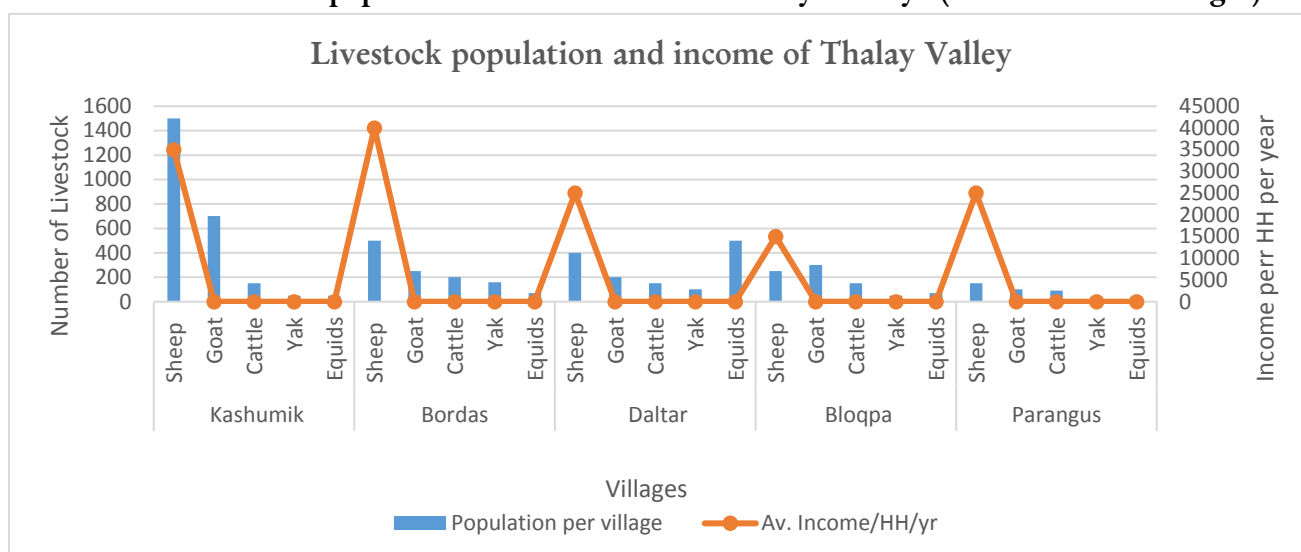


Exhibit 17: Livestock population and income of Thalay Valley (Kashumik - Parangus)



2.5. Pastures

Animal rearing dominates land use with pastures and water management being guided by customary rules in Thalay Valley. Pasture sharing within two or more villages ensuring the common access rights also guided by customary rules. Shared pasture often borders two or more villages. Local communities depend upon pastures for livestock herding, fuel wood collection, medical plants harvest, honey and other consumables on the basis of rights to access. Most of pastures are located at the same elevation and surrounds both sides of watersheds in the villages so same number of animals from each village could graze on all the pastures at same time. Local community reported only vertical transhumance patterns in the area during FGD interviews with seasonal movements from top pastures to the downside. Vertical transhumance either guided by a shepherd or family members is customary practice to avoid grazing of livestock on fields. During spring, when the fields are plowed and grains are sown. Consequently, household's livestock is moved out of villages to the lower pastures, free of snow, to protect cultivated areas from animal browsing.

As the season advanced, livestock is gradually moved at higher elevation to the summer pasture (Jul-Aug) above the timberline (4500 m a.s.l.). In the meantime, crops are grown and finally harvested. Then, livestock gradually returns to lower pastures and two stables at village levels (Nov). There, they stay during all winter (Nov-Mar) until successive spring, feeding on the crop residuals and hay collected during summer stored and dried by the households. For the farm protection from browsing prior to its movement during early spring, linear hedge of Russian olives is common on the terraces of agriculture patches. It is customary to keep all the dairy products as a payment or exchange the 50% for a certain amount of grains in the case when livestock is herd by shepherds in the pasture. Such pastures have only a few huts in them. Contrary to it, villages where the number of animals is not very large, several families might join together their livestock, each keeping them for one/two weeks or pre-settled time. Usually several huts are located in such pasture zones. Another customary practice exercised to avoid

the livestock of the neighboring villages which don't have access rights on particular pasture is the penalty. If livestock of one village moves to pasture of the neighboring village intentionally then penalty has been fixed by the village community according to the loss. At present, the FGD interviews indicate that 74% of the pastures are degrading gradually. Decline in health of pastures is a direct indicator of unsustainable harvesting practices due to increasing local population fueled by climate change. Uncontrolled grazing and other consumable products irrespective of decreasing productivity, allows them to earn handsome amount for subsistence.

Indirectly it also indicates less snow and a shift of rainy seasons, which contributes to its low productivity. Barren patches among pastures are notable features indicating the removal of top soil as a result of flooding and landslides. Collecting all the facts mentioned by local community and commonly reported in literature provokes the need of managing zones of rotational grazing in the pastures and determining the maximum number of each kind of livestock according to carrying capacity of pastures while keeping pace for wild herbivores reptiles and rodents to thrive.

Exhibit 18: Assessment of grazing pressure from each livestock classes on pastures of Thalay Valley

Pastures	Village	Other uses	Status	Grazing Period	Livestock				Total
					Sheep	Goat	Dairy Cattle	Equids	
Thaaly broq	Baltoro	Medicinal plant and wood collection	PD	Apr-Nov	2000	100	70	200	2370
Lughma		-do-	-do-		-do-	-do-	-do-		
Saithonbo		-do-	-do-		-do-	-do-	-do-		
Goshkar		-do-	-do-		-do-	-do-	-do-		
Sunghskoor		-do-	-do-		-do-	-do-	-do-		
Zawa		-do-	-do-		-do-	-do-	-do-		
Munbur		-do-	-do-		-do-	-do-	-do-		
Harrangul lungma	Harngus	-do-	H	Mar-Apr/May-Sep	600	60	20	100	780
Zgang boo		-do-	-do-		-do-	-do-	-do-		
chonsingay		-do-	-do-		-do-	-do-	-do-		
zbiarchung		-do-	-do-		-do-	-do-	-do-		
Chumdolungma	Harngus	-do-	PD	May-Sep	--	400		--	400
Tasambur		-do-	-do-		--	--	300	--	300
Spangtuchu		-do-	-do-		2500	--	300	--	2800
Braqdoug		-do-	-do-		-do-	--	-do-	--	-do-
Hrthakhamg		-do-	-do-		-do-	--	-do-	--	-do-
Shamdun		-do-	-do-		-do-	--	-do-	--	-do-
dumdum		-do-	-do-		-do-	--	-do-	--	-do-
Choll Coll	Yarkhor	-do-	-do-	May-Sep	-do-	--	300	--	2800
Braq Braq		-do-	-do-		2500	400	300	--	3200
Lamar		-do-	-do-		1500	100	38	--	1638
Khurubor		-do-	-do-		--	--	70	--	70
Shunshun	Thagari	-do-	-do-	May-Sep	1700	--	65	--	1765
barabrangsa		-do-	-do-		--	--	--	--	--

miraq			-do-		-do-			400	-	--		--		400
dangjing			-do-		-do-			--	-	--		--		--
dumsum			-do-		-do-			--	-	--		--		--
htrapormik			-do-		-do-			--	-	45		--		45
rzazgang			-do-		-do-			--	-	--		--		--
narnos			-do-		-do-			--	-	--		--		--
hlahlung			-do-		-do-			--	-	--		--		--
jilhang			-do-		-do-			--	-	--		--		--
Khusomik			-do-		H			1500	100	150		150		1900
Loagma			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Shaqar			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Fada Brangsa			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Nangjong			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Shokpaho			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Longma			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Chamik Brangsa			-do-		-do-			--	-	--		--		--
Dompy brangsa			-do-		-do-			--	-	--		--		--
Ghazbor Brangsa			-do-		-do-			--	-	--		--		--
Hapan Brangsa			-do-		-do-			--	-	--		--		--
bamalama			-do-		PD			500	150	--		--		650
khoncing		Bordas	-do-		-do-			-do-	-do-	-do-		-do-		-do-
khaparo			-do-		-do-			500	-	--		--		500
khema			-do-		-do-			500	200	300		--		1000
semboor		Daltir	-do-		-do-			-do-	-do-	-do-		-do-		-do-
balsa			-do-		-do-			-do-	-do-	-do-		-do-		-do-
Marsong			-do-		-do-			250	150	1		50		451
Ritong		Bloqpa	-do-		-do-			--	-	--		--		--
Shinkhang			-do-		-do-			--	-	--		--		--

Charqsaa		-do-	-do-			--	-	--		--	--
spanghle	Parangus	-do-	-do-	March-Sep		150	90	90		40	370
Nala shingan		-do-	-do-			150	90	0		30	270
Soghill		-do-	-do-			0	0			0	0
Maghma		-do-	-do-			0	0			0	0

2.6. Fuel Wood Collection/ Timber Harvesting

Thalay valley which lies at the humid north east side of CKNP has comparatively rich forest with approximately 44.9 km² vegetation cover and its average ABG is 682.9MgKm⁻² and CAI of the 246.8Mg/year (Ferrari, 2014). Vegetation cover is only 26.6% (2.6% grasslands, 0.5% close forest, 4.6% open forests, 18.9% for both scattered and sparse vegetation).

As a consequence of increasing population expansion of villages is a common phenomenon in Thalay like other valleys and thus construction of settlements/houses is also on the rise. The timber for construction purposes is either purchased from the local timber market or from natural/artificial plantations. Thalay which is impecunious in forest reserves, timber harvesting is usually regulated for its harvest in a few places at Thalay valley and represent an important share in total household livelihood revenues. However, in practice, this is hardly happening and locals decide by themselves where and how much to cut (FGD interview, 2016). It is important noting that use rights are maintained even by households now residing in nearby villages/cities. The usual amount harvestable is around 100/200 logs per household per year in Thalay valley.

From a large tree, locals usually obtain around 50 logs. The trees harvested for timber in each village of Thalay valley the value of a large tree harvested, divided into logs and transported to the nearest city (Skardu), can vary between 100,000 Rupees (Picea) and 125,000 (Pinus) depending upon the type and quality of wood.

Among the alternative fuel wood resources, electricity, is the only source to alleviate pressure on forest for fuel wood. According to the survey result, households partially use electricity and on average, which saves 440 kg firewood. The inhabitants of Thalay highlighted available potential and interest of local government in small- and large-scale electricity generation schemes to conserve the natural forests of Thalay valley.

Customary laws are being followed in the valley for exploitation of natural resources. Community is allowed to collect only dead and fallen trees for fuel wood and timber up to need basis only. Although,



Exhibit 19: Forest cutting at Valley

Exhibit 20: Timber harvesting and use at Thalay Valley

Village	Houses constructed in last 5 years (2010-2015)	Number of trees used	Tree species used
Baltoro	20	90	Popular, willow
Harrangus	20	60	-do-
Chundu	10	70	-do-
Yarkhor	40	50	-do-
Taghari	20	40	-do-
Kashumik	10	80	-do-
Bordas	15	15	-do-
Daltar	30	80	-do-
Bloqpa	15	90	-do-
Parangus	10	10	-do-

It does not allow the sale of timber but also not address the maximum amount of wood harvest from the buffer area. Willow in addition to poplar is harvested extensively by local community due to its frequent availability near the settlements in Thalay without taking into consideration its slow growth.

Exhibit 21: Summary of fuel wood harvest and consumption Thalay Valley (Mg yr⁻¹)

Village	HH	Consumption Per Household			Consumption Per Village		
		Winter	Summer	Total	Winter	Summer	Total
Baltoro	150	1.56	1.04	2.6	234	156	390
Harrangus	50	4.32	2.88	7.2	216	144	360
Chundu	195	1.176	0.784	1.96	229.32	152.88	382.2
Yarkhor	120	2.04	1.36	3.4	244.8	163.2	408
Taghari	120	2.136	1.424	3.56	256.32	170.88	427.2
Kashumik	70	1.32	0.9	2.22	92.4	63	155.4
Bordas	110	2.72	1	3.72	299.2	110	409.2
Daltar	140	1.2	0.8	2	168	112	280
Bloqpa	40	1.56	1.04	2.6	62.4	41.6	104
Parangus	60	2.4	1.6	4	144	96	240

There are several other gaps in customary laws which provoke the need of revitalization of these laws in addition to reinforcement of statutory laws essential for natural resources conservation and restoration. There is a strong need to quantify the magnitude of the chronic small-scale disturbances as well as large scale disturbance as a key component of landscape quality and incorporate the findings into laws to ensure sustainable and healthy environment in order to mitigate the haphazard changes of climate.

2.7. Mining

The presence of unique and specialized geological features designates the entire region of GB having most suitable geological environments as compared to the rest of the world where mineral deposits of economic grade are being extracted. These include metallic, non-metallic, energy, minerals, precious/dimension stones and different rocks of industrial use. Adequate deposits of dimension stones are found in Ghizer, Skardu, Hunza/Nagar and Gilgit Districts, besides serpentine deposits at District Skardu. Presently these are being mined using indiscriminate blasting techniques which not only destroy this natural resource, but also result wastage of more than 75% of the total yield. There is no presence of Gemstone in the valley or its unexplored, therefore people are not associated with this field.

2.8. Tourism

Tourism can be a vital source of revenues and employment if appropriate revenue-sharing mechanisms are put in place to enhance the benefits for local communities and pro-poor impacts of tourism. Thalay valley is having beautiful alpine and sub-alpine meadows and passes, but unfortunately those have not been explored / unknown to the tourists which can be turned into the famous touristic resorts and best routes by promotion. Thalay Broq is a very handy spot for tourists where jeep-able road is already constructed and the access is easy. Thalay Broq is though at a very short distance from Skardu in comparison to other such areas, but it has been remained unfamiliar to the tourist. In the past few years, locals have started to visit the area and considering it as the best and convenient spot for holidays in the summer. Local community hopes that it will get a great exposure among the domestic tourist in the upcoming years. A pass from Thalay to Askoli is already explored, but not promoted, similarly, another pass from Thalay to Shiger has the same status.

Exhibit 22: Annual fuel wood harvest, Thalay Valley

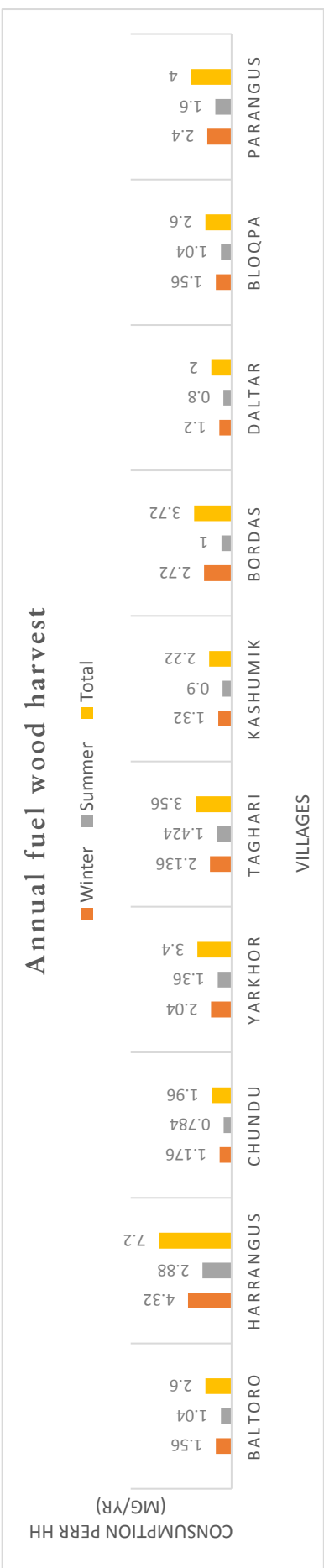
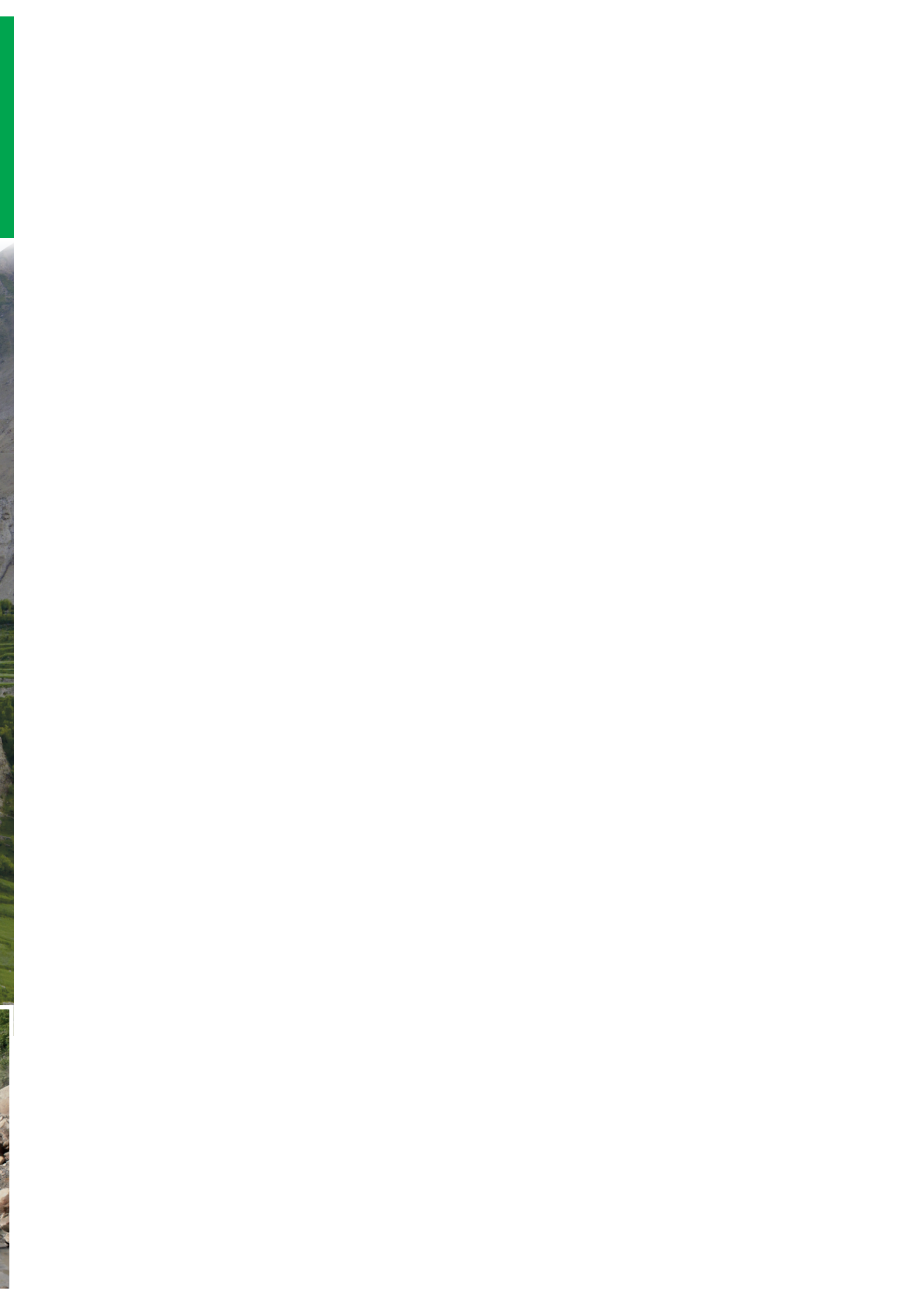


Exhibit 23: Details of fuel wood harvested per household from several sources (Mg/HH/yr)

Villages	Artemisia		Sea buckthorn		Juniper		Shrubs		Dung		Riverbank		Natural Forest		Fruit Trees		Plantation		Other Riparian trees	
	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W
Baltoro	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.6	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.4	0.0	0.0
Harrangus	0.96	0.64	0.1	0.12	0.3	0.5	0.0	0.0	0.8	1.2	0.0	0.0	0.1	0.1	0.5	0.7	0.5	0.7	0.0	0.0
Chundu	0.1	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.8	0.0	0.0	0.1	0.1	0.03	0.05	0.03	0.05	0.0	0.0
Yarkhor	0.2	0.16	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.84	0.0	0.0	0.0	0.0	0.48	0.7	0.2	0.2	0.0	0.0
Taghari	0.2	0.16	0.0	0.0	0.0	0.0	0.0	0.0	1.1	1.68	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0
Kashumik	0.7	0.4	0.0	0.0	0.0	0.0	0.1	0.1	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.0
Bordas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.04	0.0	0.0	0.0	0.0	0.01	0.01	0.1	0.1	0.0	0.0
Daltar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.1	0.0	0.0
Bloqpa	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.64	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Parangus	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.2	0.0	0.0	0.0	0.0	0.7	1.1	0.08	0.1	0.0	0.0

ASSESSMENT OF CLIMATE CHANGE IMPACT FOR SUSTAINABLE USE OF NATURAL RESOURCES IN CONTEXT OF INDIGENOUS KNOWLEDGE





3. ASSESSMENT OF CLIMATE CHANGE IMPACT ON NATURAL RESOURCES

Climate change is projected to have a significant effect upon the future rate of biodiversity loss. There is a growing global consensus that the rate of climate change has already exceeded the capacity of some species and ecosystems to adapt naturally, and is close to exceeding that of many more. There is therefore an urgent need to identify the key mechanisms underpinning climate change impacts on natural resources in order to best select climate change adaptation strategies. It is also essential that the scale of these changes is clearly communicated to policy and decision-makers. Furthermore, it is recognized that climate change will have increasingly significant direct impacts on local communities, biodiversity and that increased rates of species extirpations are likely. The growth of many crops and weeds is being stimulated. Migration of plant and animal species is changing the composition and structure of the local ecosystem. This will have negative consequences in terms of services provided by these species and ecosystems provide, especially in areas where the majority of the human population are the rural poor and dependent on direct exploitation of these ecosystem services.

3.1. Climate Change in the Perspective of Indigenous Knowledge

People at Thalay valley are well aware of the changes coming as a result of climate change the main concern of local community discussed during the FGD's was the adaptation strategies that are required to mitigate the effect of climate changing. Data obtained shows that the local climate is changing, but these changes are not very pronounced and can be reversed if we do proper and timely actions. Change in length of season has been reported by the local community with increased temperatures and prolonged summer.

The local community has also reported an increase in the frequency of disastrous activities. According to scientific investigations these higher temperatures are degrading the permafrost layers, causing slope instability, rock falls, landslides and avalanches.

Although climate change has both positive and negative impacts, the issue is that the negative consequences may be more pronounced in mountains, both for the communities and for their environments, requiring more awareness, more attention and quicker reaction than elsewhere. Equally, the consequences of negative impacts may go beyond the boundaries of the mountains and affect people and ecosystems in the surrounding lowlands.



Exhibit 24: Barren land patches

3.2. Temperature Variability and Seasonal Shifts

Gradual increase in temperature has been reported by the local community during the last 30 years. The most visible evidence of temperature increase is the earlier melt out of snow cover and glaciers across the region which has become more rapid over the last one decade. Trend analyses of the historical data for the period 1955-2010 show that winter season temperatures have increased in this region during the past 55 years (Raza, 2015). This increasing temperature is responsible for disastrous activities and glacier recession, which is getting frequent day by day according to the local community. Warming temperatures have led to effects as diverse as altered timing of bird migrations, increased evaporation, and longer growing seasons for wild and domestic plant species. Increased temperatures often lead to a complex mix of effects. The temperature in Thalay valley similar to other CKNP valleys in the Baltistan region shows an increasing trend over the last. According to the locals, increasing temperature is the reason for the increasing summer season length. Local community assess these changes through daily and seasonal activities, e.g. ripping of crops, melting snow/glacier, human diseases etc.

3.3. Precipitation

In addition, changes in climate, such as reduced snowfall and increased rainfall, are reported across the area by the local community, but solid evidence of the impact is difficult to ascertain. Changes in precipitation level and the size of storms affect plant-available moisture, snowpack and snowmelt, stream flow, flood hazard, and water quality. Rainfall variability and periodicity has changed since last 30 years with the most profound effect since last ten years. High speed and late rains have been observed by the local community which accelerates the crop diseases and infections. It shows that pests are getting adaptable to seasonal shift and variability more than other organisms and contribute to increased economic loss of crops and fruit trees. According to the local community frequency of snowfall has significantly declined and diminishing year by year. As a resultant decline in natural vegetation growth at sub-alpine pastures more than alpine pastures. Besides, it leads to declined water quantity and quality.

3.4. Drought

The drought is considered as the most damaging and costliest type of natural disaster, especially in mountainous regions where water quality and quantity is regulated solely by the precipitation with a far-reaching economic, environmental and social impact leading to food and water insecurity, reduced agricultural productivity, damage to forests, pastures, wildlife, livestock, fish and food price hikes. In Thalay valley drought is not a common phenomenon, however, very few time drought situations in few villages were observed, but the impact was not big enough to be reason for agriculture production loss. Warmer temperature the snow deposits are melting before time and in an increasing speed. Altered timing of rain is presenting a cumulative effect on drought, which results into the huge quantity of water by the start of summer. This quantity decreases and ultimately dries out as the season proceeds. The irregular availability of water halts not only the agricultural productivity, but also natural riparian

species. The local community so far is unable to assess the intensity of drought and to adapt it accordingly. Therefore, to enhance the resilience of the local community and ecosystem it is necessary to incorporate the following actions for CKNP operational plan.

- a) Devise the research to determine natural indicators to measure the intensity of drought for local community.
- b) Evaluate the proper management actions/ interventions to improve preparedness of community for drought.

3.5. Flood

Changes in the climate have had an influence on the magnitude and frequency of flooding in rivers in Gilgit-Baltistan. With respect to snow and glacier melt, the magnitude of temperature-changes during the spring and summer are sufficient to have caused a major change in the flood-potential of catchments. Changes in winter temperatures have influenced the amount and altitudinal distribution of snow available for melt in the subsequent season and this has increased the magnitude of the flood which is on average 45%, the flood frequency has also increased by 54%. Since changes in flood pattern is observed in the last three decades but over the last half a decade, a sharp increase in both frequency and magnitude of flood is observed. The increasing flood causes infrastructure damage such as irrigation channel and road and arable land erosion cum damaging crops and plantations. The communities suggested actions are to mitigate flood damage risk through mature the irrigation system with building concrete walls and also protective walls on the main sides of the main water stream.

3.6. Landslides

Floods are the regulating factors of the landslides. With an increase in the temperature and rain intensity, the soil patches lose their compactness. The increased Aeolian movements remove the top layer of soil and rain washes this layer from the mountains and move it to the nearby rivers and ultimately it becomes the part of the Indus basin. According to the survey conducted to gather information about the driving factors of the climate events by the local community, it is observed that landslides have increased considerably by 16.8 % over last 30 years. These landslides wither soil from the mountains, pastures and less vegetated areas and make the land barren. It destroys the infrastructure facilities such as roads, bridge, and sometimes buildings along the edges. Agriculture is the most negatively impacted sectors by land sliding because the irrigation systems are mostly built through rough mountain ranges and are more prone to landslide. As a result of damage to irrigation channels water supply remains blocked sometimes even for months, which causes water shortage and consequently decrease in agriculture production, fruit and plantation damage.

Exhibit 25: Climate change at Thalay Valley in the perspective of indigenous knowledge

Factors	Status	Change (days/%age)	Trend		
			30 yr ago (1985)	10 yr ago (2005)	Future prediction
Rain	Magnitude of rain increased, but frequency of rain has decreased. 50% villagers reported increased rain and 50% reported decreased rain. However, the community's perception about change in rain pattern is not clear.	NA	Normal/No change	Community never noticed	Community never noticed
Snow	Decrease	43	There was no obvious change in however very slight decrease in snowfall was observed	Decreasing	Based on sharp decrease in snowfall over last one decade the community concludes that snowfall will decrease in the future.
Temperature	Increase	18	Normal/ Slight increase	Increased	Temperature is observed continuously increasing and the trend shows an increase in temperature in the upcoming years.
Summer season duration	Increase	16	No clear change observed, but the community members think that increase in temperature has become very visible over last one decade and they could have observed an increase in summer length	Increase	With increase in temperature the community expecting increase in summer length.

Winter season duration	Decrease	16	No considerable change observed 30 years before	Decrease	With increasing summer length, winter season length is decreasing accordingly and will decrease in the future as well.
Glacier recession	Slight decrease	2% - 10 %	NA	NA	NA
Landslides	Increase	16	Increase	Normal/No change observed	Over last one-decade land sliding is observed increasing continuously and based on the local indigenous knowledge land sliding has increasing trend in the future as well.
Flood frequency	Increase	45	Increase	Normal/No change observed	Flood frequency in Thalay valley is reported highly increased over last ten years. Which damages road and irrigation infrastructure and the trend is expected to be increased frequency in the future
Flood magnitude	Increase	54	Increase	Flood magnitude is doubled over last two years	Magnitude of flood has highly increased in the valley. Though the community has reported sharp increase, but one can see the devastation in the sharp of road damage and land erosion as well while going Thalay valley.
Drought	N/A	N/A	N/A	N/A	Due to largely availability of water in the valley, no drought /very rare drought reported in the valley.
GLOF	N/A				

3.7. Pastures

Regional climate scenarios for CKNP valleys shows prolonged growing seasons and shifts in temperature and precipitation as currently happening in the valleys around CKNP are likely to affect plant phenology and growth. Despite the better and prolonged growth seasons range lands that serve as pastures and grazing lands are degrading annually. In the alpine and sub alpine pastures on average 10% degradation has been observed as a result of climate change, such as the declining amount of snow causing declining vegetation growth, etc. Mid and low land grazing areas have declined on average 15%. Locals are of the view that with high decreasing snow fall the low land/rangeland grazing area receives less amount of snow and thus more degradation takes place. Relatively amount of snow remains comparatively high on the alpine pastures and vegetation status is though degrading but relatively better off.

It can be assumed that many plant species are migrating vertically for lower temperature increasing the plant diversity at higher alpine regions and growing competition by highly productive species at low lands. The local community reported probable causes for pasture degradation as vertical shifts in plant growth and unsustainable livestock management.

On the other hand, warmer temperatures and increased microbial activity are likely to contribute in the loss of carbon from alpine soils. Since a higher amount of carbon is stored in soils than in the aboveground biomass above tree line this indicates that alpine ecosystems may turn into carbon sources rather than sinks.

Exhibit 26: Impact of climate change on pastures of Thalay Valley

Pastures	Status	Change (days/ %age)	Trend			Adaptation Measures by local community
			30 yr ago (1985)	10 yr ago (2006)	Future prediction	
Alpine and sub-alpine pastures	Degrading	10	Less degraded as compared to present	Degrading	More degradation is expected	Nil
Mid and low land grazing	Degrading	15	Less degraded as compared to present	Degrading	More degradation	Nil

3.8. Biodiversity

3.8.1. Agriculture and Fruits

Climate factors such as temperature, precipitation, CO₂ concentrations, and water availability directly impacts the health and well-being of fruit trees and agriculture crops. With increased temperature and CO₂, crops such as wheat, maize, barley, buckwheat, fodder, etc. and fruit trees are likely to grow more rapidly due to increased photosynthesis. It is also influencing insects, disease, and weeds, which in turn decreases agricultural production as currently happening in Thalay aided to these additional stresses is offered by variable precipitation and

irrigation water. Early and rapid snow melting accompanied by irregular rainfall followed by drought declines the productivity.

Farmers reported rapid increase in weeds and pests during the last 10 years, which shows a positive correlation with the increase in temperature. Thriving chances increases for the pests in warm climates. Disease pressure on crops is continuously at increase with earlier and prolonged summers and warmer winters, which allowed proliferation and higher survival rates of pathogens and parasites. The marketable yield of many commercial crops, e.g., potatoes, walnut, apricot, mulberry, almonds, etc. is declined for Thalay valley and become more sensitive to climate change than agriculture crops.

Local farmers observed the productivity and economic decline which shows that they are aware of climate change impacts but at the same time these people have no idea about the climate resistant seed varieties. To keep the tinge of organic farming and pristine local ecosystem the community must be trained about the natural and biological removal of pest and weed species.

3.8.2. Forest

Climate change directly and indirectly affects the growth and productivity of forests. Direct effect embraces the change in atmospheric carbon dioxide due to increased temperature and change in precipitation. The indirect effects account for the complex interactions in forest ecosystems. Climate also affects the frequency and severity of many forest disturbances such as cutting, removal of fruits etc.

Natural forest stands of Thalay valley represent a mix of woody and non woody vegetation. Major floral species are Pine, Junipers, Poplar, Fraxinus, Olea, Berberis, Wild Rose, Cotoneaster, Sea buckthorn, Artemisia, Stipa. Over the last few years, the conservation process in the area got swifts progress, discussion during FGD sessions reveals that condition of forest has started improving in the valley due to strict conservation practices by local communities. It is pertinent to note that Thalay LSO is the only LSO in the region which has not confined the conservation strategies to the plans, but practically implementing the practices through village level committees within the meager resources they have. The committees are ensuring customary practices regarding forest and wildlife management to avoid deforestation. Wood from the forest by the local communities are collected after permission of the committees, who allow them to collect a specified amount of wood permitted by the committees, while the committees stay quite vigilant during the peak firewood collection season from natural forests and ensure that only dead fallen wood is collected, if someone violets the rule, the illegitimate act of such offenders are taken seriously into account and being punished by imposing fine.

Since the community itself is effectively dealing with the climate change issues from the platform of the LSO, but still the practices are not enough to scuffle the situation. The LSO still facing technical and financial capacity and NGOs working on climate changes related programs or projects in the area can play a vital role to assist the LSO management in filling the gaps.

The local community has reported the following impacts of climate change on the forest:

- a) Rising temperature and CO₂ as a consequence of climate change has impacted the local forest ecosystem of Thalay by providing a prolonged growth season which seems to enhance its productivity apparently. But this rising temperature can lead to phenological shifts of the alpine species and they will become locally or regionally extinct since they are unable to shift to higher altitudes. The increased CO₂ is becoming useless with increased temperature because of water unavailability throughout the season due to early and rapid melt out of snow and shift in rain season.
- b) The nullahs branching out from glaciers and springs are the major irrigating channels for the agriculture crops and the forest species. With increasing temperatures these channels dry out and cause water stress augmenting the forest degradation.
- c) Along with this, warmer springs has the chance to extend the range and lifetime of many pests that stress trees and crops and at the same time it decreases the available water quantity throughout the year.

Considering all these facts, it can be concluded that the local community knows about the impact of climate change on the forest/natural vegetation but don't know about the mitigation strategies. These strategies are needed to be designed by thorough research and impact. With the increasing temperature and drought, it is obvious that some species will not be able to adopt and flourish in the ecosystem so there is a need to assess that how long the present floral species will survive and which species should be planted to continue the forest sustainability. All these questions need research-based answers and capacity building of the community accordingly to ensure the ecosystem viability.

3.8.3. Wildlife and Associated Biodiversity

The multiple components of climate change are anticipated to affect all the levels of biodiversity, from organism to biome levels. The impact of Climate change is projected to become a progressively more significant threat in the coming decades. In addition to warming temperatures, more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity.

In Thalay valley, condition of faunal diversity has recently improved over the past few years due to conservational practices carried out by CKNP and active participation of the community through the LSO. Rapid decline was taking place in the population of the only ungulate of the area 'Ibex' up to some 10 years back. High migration, increasing altitudinal shift and declining population were observed and the community itself took conservational practices earnestly and strict ban was put on poaching. Almost a decade of effort has receptively helped to increase in Ibex occurred.

It indicates that either climate is not posing pressure on the survival of Ibex or it is adapting to the changing climate. In either case comprehensive study is required to assess the breeding potential and adaptability of the species in a changing climate.

Considering the birds and butterflies it has been reported by the local community that these species were common a long time ago, but now several of them are not common and

experiencing a decline. The apparent reasons are the absence of a favorable climate for the prey species, decline in seed crops, removal of forests and floral species. No assessment has yet been done, which provides the complete biodiversity information about Thalay valley. Therefore, it is difficult to prioritize the species for conservation actions and to monitor the effect of climate change on the small and large animals.

3.8.4. Fishery

Climate change is likely to affect fisheries and aquaculture, their dependent communities and related economic activities along three main pathways. Many fisheries-dependent communities already live a precarious and vulnerable existence because of poverty, lack of social services and essential infrastructure. The fragility of these communities is further undermined by over exploited fishery resources and degraded ecosystems. Thalay valley is not dependent on the fishery for subsistence and therefore local community has no idea about the impact of climate change on the fishery. The implications of climate change for food security and livelihoods in the neighboring community of Thalay are need to be evaluated.

3.9. Water

GB is the largest fresh water reservoir of Pakistan due to high precipitation rates. Owing to the recent climate changes the water availability has been changed. Snow fall has declined up to 58%, according to the perception of the local community, but rainfall is abnormal increase. The altered precipitation pattern has caused the differential availability of water during different seasons. In the Thalay valley though water shortage is not common, but during the start of cultivation season and end summer water become scarce in some villages of leads to unsustainable water management, while in the summer season flood in the streams increases and washout water supply system which causes create water scarcity. The counteractive solution offered by the local community is to improve the structure of water supply system and construction of protective wall on the sides of water streams.

3.10. Tourism

Mountain areas are sensitive to climate change. The implications of climate change include less snow, altered rain timings, receding glaciers, melting permafrost and more extreme events like landslides. However, climate change is a severe threat to snow related sports such as skiing, snowboarding and climbing. Lower earnings in winter tourism are reinforcing economic disparities between the dependent communities and compel them to depend upon the natural resources of the area as a mean of their livelihood.

There is huge potential for tourism in the area in the coming future, but road facility and other infrastructure is meager. The most hindering issue is increasing flood levels in the river that causes water in the peak tourism season. To address the climate change impact on tourism the foremost important initiative is to ensure durability of road facility, which is highly prone to flood in the lower part of the valley.

Exhibit 27: Impact of climate change on biodiversity of Thalay Valley

Biodiversity	Status	Altitudinal Shift	Trend			Adaptation Measures by local community
			10 yr ago	30 yr ago	Future prediction	
Agriculture crops and fruit trees	Degrading	N/A	Increasing flood, diseases and largely adoptability of traditional farming method are reported the key reasons	No considerable change reports.	If no adaptive measures taken, the production is will remain on decline	Using traditional methods of treating diseases, Repair and maintenance of irrigation channels etc.
Natural forest	Degrading	Increasing	Decreasing	The communities are highly dependent on natural resources, therefore, forest degradation in the past 30 years and before that also remained on degradation	Forest productivity, regeneration is a low and altitudinal shift in increasing. The community is trying to mitigate the risk of high degradation over the last 10 years through LSO, but research-based interventions require, otherwise forest will keep on decline in the future as well	Forest committee under LSO is actively implementing customary laws with slight changes to protect forest
Wildlife						
Ibex	Population is increasing as a result of effective conservation by community; however, migration also takes place due to climate change effects. Such as due to decreasing snowfall	Increasing	The Ibex population is increasing	Population was on the decrease in the absence of conservation	If conservation practices strictly followed, the population of ibex is expected to be increased	Wildlife committees have put a ban on wildlife poaching and strictly vigilant to reduce poaching. The climate change impact is not within the community's capacity to deal with
Urial	N/A	-	--	--	--	--
Markhor	N/A	N/A	N/A	N/A	N/A	N/A

Birds	Increasing over last five years due to conservation practices.	NA	Increasing over last five years. Though as compare to the past some birds are still living relatively at higher altitudes which could be seen in the village before, but the number is observed at increase	Visible reduction is seen in population of birds such as Snow cock	If conservation practices within the community are not improved, Ibex population will decrease	Community is showing little awareness about decreasing in ungulate wildlife population, but yet not concern about reduction in bird population
Butterflies	Decreasing	Increasing	Butterflies population is on decline	Different varieties of butterflies existed and the population was much improved relatively than the current scenario	The population was normal	No adaptation has been done yet

CONSERVATION MANAGEMENT ISSUES & PROBLEM OF THALAY VALLEY



4. MANAGEMENT ISSUES AND PROBLEMS

Present scenario of Thalay valley has reflected several issues in customary practices and adaptation to climate change. These issues directly or indirectly affect the economic situation of each household and increase their dependence on natural resources which are free of cost and in vicinity to the community as compared to market. Therefore, in order to develop an effective strategy for adaptation, it is necessary to develop the capacity of local community to adapt to the changes in a way that reduces their dependency on natural resources. These adaptation approaches must then be disseminated to the communities and relevant laws up-gradation. In Thalay valley customary laws are being practiced in all villages, but these laws are unable to sustain and address the suitable practices and continuously generating issues, therefore needs an up-gradation. Though village committees are formed and actively performing toward the set objectives but the customary law needs to be well aligned with required conservations objectives to ensure ecosystem sustainability.

4.1. Agriculture

A smaller area of arable land is cultivated in Thalay valley by traditional varieties of fodder, crops, fruit trees and commercial trees. The following issues are being reported by the local community. These issues, although belongs to several sectors, but all are aiding in decline of agriculture production.

1. **Small land pieces for agriculture:** Thalay valley consists of ten villages lying on both sides of Thalay River spread over sloped mountainous terrain. The main agriculture area is squeezing fast with increasing population and emerging nuclear family system which accelerates per household landholding and consequently decreasing per household agriculture production. On top of that, Thalay stream grounds for land erosion on both sides and results in land, crop and plantation loss. The community has quite handsome area of arable land available in the upper part of the valley, which can be brought under irrigation through construction of irrigation channels. The community has no capacity to do it by its own and seeking for funds for participatory approach.
2. **Irrigation and water rights:** Customary rights about water sharing between villages and among the households is not documented anywhere. This generates confusion and rivalry among the land holders for water needed for irrigation.
3. **Low productivity:** Farmers, technical personnel, and interviewee from relevant fields unanimously reported low productivity per unit area. The common issues underlying this fact is small land, thin soil cover due to erosion, increasing pest prevalence over the crops, low fertility, water unavailability, erratic and unpredictable precipitation times, warm temperature, disasters such as landslides, floods and several other. The most important among them is the use of traditional methods and seeds for cultivation.
4. **Weeds and pest:** Organic farming is an important aspect that is valued all over the world for nutrition. Local farmers are lucky enough to manage the crops and fruit production

without using pesticides, insecticides and inorganic fertilizers. Animal manure and ash to be used to enrich the soil with minerals. Moreover, water in the streams also provide sufficient quantity of mineral to sustain agriculture practices. Despite of these, farmers are facing difficulties now a days due to several insect and flies' pest species which feed on the grains, fruits and other such products. Indigenous people and their knowledge is blaming climate change for increasing pest infection on fresh as well as dry seeds and fruits.

5. **Traditional practices and non-certified seed varieties:** Local farmers rely upon the traditional farming and cultivation methods. Growing crops from farm saved seed is common practice around the world and the same in Thalay Valley. Farmers prefer this practice due to several reasons which includes certainty of quality, convenience, timeliness/availability, and cost. They also prefer this practice because farmers don't want to take a risk on their productions. But with the progress of time keeping though cultivar performance remained same, but productivity declined, which demands the practices of modern farming techniques and new seed varieties.
6. **Climate Change:** Climate change is exacerbating the challenges faced by the agriculture sector, negatively affecting both crop and livestock systems in Thalay Valley. Climate change induced increases in temperatures, rainfall variation and the frequency and intensity of extreme weather events are adding to pressure on the local agriculture system – which is already struggling to respond to rising pathogenic infections. The changing climate is also contributing to resource problems beyond food security, such as water scarcity, pollution and soil degradation. As resource scarcity and environmental quality problems emerge, so does the urgency of addressing these challenges. The farmers really feel helpless against the inconsistent weather even they are thinking to abandon growing maize and wheat, and cultivate cash crops like potato because that are short-duration.

4.2. Pasture

The majority of the pastures Thalay valley is reported declining. The pasture sustainability is also facing a lot of pressures from livestock more than carrying capacity, medicinal plant extraction, landslides and floods. The most significant factor over the last ten years similar to surrounding valleys is an infrequent snow fall which declined growth of natural vegetation in alpine & sub-alpine pastures and rangeland, and largely contributing to declining livestock rearing trend in the valley. One major factor is an increase in population expansion contributing to pasture degradation. Though the overall status of per household shows decreasing trend, but with increasing nuclear family system number of livestock reportedly increasing.

1. **Baseline of flora and phenological shift:** There is no documented baseline data or inventory about the floral species of the pastures, their status and use. So, it is the need of time to develop such basic dataset which prioritize the species for conservation actions to mitigate the socioeconomic and environmental pressures. It is especially recommended on priority basis to monitor and conserve the floral species and medicinal plants affecting by climate change and showing phenological shifts. Only medicinal plants are explored and

listed, but there is no information on the predicted impacts of climate change over these medicinal plants and their adaptations.

2. **Gaps in customary practices:** Livestock grazing is an ecosystem service provided by the pastures. 100 pastures of Doghoni valley partially are degrading or showing decline in productivity due to unsustainable livestock grazing practices. There are no established rules about the maximum number of livestock heads in the customary rules. Carrying capacity of these pastures have never been estimated and that's why unsustainable pressures are fueling the degradation. Diseased animals are advised to keep away from the pastures, but their water points are shared which can induce the infection in whole herds and also there is a chance of disease transmissions.
3. **Grazing timing:** The peak growing season of pastures starts from June while villagers start herding in the pasture from May which proves disaster to vegetation. Lasting pastures can be improved only when herders understand plants' recovery needs and practice good grazing land husbandry to maintain plant health. The local community of Thalay reported the problems like weed invasion, less productivity and weakened soil health. All these issues are indicators of impatient grazing by the herders i.e. they start to graze their animals before pastures are fully grown. Herders do so to provide animals with a high-quality diet, but they are unaware that short plant growth reduces the bite size and the nutrient intake. Moreover, it contributes to decline in pasture productivity, which is lose-lose situation only.
4. **Livestock insurance scheme:** Livestock insurance scheme is an incentive equal to the loss for the herders if their livestock get killed or attacked by the wildlife. The livestock insurance scheme is an incentive equal to the loss for the herders if their livestock get killed or attacked by the wildlife. Project based effort resulted in development of the scheme, but terminated as soon as the project ended. Livestock kills by predators is a burning issue, although no retaliatory killing has been reported by the community, but in the absence of insurance scheme retaliatory killing of wildlife is expected. Such schemes need to be revitalized with some revolving fund for its sustainability.
5. **Lack of zonation:** Pastures are degrading continuously, but the customary laws don't have any hint of abandoning such pasture areas which hastens its decline. It is essential that grazing on pastures in the buffer area of CKNP should be controlled to maintain adequate vegetative cover that reduces erosion and permits adequate growth rate after each grazing period to ensure the health of grazed plants.
6. **Harvest of medicinal plants:** Thalay Valley pastures and forest areas also have these herbs. Local community uses them for disease cure. These drugs have anti-pyretic, analgesic, anti-cancerous, anti-diabetic and several other uses. Local community is fully aware of their uses, but they don't have any concept of its extraction without damaging the whole herb. Training of the local community for the collection, drying and usage is important.

4.3. Water

Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community at Thalay depends directly

on snowfall and indirectly rain. Due to delayed rain timings and less annual snowfall, the local community is frequently facing the drought and water shortage due to increasing glacier melting and flood causing blockage of irrigation system. Moreover, torrential rains are now more frequent which on one hand increases water quantity but also cause floods and landslides in disaster prone areas thereby creating socio-ecological stress. Water pollution is increasing due to lack of sanitation /drainage system and animal sheds nearby water channels and drinking water sources. Grey water from the local community is also getting mixed into fresh water and degrading its quality.

1. **Drinking water:** Local community depends on fresh water supplies from glaciers and springs for drinking purposes. Sediments are continuously increasing the water supply due to weathering of rocks and mixing of soil and grit in the area. High mineral content can induce disease in local community and their livestock. The water testing facility already established at the Karakoram International University provides the free testing but local community is not very interested in the procedure due to lack of awareness.
2. **Irrigation deficit:** Like other valleys local community reported unstable structure of irrigation channels as well as need of new irrigation channels which is the prime reason for irrigation deficit. “Either a lot of water or no water” in the water sources, the communities cannot fully utilize it for irrigation purpose. The communities in the villages have constructed irrigation channels, but with increasing land fragmentation and demand for water those irrigation channels have proven insufficient. The communities cannot construction of more irrigation channels due to lack of financial resources.
3. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water, ensuring that it do not mix into the freshwater streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.
4. **Disaster management:** Climate change is deeply reshaping the landscape of disaster risk. Weather extremes such as drought, flood and landslides cause the huge economic depressions in all sectors ranging from transport to land farms. No protocols are developed, yet for the villages in the surrounding of CKNP.

4.4. Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other and therefore, there is a strong need to assess and enhance the adaptive capacity of the forest and biodiversity.

1. **Mortality:** Decrease in snowfall has increased tree mortality and resulted degradation and reduced distribution of the entire forest ecosystem. It increased the wood harvesting opportunity for the local community from Thalay for subsistence purposes at the cost of degenerating forest.
2. **Harvest pressure:** Heavy collection of timber and non-timber products from the forests allow the community to fulfill their needs. With the continuously increasing population dependence of the local community is also increasing on these natural resources. The

majority of the area in Thalay has open canopy coniferous tree species which are unable to cope with natural changes in climate and also facing threat due to the fuel wood and wild fruits collection. This harvesting is not limited to, here only, but includes the removal of foliage, branches and plants cutting for livestock forage as well. Unsustainable practices and unguided approaches towards harvesting lead the ecosystem imbalance.

3. **Forest regeneration:** Climate change has shown differential approaches for the propagation dependent upon the species ecology. Warmer temperatures and increased CO₂ increased the rate of photosynthesis and thus growth, but increased the pest attack is seriously stressing the forest regeneration.

4.5. Eco-tourism

Ecotourism is nature based tourism that fosters environmental appreciation and awareness. Gilgit-Baltistan, which is considered as the hub of eco-tourism incorporates a considerable number of tourists every year to generate the huge amount of revenues and alternative livelihood opportunities. In Thalay valley eco tourism opportunities are available, but not getting materialized due to following hindrances to boost those opportunities.

Following issues are being reported by the local community.

1. **Tourist accommodation:** Limited accommodation facilities compel the tourists to opt for camping in open areas. This option becomes unsuitable during the adverse weather.
2. **Visitor facilities:** Site maps, designated camping areas, information boards, sign board and other facilities are rarely available. Thalay sectors provide minor tourism services and therefore they don't have the opportunity to earn the livelihood from tourism.
3. **Climate change:** Climate is a key resource for tourism and the sector is highly sensitive to the impacts of climate change and global warming, many elements of which are already being felt. Climate change is having adverse impacts on the number of tourists.

4.6. Mining

In and around CKNP in the sedimentary rocks of the mountains, huge reservoirs of gemstones and precious rocks are deposited. Local level mining is being carried out in and around CKNP. Mining area can be identified by having the holes in its mountains just like bee web. Mining activities do not exist in the area due to unavailability of the gemstone, which is not existing completely or has remained un-explored due to the following issues

1. **Lack of modern tools and Practices:** Local miners are not trained for mining. They use iron rods for excavation and mostly end up in the damaging the stones. It leads to loss of revenue not only on a personal level, but also on the regional and ultimately at national level.
2. **Lack of training:** Local miners have learned the methods of mining by hit and trial approach and succeeded somewhat. Nevertheless, due to lack of training they are unable to extract

pure and high-quality rock. They accidently break these gemstones and thus lose the amount of profit.

3. **Value addition of gemstones:** Gemstones are sold in raw form by the local community to the dealers on low cost due to improper cutting and polishing. Therefore, local miners lose their chance to earn huge revenues and only get a minor share.

4.7. Wildlife and Protected Areas

Institutional structures to manage wildlife and protected areas experience lot of issues due to increasing urbanization, degrading forest and natural areas. The biodiversity of CKNP and its buffer zones has the species, which are of international and national importance. Wildlife plays an important role in both ecosystem sustainability and community economics. Although trophy hunting is a controversial subject, yet it enabled the community to earn millions of dollars since its start and contributed to conservation as well.

1. **Population trends:** The investigation of issues related to wildlife and protected areas normally consider the number of heads of animals irrespective of their health, annul recruitment. The overall trend Ibex seems be decreasing in their population according to the survey results, but there is no assessment on the reproductive output. There is chance of reproductive deficit in mountain ungulates such as Markhor, Urial and Ibex due to the history of population surge.
2. **Population surge:** During the recent years of conservation, wild species has increased considerably. The sudden increase from small population are often culprits of inbreeding depression, which is most expected in the case of mountain ungulates and birds which are decreasing continuously.
3. **Unidentified species:** GB hosts the diversity of wild fauna and flora most of which are unidentified and even un-discovered yet. The rapid environmental degradation is causing the extermination and extinction of the specialist species. It shows that biodiversity of the species is declining without recognizing their ecological and economic roles.
4. **Habitat degradation and isolation:** Population is continuously increasing In Thalay valley, increasing and encroaching into the natural areas for settlements and agriculture. This land use changes affected wildlife both positively and negatively depending upon the species ecology. Habitat degradation has also pushed the species to isolated and low quality habitats that caused additive stress on the wildlife health, reproductive potential and genetic health and so on. There is no assessment for the impact of habitat degradation on the genetic health of wildlife species.
5. **Genetic reserves of wildlife species:** Most wildlife surveys are based on the numerical assessment of the animals and do not account for their genetic viability. Designated areas such as national parks and sanctuaries are notified irrespective of the idea that particular area is either genetic bank of the particular species or not. Genetic reserves of forests and wild species are not identified and protected yet.

PROPOSED MANAGEMENT INTERVENTION FOR THALAY VALLEY



5. PROPOSED MANAGEMENT INTERVENTIONS

5.1. Agriculture

In particular, there are different adaptation options in agriculture, according to the involvement of different agents (producers, industries, governments); the intent, timing and duration of employment of the adaptation; the form and type of the adaptive measure; and the relationship to processes already in place to cope with risks associated with climate stresses finally the development of provincial climate change policy.

The adaptation options required for the local community need four tiers. (i) Technological developments, (ii) government programs and insurance (iii) farm production practices, and (iv) farm financial management.

1. **Population expansions:** Land fragmentation is considered as a major factor for shrinking landholding per household similar to other areas of GB. Due to increasing population, shelter demand is also at an increase, mostly houses, cattle shed and other required constructions are being built around the settlement and agriculture area, which is continuously shrinking arable and naturally forested land.
2. **Certified seed varieties and crop insurance:** Certified seed is the only input that can get farmer more than just higher yields. Such varieties are resistant to climate related and pesticide issues. To introduce the concept and usage of certified seed varieties, there is the need to provide those seeds on subsidized rates and premium insurance packages. Along with this one-time training of farmers of each village in the valley is crucial and establishment of input stores among a cluster of villages within a valley would help them overcoming certified seed related issue.
3. **Integrated farming and agriculture products:** Farmers are traditionally inclined to mono-cropping systems and earn the revenues from raw products. In Thalay valley farmers, mostly earn very minor revenue due to lack of awareness on post harvesting techniques, processing techniques and proper storage facilities. The little economic innovation lies in the sale of potato only, while million rupees' worth of fruit is being wasted annually due to lack of awareness, and skill for value addition and facilities for storage. Many end-users require specifically processed products such as Marmalades, Jams, Vinegar and Honey. Farmers need guidance on the value addition of products in order to be economically stable.
4. **Soil analysis:** It was unanimously reported by all the communities that land they are cultivating is never tested in the laboratory and scientifically they don't know which crop and fruit varieties are best for their soil type. Each crop is sensitive to soil type and productivity heavily depends upon the suitable soil. Practically there is requirement of a soil testing facility within each agriculture information cell. This facility will provide information about several structures, especially addressing the common question of farmers such as suitable seed varieties, microbiota of soil and its capacity of crop growth and several others.

5. **Secure water availability:** Water is central to agriculture productivity. Adaptation of climate-smart inputs and shifting to more efficient irrigation methods will help local farmers maintain productivity levels. Water tanks for the storage purpose of agriculture are required to reduce the drought effects at some village.
6. **Training on climate friendly agriculture practices:** In Thalay people are highly dependent on traditional farming techniques and don't know to adapt with changing climate impacts on agriculture. It is therefore mandatory for agriculture concerning agencies to train farmers with the emphasis on target ingenuities such as outcome-based farmer incentives and knowledge transfer systems – that enhance the farmer capacity to achieve sustainable productivity growth through mitigating and adaptive practices keeping the pace with climate change. These climate friendly and climate proof practices particular to each valley must be incorporated into the operational plan. As there are no previously approved practices so they are needed to be designed by methodically modeling the practices with climate change models.
7. **Introduction of climate resistant seed varieties:** As mentioned above that farmers are largely practicing traditional farming, but they are having knowledge about climate change effects, however, they are absent to know that how the knowledge could be materialized to coup up with climate change effects and sometime take poor decisions. Farm decision-making is seen as an on-going process, whereby producers/farmers are continually making short-term and long-term decisions to manage risks emanating from a variety of climatic and non-climatic sources. In this sense, adaptation is the result of individual decisions influenced by forces internal to the farm household (i.e. risk of income loss, environmental perception) will become reasonable and let them earn revenue to decrease the pressure of the local community on natural resources. To resist or at least minimize the pressure of ever-changing climate patterns and issues in relation to climate change, there is a need to develop an agriculture information cell for the farmers in each village. This information cell will raise the job opportunities for local community and will guide them about the climate resistant breeds, ways of cultivation, harvesting in detail. This information cell must have the tested varieties of climate resistant seeds and seedlings. Seed storage for potato in the harsh climatic condition is a challenge in the CKNP area, therefore input store for seed must be provided at least among every three villages.
8. **Spread of infestation to the wildlife:** Buffer area of CKNP harbor 230 villages. All of these villages have agriculture crops and trees which have been getting infected manifolds since last decade. These pest species have the chance of transmission towards the wild medicinal herbs, forests, nests of birds and ultimately enter in fauna. This pathogenic transmission can induce infections in the flora and fauna and has a considerable potential to depress the specialist species. However, this issue has not yet been explored and needs a well-prepared monitoring procedure to estimate the estimate the annual economic laws.
9. **Research projects:** Without research, adaptation to climate change is generally problematic for agricultural production and for agricultural economies and communities; but with adaptation, vulnerability can be reduced and there are numerous opportunities to be

realized. Adaptation must be supported by the research of relevant components. Productivity is declining at a rapid pace due to some known and unknown reasons. Apparently, climate change seems responsible for this decline aided with ever increasing pest attacks during the last 10 years. The recent changes in the climate are so unpredictable that it is becoming impossible for the farmers to work in agriculture farms for profit. Customary practices for agriculture, sustainability is losing their functionality. These practices must be updated by designating specific studies of seed variety, soil analysis, crop suitability analysis, bio-control of pests, the projected impact of climate change on the crop's productivity and transport, optimum economic benefits from every suitable crop and several other inter-related components. As it is evident that the impacts of climate change on agriculture will vary depending on precipitation changes, soil conditions, and land use, therefore these impacts are required to be evaluated independently for each valley in the buffer zone of CKNP. This vast research is possible if included in the operational plan of the CKNP to provide support for an updated management plan of CKNP.

10. **Key policy reforms:** Key policy reforms across three pillars are needed to strengthen farmer incentives to achieve productivity growth sustainably, and without sacrificing climate change mitigation and adaptation objectives. These three pillars are i) Farmer level, ii) Agriculture sector level, iii) Provincial level. The agriculture policy needs an up gradation to mitigate the effects of changing climate and devising the climate friendly strategies at an urgency to minimize the agriculture induced impacts on climate ultimately to protect the protected areas of GB, particularly its largest park the CKNP. The management plan which is already established has a huge gap about the laws of employing climate friendly approaches in villages residing in buffer areas for agriculture. Moreover, the climate is not only changing, but it is also on stationary which means old knowledge can't be the thing to rely upon. So a gap of climate friendly approaches must be assessed via operation plan for CKNP and then addressed into the revised version of the CKNP management plan.

5.2. Pasture

1. **Upgradation of customary laws:** Customary practices should be amended in such a way that ensure the sustainable use of pastures. Diseased animals must be kept away from the pastures to avoid the zoonosis and must be vaccinated. Extraction/cultivation of medicinal plants by the local community must account only for household purpose and should be cultivated in the amount equal to its removal. Encourage stall feeding/minimize grazing till the improvement of pastures. These strategies must be field tested and then included in the customary and statutory laws and CKNP revised management plan.
2. **Grazing management:** To enhance pasture productivity timing of grazing and grazing sites in each pasture are need to be designated to develop holistic grazing strategies with farmers/herders that include rotational grazing or intensively managed grazing as a regular grazing routine.

3. **Fodder cultivation:** Regionally adapted and high nutrition value fodder crops should be cultivated for fodder instead of traditional species. This will remove the stress of early grazing from the pastures and allow them to grow.
4. **Training of herders:** Herders have no information about the sustainable practices of livestock grazing. They just sent their livestock with guards to feed upon the pastures. Timing of grazing is integral for livestock. There are several other factors that need to be cared for the sustainable livestock grazing.
5. **Seeding of local flora and training of farmers:** Local flora should be collected and cultivated on the barren patches among the pastures. This will increase the pasture areas and productivity. Research on cultivating these species is required. After its dissemination of knowledge through training sessions, manuals and brochures will convince the farmers about the re-seeding of pastures.
6. **Local botanical garden to ensure the existence of local flora:** Adaptable plants should be identified among the plants. These plants should be kept in the botanical gardens to provide backup in case of avalanches, landslides, floods and barren land cultivations.
7. **Encourage the pasture extension services by other line departments:** Many forestry and livestock enterprises run by private farmers and the government depend on efficient, economical, and environmentally beneficial pasture use. Farmers need technically competent advisors to help them accomplish their objectives. Unfortunately, no advisory services for the pastures exist in the villages because of lack of pasture specialist technical advisor. Therefore, there is a strong need to train the forest relevant personnel from each village or valley as a pasture specialist. CKNP biodiversity directorate staff can be a potential candidate for this training as they are both aware of natural resource use in and around CKNP.
8. **Cultivation and marketing of medicinal herbs:** Cultivation of these herbs should be promoted as an alternative economic resource with appropriate site assessment and training on its cultivation, harvesting, marketing and utilization. Economic uplift of the community will actually decrease their dependence on CKNP resources and allow them to grow.
9. **Ethno-botanical database:** Development of consumer linked ethno-botanical databases of each village will not only enhance the market for the local farmer but also fosters the direct link to the consumer.
10. **Pasture awareness programs:** Hands-on training and field experience are two of the best, most rapid ways to increase farmer's/shepherd's awareness and local university students about the optimum pasture use of healthy livestock. Final outcomes will be best when this training is guided by technically competent professionals who can accurately answer questions and help solve problems. This training will allow the local community to employ sustainable practices and secure these resources for their future generations.
11. **Research problems:** Phenological shift of floral species and their impact on biodiversity must be assessed on a priority basis so that extirpations can be avoided. The ecological baseline of the pastures to keep the biodiversity of the area must be developed. Similarly, potential farming sites for each medicinal plant should be identified. The predicted impacts

of climate change on the pasture productivity are not known and need to be evaluated due to their high valued ecosystem services. Most utilizable and ecologically resilient entry points are needed to be identified and designated.

5.3. Water

The water laboratory at KIU has carried out a water quality assessment in all villages of CKNP, the result shows that people living in CKNP buffer zone afflict with different kinds of water contagious diseases because of the scarce access to clean drinking water. Even though glacier water is present in many areas, however easy access to clean water is very difficult for most of the population.

1. **Quality of drinking water:** The water testing facility already established at the Karakoram International University provides the free testing, but local community is not very interested in the procedure due to lack of awareness.
2. **Construction of small and medium sized reservoirs:** Construction of small or medium-sized reservoirs in the foothills and plains are quite necessary, so that water from streams can be harvested for use during the dry season and the winter, both for farming and domestic purposes.
3. **Common drinking water storage tank:** Shared water storage tanks should be built upon among the households to help them adapting drought conditions.
4. **Water pollution mitigation:** To ensure the water quality local community should be compelled to make separate pathways for grey water, ensuring that it do not mix into the freshwater streams. Hotel owners should be trained to dump the trash elsewhere instead of water while adopting ecosystem friendly approaches.
5. **Early warning system:** But to give relief to the local community of Thalay, there must be system to give them timely alerts about their crops and livestock protection. This will accentuate the economic resilience of the community and natural resilience of the buffer area.

5.4. Forest and NTFP

Though forest resource is available in Thalay valley, but the available species can be protected through improving customary practices and the inclusion of the most valid rules in statutory law. Conservation committees in the valley are formed and conservation related customary practices exist but needs improvement. However, customary laws are not much efficient on deforestation, thus customary laws allow the fuel wood collection, timber and non-timber forest products unlike statutory laws, which increase their favor towards the customary laws. If this practice is continued, then the community will shortly run out of their forest reserves. To ensure sustainability, an up-gradation of customary rules is recommended. Otherwise, implementation of statutory laws is the integral which can be more enhanced by fostering statutory laws by the concern line department

1. **Promotion of farm forestry:** Resources should be provided and farmers should be trained to have small-scale farm forests, which, along with revenue generation allow them to be independent of forests. This practice exists in a valley but very limited. The training will allow the farmers to take self-initiatives and entrepreneurship in the forestry sector.
2. **Climate change and conservation friendly forestry projects:** To generate credible forestry and conservation offsets, projects must be additional to what would have occurred without the incentive supplied by the carbon market; they must be verifiable (i.e., measurable and enforceable); they must control or adjust for leakage; and they must address the issue of permanence. Forward crediting is proposed by some to accommodate the long period of carbon accumulation in forests, but others are concerned about assuring payments only for actual carbon sequestration.
3. **Restoration cum conservation:** Several sustainability practices are being carried out in Thalay valley, but any of them hardly meet the conservation targets. Keeping in view the present environment, sustainability changes, restoration is required along with conservation. Therefore, the upcoming forestry projects must come up with the forward crediting instead of required crediting.
4. **Research projects:** Projected annual greenhouse gas emission counts provide a baseline to identify required CO₂ sequestration offset. On the basis of this, it will be identified that which species is required and in how much amount to keep the climate stable for each valley in the buffer zone of CKNP and its surrounding areas. Remote sensing to monitor the land use changes is very essential because of the location of valley around CKNP. In future due to CPEC, land use is expected to be altered and its environmental consequences seem negative. To neutralize these expected issues baseline data about land use will quantify the environmental impacts and truly determine the required type of actions with high accuracy.

5.5. Eco-tourism

Following interventions are recommended on the basis of the survey conducted for VCSDPs development.

1. **Interpretation of resources:** In order to increase the revenues by tourism there is a need to provide interpretation programs that are relevant to the public, further information is required. This information can be obtained through visitor surveys.
2. **Destination vulnerability hotspots:** The integrated effects of climate change will have far-reaching consequences for tourism businesses and destinations. Importantly, climate change will generate both negative and positive impacts in the tourism sector and these impacts will vary substantially by market segment and geographic region. The Thalay valley is a disaster-prone area which is not mapped and disseminated to the tour operators. This inventory should be developed along with measured risks and challenges that tourist can face.
3. **Infrastructure:** Surging flow of tourist in Gilgit-Baltistan over the last 2 years has increased opportunity for the unexplored valleys from a touristic point of view. Thalay valley has not

much potential for tourism due to lack of related infrastructure such as narrow road and no accommodation facility available. Ecotourism facilities are required and needed to be developed to ensure the provision of facilities for tourist influx by public and private department.

5.6. Wildlife and Protected Areas

1. **Population assessment:** Database should be established to keep the systematic annual population assessment of all the near threatened and endangered animals. The protocols for population assessment of each species should be determined on ecological basis and kept same every year.
2. **Species recovery plan:** There is a growing consensus that habitat fragmentation has caused wildlife decline. However, what is the impact of this fragmentation is still unknown. There is a need to study to study how the urbanization, habitat isolation, decline in vegetation has stressed the wildlife. How these impacts can be mitigated, which habitat areas need priority conservation actions such as habitat connectivity? All this information is possible from the properly designed studies unique to each class of wildlife based on which species recovery plan will be designed.
3. **Genetic reserves:** Genetic reserves inside the protected areas of the threatened and endangered species are needed to be identified for their restoration. If the designated protected areas do not have by chance these genetically healthy populations, then their boundaries should be adjusted according to these reserves.
4. **Climate change indicators:** Several fungi and amphibian species are considered as an indicator of climate change. These species are experiencing decline in the population, such as Deosai toad, which was once abundant in the clean waters of the area. This species is now hard to find because of water pollution. These indicators are needed to be identified and used as a climate change detection for the areas. This research will provide the real assessment unlike models, which sometimes fails to give real estimate.

6. STATUARY VS CUSTOMARY PRACTICES IN THALAY VALLEY

S. No.	Consumptive Uses of Park Resources	Community Practices	CKNP MP/OP Rules	Recommendation
1.	Harvest of Forest and other natural vegetation	Juniper trees are cut and used as fuel wood and timber	Harvest of Juniper is banned; if harvest is necessary than only only branches should be removed instead of the whole tree	Awareness of community is required
		Riparian vegetation e.g. Sea-buckthorn and Willows, community usually removes the whole plant/tree from the soil	Cut single basal shoots from each plant to preserve in its root system. By doing so, new shoots can re-grow rapidly producing new biomass to be harvested	-do-
		Community harvests wood at an unsustainable level, both from the buffer and core zone	Wood and shrub collection are allowed only in the buffer zone up to a sustainable level	Afforestation, alternative fuel options and sustainable forest management areas are need to be designated. Along with this harvest rate compatible to annual growth of forest should be determined
2.	Medicinal plants	Community harvests local medicinal herbs and aromatic plants from a park for household purpose	Harvest is completely banned in core zone and allowed at a sustainable level from buffer areas under license.	Community must be awarded the license and concerned department restrict the harvest without license.
3.	Livestock grazing	Herd grazing is allowed only in buffer zone and tourism focused zones of the park.	Community grazes their livestock in packs along with dogs inside core zone. Dogs and packs are not allowed inside parks	Improvement in watch and ward mechanism along with community awareness is necessary at urgency

		Equines (horses, mules, donkey) occasionally found in the core zone of the park	Equines are allowed only in tourism focused zone	--
		Yaks and its hybrids freely graze in the park	Grazing of traditional free roaming yaks and yak-cow breeds is buffer and core zone is acceptable	--
		Herders graze livestock in pasture and core zones dispose plastic bags, bottles in nearby streams and also use burn wood from the forest	Use of plastic bottles, glass bottles, plastic bags and match box is not allowed inside parks.	Movement must be restricted for the grazers.
4.	Pastures	Community graze livestock in the pastures which are located in and around buffer zones.	Grazing is allowed only in the buffer zone	--
		Indigenous systems of grazing were sustainable. During previous times herders ensured to take livestock into the pastures, when vegetation becomes knee-length. Currently, herders have abandoned this practice and take their livestock to pastures even before its sprouting.	Indigenous grazing system should be revived	Awareness and training of herders is important
5.	Wildlife hunting	Community take advantage of inaccurate population counts of wildlife and poach/ hunt wildlife at family gatherings, holy occasions and on other such events	Reliable wildlife count by DNA analysis is recommended and also to track poaching for core zone management. Hunting except for “trophy hunting” is banned both for buffer zone and core zone.	Community awareness can serve the purpose. Moreover, genetic approach should be employed for accurate population counts and tracking of poaching

7. RECOMMENDED ACTION PLAN FOR THALAY VALLEY

S. No.	Sector	Management Objectives	Conservation/ Development Issues/Gaps	Root Cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time Scale (Short, Medium, Long term)
1.	CKNP Directorate	1.1. Improve CKNP functionality	Lack of enough support of local community for CKNP	Conflicts over the use of park resources	1.1.1 Manage the conflicting issues, ensuring park conservation	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
				Community awareness is insufficient due to deprivation meetings, and awareness campaigns by CKNP Directorate	1.1.2. Awareness campaigns /training of the local community about the significance, rules and regulations of the park and sustainable use of natural resources.	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
2.	Local Social Organizations	2.1. Develop Structural/ Institutional framework of social organizations	Insufficient support of LSO to CKNP directorate	Weak communication linkages Lack of effective conflict management mechanisms	2.1.1. Develop appropriate networking for existing social organizations under the umbrella of concerned LSO/CKNP	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
		2.2. Develop capacity for Financial sustainability of local social organizations	Poor implementation of conservation interventions and subsequent sustainability	Lack of awareness about sustainability avenues	2.2.1. Preview the existing capacity of relevant LSOs for the identification of gaps	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term

				2.2.2. Capacity building of Social organizations to ensure conservation of park resources and sustainable resource used	Activity 5.2.1	All	Urgent	Short term
				2.2.3. Capacity building of LSO to generate funding for their sustainability	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
				3.1.1. Capacity building of existing staff 3.1.2. Provision of Medicines 3.1.3. Provision of new diagnosis equipment 3.1.4. Establishment of new health facilities	Suggested for inclusion in relevant community development plans -do-	Harangus Harangus Harangus Thaghari / Bloqpa and Kashumik	Urgent Urgent Urgent Urgent	Long term Short term Medium term Long term
				3.1.5. Awareness conferences about hygienic practices	Suggested for inclusion in revised MP/OP activities	Al 1	Urgent	Short term
				3.1.6. Dissemination of brochures and pamphlets to educate	Suggested for inclusion in	All	Urgent	Short term
3.	Health	3.1. Promote health facilities	Prevalence of Diseases Unhygienic practices by locals	Lack of basic health facilities in existing dispensaries Lack of sufficient dispensaries				

				community about prevention from sporadic diseases 3.1.7. Promotion of healthy and hygienic practices by women and children through workshops, campaign and social organizations	revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
4.	Energy	4.1. To meet energy demand	Depletion of natural resources	Preference of fuel wood from forest by the local community due to free commodity Lack of alternative fuel options	Activity No. 14.2.1 Activity 14.2.1.	All	Urgent	Short term
				4.1.1. Promotion of fuel-efficient stoves at high altitudes 4.1.2. Develop and Motivate usage of alternative sources		Upper Thalay Villages	Urgent	Long term
5.	Education	5.1. Curb illiteracy	Prevalence of unsustainable practices	Lack of needful development infrastructure and human resource	Suggested for inclusion in relevant community development plans	All	Medium	Long term
				5.1.1. Increase the capacity of existing schools				
				5.1.2. Creation of new educational facilities	Suggested for inclusion in relevant community development plans	Upper Thalay Villages	Medium	Long term
			Poor acceptability of messages/solution of conservation	Lack of awareness	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
				5.1.3. Awareness of school staff and children about sustainable use of resources, respect of statutory laws and changing climate scenarios				

6.	Agriculture	6.1. Lack of sufficient food and future food security	Out-migration and Malnutrition and related disease	Lack of financial and technical capacity to enhance agri-productivity	6.1.1. Introduction of Improved seed varieties for agriculture and other related crops adaptable to local climatic conditions 6.1.2. Capacity building of farmers about modern techniques to enhance productivity.	Suggested for inclusion in revised MP/OP activities Activity No. 17.1.1.	All	Medium	Medium term
				Water Scarcity	6.1.3. Construction and repair of water channels and for barren lands	Suggested for inclusion in revised MP/OP activities	All	High	Medium Term
				Pests and diseases	6.1.4. Integrated pest management techniques	Suggested for inclusion in revised MP/OP activities	All	High	Medium Term
				Improper crop storage	6.1.5. Promotion of small-scale solar driers	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term

			Lack of jobs and economic opportunities in agriculture and related crops	6.1.6. Improvement of existing economic opportunities	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
				6.1.7. Creation of new jobs to enhance the economic capacity of the local community	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
				6.1.8. Provision and Installation of fruit processing unit	-do-	Bloqpa	Urgent	Long term
			Less arable land per household	6.1.9. Development of barren land patches	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
7.	Livestock	7.1. To enhance income opportunities for locals from livestock	Disease spread Poor breeds with lesser dairy productivity Lack of proper grazing management, regeneration with lesser productivity	7.1.1. Improvement of existing vet facilities 7.1.2. Establishment of new vet facilities	Suggested for inclusion in revised MP/OP activities Suggested for inclusion in revised MP/OP activities	All Thagh ari or Bloqpa and Kashu milk	Urgent Medium	Long term Medium Term
			Depredation of livestock by wildlife	7.1.3. Livestock insurance scheme	Activity No. 9.4.2	All	Medium	Medium Term

			Poor breeds with lesser productivity		7.1.4. Training regarding animal husbandry	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
			Disease out break		7.1.5. Training of herders to restrict zoonosis	Suggested for inclusion in revised MP/OP activities	All	Urgent	Medium Term
8.	Pastures and Rangelands	8.1. To maintain ecologically healthy ecosystem	Loss of floral diversity Loss of pollinators	Water scarcity	8.1.1. New snow fed channels for pastures irrigation	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term

			Over grazing Degraded pastures resulting in loss of food for Wildlife	Uncontrolled number of livestock Insufficient growth time for pastures Poor and dangerous accessibility to pastures	8.1.2. Promotion of supplementation with stall feeding 8.1.3. Promotion of fodder cultivation on suitable land patches 8.1.4. Awareness of herders/professional shepherd about sustainable herding practices 8.1.5. Revive the use of the indigenous grazing system	Suggested for inclusion in revised MP/OP activities -do- -do- -do-	All All All All	High Moderate High Urgent	Medium Medium term Short term Short term
			Unknown Carrying capacity	Lack of Research studies	8.1.6. Research studies about the carrying capacity and adaptability of Pasture to climate change 8.1.7. Establishment of enclosure to measure productivity with surrounding pastures	Activity No. 9.2.1. Suggested for inclusion in revised MP/OP activities	All One health y/least degrad ed pastur e in the whole valley	Urgent Urgent	Long Term Long Term

9.	Forest	9.1. To maintain appropriate forest cover	Run-off and landslides Less biodiversity Less fuel wood availability for local community	Lack of alternative fuel resources Lack of capacity to use fuel resources Lack of awareness on values and function of forests	9.1.1. Enhance productivity through Reforestation and afforestation 9.1.2. Promotion of farm forestry 9.1.3. Develop restricted forest zones to ensure regeneration and implement a ban on Juniper harvest 9.1.4. Training of farmers for farm forestry 9.1.5. Up gradation and regulation of customary practices 9.1.6. Improved Watch & ward (Capacity building and induction of more game watchers or community guards) to minimize illegal harvest	Suggested for inclusion in revised MP/OP activities -do- Activity No. 9.1. -do- -do- -do-	All All All All All	Urgent Urgent Urgent Urgent Urgent	Long Term Long term Long term Long Term Long Term Long term
10.	Wildlife	10.1. To improve and maintain healthy	Unsustainable hunting Habitat degradation	Habitat fragmentation and degradation Poaching	10.1.1. Dedicated zones for wildlife, restrict grazing in those areas	Suggested for inclusion in revised MP/OP activities	All	High	Long term

		wildlife population	Diseases from livestock resulting in un-natural mortality	Lack of awareness about significance of biodiversity of area Lack of eco-tourism opportunities	10.1.2. Improve habitat connectivity in existing fragmented habitats 10.1.3. Habitat modelling for near threatened wildlife species 10.1.4. Identification of healthy population of endangered species reintroduction 10.1.5. Establishment of water point 10.1.6. Improve watch and ward mechanism with inclusion of local SOs 10.1.7. Awareness raising through seminars, and wildlife clubs in schools 10.1.8. Dedicated research projects	-do- -do- -do- Activity No. 6.1.3 -do- -do-	All All All All All All	High High High High High Moderate	Long term Medium term Medium term Short term Long Term Medium term Long term
11.	Tourism	11.1. Promotion of tourism as a sustainable	Loss of economic opportunities	Insufficient facilities of the road and stay	11.1.1. Maintenance of road throughout the touristic season	Suggested for inclusion in revised	All	High	Short term

		economic avenue	Loss of support for conservation and development opportunities	Lack of interpretation of resources, i.e. Hot springs Lack of a mechanism to attract tourist/visitor	11.1.2. Development and dissemination of brochures for interpretation of tourist opportunities 11.1.3. Water supply, waste disposal and improvement in washroom condition 11.1.4. Community based residence and restaurants	MP/OP activities -do- -do- -do-	All Thalay La All	High High Medium	Short term Short term Medium term
12.	Water	12.1. To maintain quality and quantity of water	Pollution Water shortage at source and point of end-user	Climate change Waste disposal into water channels	12.1.1. Water quality testing from all water channels 12.1.2. Awareness of the local community with focus to keep water resources clean and its minimal usage	Suggested for inclusion in revised MP/OP activities	All All	High High	Long term Long term
13.	Gem stone Mining	13.1. To aware the local miners with true practices and value of mining with ultimate aim to increase livelihood	Low economic revenues from mining products	Lack of training Lack of Contemporary practices and tools Lack of Value addition service units	13.1.1. Training sessions for local miners under framework of local organization established. 13.1.2. Enhance the direct linkages between local miners and market 13.1.3. Establishment of local service units for gem cutting and polishing	Suggested for inclusion in relevant community development plans -do- -do-	All All All	Medium Medium Medium	Short term Short Term Long Term

8. IMPLEMENTATION AND MONITORING MECHANISM

8.1. Implementation Mechanism

The whole process needs to be facilitated by Conservator- Baltistan in collaboration with CKNP Directorate and NGOs such as AKRSP, AKPBS, EvK2CNR, WWF etc. Following steps are important in this regard:

The first step should be the restructuring of the community organizations in the form of Community-based conservation and sustainable development organization's (CBCSDOs). Agreements should be signed with CBCSDOs for their proactive participation in conservation and sustainable use of natural resources. The local communities are now well mobilized in support of CKNP and the restructuring should not be a problem.

The second step is participatory conservation planning in which the draft CSDP should be shared with the respective communities (involving VCCs, UC members, President of VO and WOs (where possible)): line departments at district level (Agriculture, LS&DD, Forest, Wildlife and Park, Tourism) and concerned NGOs such as AKRSP, AKPBS, EvK2CNR) to solicit their technical opinion and possible support during implementation of the plan.

The third step is approval of VCSDP from DCC Ghanche, and facilitation of subsequent DCC meetings to facilitate and monitor implementation on VCSDP.

There are two cross-cutting themes. First is capacity-building involving awareness raising, trainings and exchange programmes. The second is financial sustainability which comes from various sources, primarily from government allocations and subsequently at community level from various sustainable use initiatives such as trophy hunting, ecotourism, CKNP entry fee etc. Community based organizations can also initiate small projects for that the capacity of the CBCSDOs can be enhanced so to conceive, develop, hunt and implement small initiative on their own. However, this kind of the implementation will be done in consultation with the CKNP directorate to avoid any duplication in the activities.

8.2. Monitoring Mechanism

8.2.1. CKNP Directorate

The major responsibility of monitoring all action of a CBCSDO carried out under the framework of VCSDP should be jointly with DFO Ghanche and CKNP Directorate. The DFO Ghanche and CKNP Directorate can monitor their progress in the following steps:

- Visiting individual CBCSDOs and checking their records and verifying physical progress on activities
- Attending DCC meetings and reviewing progress of CBCSDOs annual plans
- Monitoring CBCSDOs performance against their annual plans in the meetings of the CKNP Management Committee

- CKNP can call in meetings of the representatives CBCSDOs at the directorate on a periodic or need basis to review the progress against the tasks

8.2.2. District Conservation Committee Meetings

The VCSDP should be presented in DCC Ghanche and endorsed by the chairman of DCC with recommendations from CKNP Director and DFO Ghanche. The DCC Ghanche in its bi-annual meeting should review the progress of implementation on VCSDP. Each village should have an annual plan to be presented and subsequently reviewed in DCC.

8.2.3. Community Agreements

DFO Ghanche, CKNP Directorate or any supporting agency intending to initiate any activity with a CBCSDO should sign a letter of agreement explaining the roles and responsibilities of all parties involved in undertaking the activity. A copy of such an agreement should be made available in CBCSDOs office records.

8.2.4. CBCSDOs Audit and Record Keeping

DFO Ghanche, CKNP Directorate or any supporting organizations should emphasize on proper record keeping of all activities undertaken by CBCSDOs. This can be done by checking monthly minutes' sheet, proceedings of the special meetings and financial records of CBCSDOs. It should be mandatory for every CBCSDO to have their annual audit report. Any financial support to a CBCSDO should be linked to availability of annual audit report. The community must have a separate file for all major activities to be undertaken as part of the VCSDP.

For all major initiatives the CBCSDO should constitute two committees: a) project execution committee and b) project audit committee. Most of the local communities are familiar of this system due to the projects of several organizations.

8.2.5. CBCSDO Visitor Diary

CBCSDO should maintain a visitor diary for noting comments, feedback and observations of all visitors coming to a village in connection with conservation and sustainable development initiatives. The CKNP Directorate, DFO Ghanche and supporting agencies or organizations should clearly instruct their employees visiting any village/ valley to write down their notes in CBCSDO visitor diary. This way the supporting agencies can avoid duplicate of efforts and it will be helpful in carrying out the activities systematically and logically.

8.2.6. Relevance in Assignments

The CBCSDOs should find the relevant person for carrying out tasks including the finance and record keep, meeting minutes etc. The relevant persons will thus be able to keep a proper record that is a prerequisite for the sustainability of the community organizations. Channels should be found out, wherever possible for the capacity building of the technical persons closely coordinating with the government and private organizations.

8.2.7. Network of CBCSDOs

In order to learn from each other's best practices, it is worthwhile to develop a network of CBCSDOs. They may opt to meet led by some representatives facilitated by CKNP to discuss the successes and failures. The learning can be shared that can help in avoiding failures, adopting models that lead to successes considering the relevancy.

Visitors Diary

Name of CBCSDO.....

Name of Visitor

Organization/institution

Date of visit

Purpose of visit

Venue of meeting

Meeting participants.....

Key discussions or decision points

.....
.....
.....
.....
...

Required follow up actions

.....
.....
.....
.....

Signature of the visitor.....