

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







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2016-2026  
Central Karakoram National Park  
Gilgit Baltistan



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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: Vegetarion 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 Km<sup>2</sup>. According to new administrative divisions, park spans on five of the ten districts of Gilgit-Baltistan<sup>1</sup>. 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 Km<sup>2</sup>*



### 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.

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

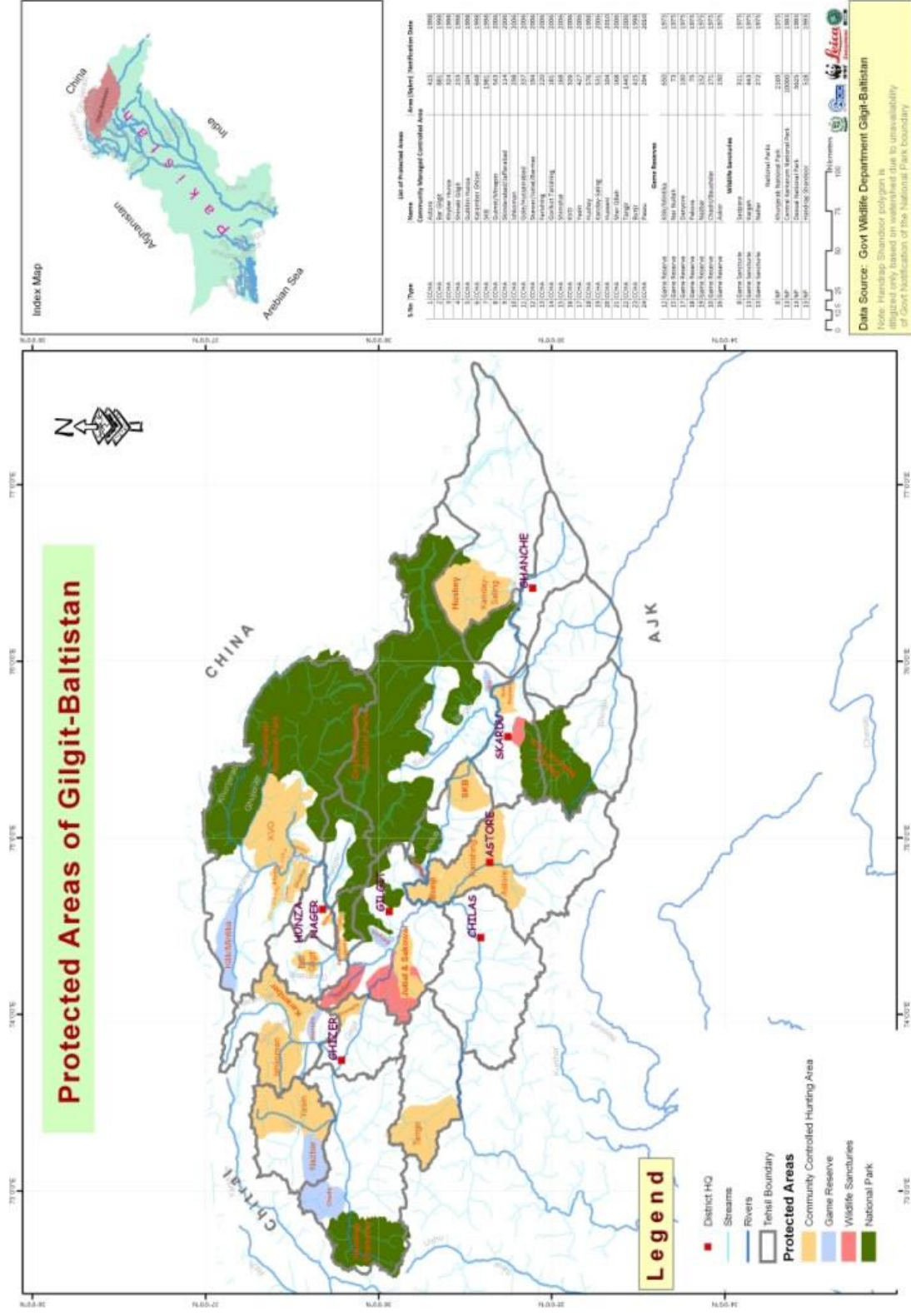


Exhibit 2: Protected areas of Gilgit-Baltistan

## 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 year<sup>2</sup>.

## 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 Karakoram<sup>3</sup>. 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

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

<sup>3</sup> 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 Nagar<sup>4</sup>. 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 CKNP<sup>5</sup> 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 park<sup>6</sup>.

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<sup>4</sup> 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.

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

<sup>6</sup> 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 practices<sup>7</sup>. 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 Hushey<sup>8</sup>. 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.

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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)<sup>9</sup> 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:

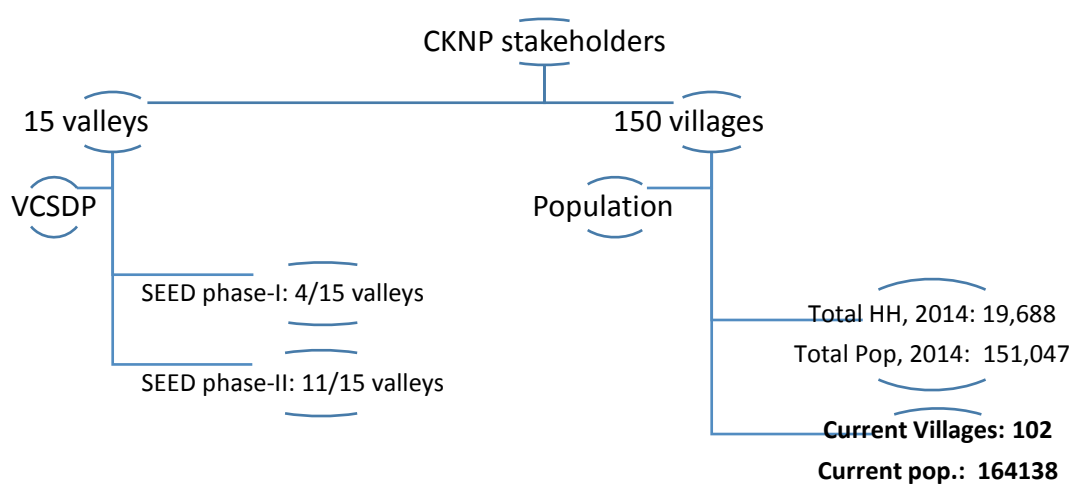
- a) Resource Need Assessment (RNA)
- b) Participatory Conservation Planning (PCP)
- c) Approval of VCP from District Conservation Committees (DCCs)

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<sup>9</sup>Integrated 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**

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

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

#### 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
<b>Total</b>	<b>102</b>	<b>164138</b>	<b>325362</b>	<b>--</b>	<b>89</b>	<b>45</b>	<b>15</b>

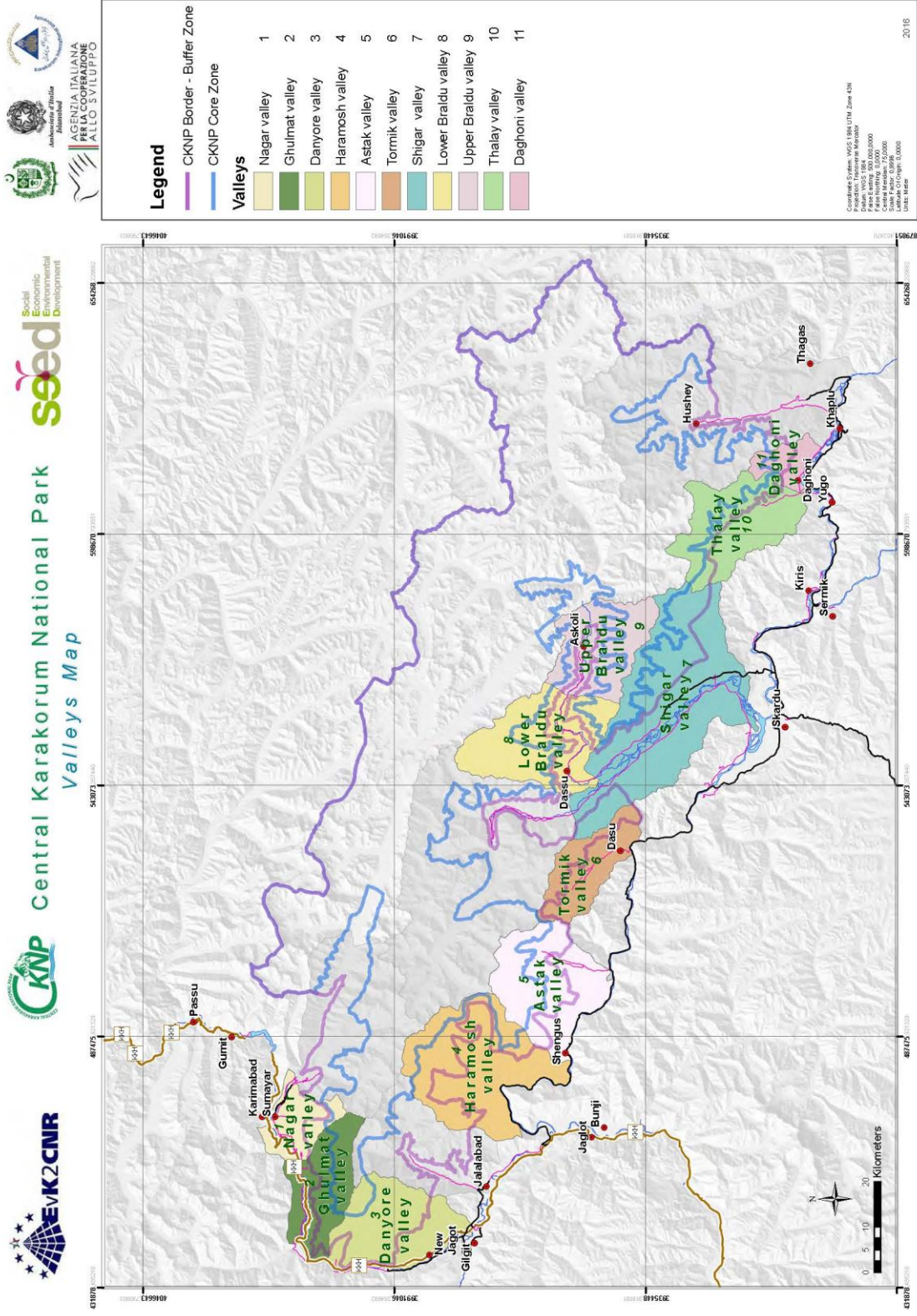


Exhibit 13: Valleys of CKNP



**Exhibit 14: Status of Natural Resource Harvest in CKNP valleys**

Name of Valley	Water			Forest			Pastures			Medicinal Plants			Wildlife Hunting		
	Sustainable	Unsustainable		Sustainable	Unsustainable		Sustainable	Unsustainable		Sustainable	Unsustainable		Sustainable	Unsustainable	
		L	M	H	L	M	H	L	M	H	L	M	L	M	H
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	<p>Juniper trees are cut and used as fuel wood and timber</p> <p>Riparian vegetation e.g. Sea-buckthorn and Willows, community usually remove the whole plant/tree from soil</p> <p>Community harvests wood at unsustainable level both from buffer and core zone</p>	<p>Harvest of Juniper is banned; if harvest is necessary than only only braches should be removed instead of whole tree</p> <p>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</p> <p>Wood and shrub collection is allowed only in the buffer zone up to sustainable level</p>	<p>Awareness of community is required</p> <p>-do-</p> <p>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</p>
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 VCS DP 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 CO<sub>2</sub> 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 27<sup>th</sup>, 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 27<sup>th</sup>, 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 accidentally 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 its 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 CO<sub>2</sub> 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 Dagboni 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

## Shigar Valley

### Central Karakorum National Park

### Gilgit Baltistan





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



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PLAN EDORSEMENT

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Held .....

Dated.....

## CONTENTS

Abbreviations.....	i
1. Introduction of Shigar Valley .....	1
1.1. Locality of Shigar Valley .....	1
1.2. Ecological Profile of Shigar Valley.....	3
1.3. Socio-economic Profile of Shigar Valley .....	3
1.3.1. Demography of Shigar Valley .....	3
1.3.2. Road Access.....	3
1.3.3. Education Facilities.....	6
1.3.4. Health Facilities .....	6
1.3.5. Veterinary Facilities.....	6
1.3.6. Electricity.....	6
1.3.7. Traditional Governance System.....	9
2. Assessment of Customary Practices for sustainable use of natural resources .....	13
2.1. Requirement of revitalization of indigenous knowledge .....	13
2.2. Water .....	13
2.3. Agriculture.....	16
2.4. Livestock.....	21
2.5. Pastures .....	26
2.6. Fuel Wood Collection/ Timber Harvesting .....	33
2.7. Mining.....	40
2.8. Tourism .....	40
3. Assessment of Climate change impact on natural resources .....	43
3.1. Climate Change in the perspective of Indigenous knowledge .....	43
3.2. Temperature variability and seasonal shifts .....	43
3.3. Precipitation.....	44
3.4. Drought .....	44
3.5. Flood.....	45
3.6. Landslides.....	45
3.7. Pastures .....	47
3.8. Biodiversity .....	48
3.8.1. Agriculture and Fruits .....	48

3.8.2. Forest.....	49
3.8.3. Wildlife and associated biodiversity .....	50
3.9.Water .....	52
3.10. Tourism .....	52
4. Management issues and problems.....	55
4.1.Agriculture.....	55
4.2.Pasture.....	56
4.3.Water .....	57
4.4.Forest and NTFP Issues .....	58
4.5.Eco-tourism.....	59
4.6.Mining.....	59
4.7.Wildlife and Protected areas.....	60
5. Proposed Management Interventions.....	64
5.1.Agriculture.....	64
5.2.Pasture.....	66
5.3.Water .....	68
5.4.Forest and NTFP .....	68
5.5.Eco-tourism.....	69
5.6.Mining.....	69
5.7.Wildlife and Protected areas.....	70
6. Statuary Vs Customary Practices In SHIGAR Valley .....	71
7. Recommended Action Plan for Shigar Valley .....	73
8. Implementation and Monitoring Mechanism.....	84
8.1.Implementation Mechanism .....	84
8.2.Monitoring Mechanism .....	84
8.2.1. CKNP Directorate.....	84
8.2.2. District Conservation Committee Meetings .....	85
8.2.3. Community Agreements.....	85
8.2.4. CBCSDOs Audit and Record Keeping.....	85
8.2.5. CBCSDO Visitor Diary .....	85
8.2.6. Relevance in Assignments .....	85
8.2.7. Network of CBCSDOs .....	86



## LIST OF EXHIBITS

Exhibit 1: Link road in Shigar Valley .....	1
Exhibit 2: Village locations of Shigar Valley, 2016 .....	1
Exhibit 3: Map of Shigar Valley.....	2
Exhibit 4: Demographic map of Shigar Valley .....	4
<b>Exhibit 5: Demographic profile of Shigar Valley .....</b>	<b>5</b>
Exhibit 6: Demographics of Shigar Valley, 2016.....	5
Exhibit 7: Socio-economic Profile of Shigar Valley .....	7
<b>Exhibit 8: Land Cover Map of Shigar Valley.....</b>	<b>15</b>
Exhibit 9: Economic benefits of agriculture production.....	17
<b>Exhibit 10: Need fulfillment by Agriculture in Shigar Valley, 2016.....</b>	<b>20</b>
<b>Exhibit 11: Need fulfillment by Agriculture in Shigar Valley, 2016.....</b>	<b>20</b>
Exhibit 12: Livestock at Shigar Pasture .....	21
Exhibit 13: Contribution of livestock in economics of Shigar Valley.....	23
<b>Exhibit 14: Livestock population and income of Shigar Valley (Alchori – Markonja).....</b>	<b>25</b>
<b>Exhibit 15: Livestock population and income of Shigar Valley (Saldi - Zwapa).....</b>	<b>25</b>
<b>Exhibit 16: Grazing Pressure by livestock on pastures of Shigar Valley .....</b>	<b>28</b>
<b>Exhibit 17: Grazing Pressure by livestock on pastures of Shigar Valley .....</b>	<b>29</b>
Exhibit 18: Assessment of grazing pressure from each livestock classes on pastures of Shigar Valley ...	30
Exhibit 19: Timber collection from forest.....	33
Exhibit 20: Fuel harvest from natural vegetation .....	33
Exhibit 21: Artificial plantation in Shigar.....	34
Exhibit 22: Timber harvesting and use at Shigar valley .....	36
Exhibit 23: Summary of Fuel Wood harvest and Consumption in Shigar Valley .....	36
Exhibit 24: Annual fuel wood harvest, Shigar valley .....	38
Exhibit 25: Details of fuel wood harvested per household from several sources (Mg) .....	39
<b>Exhibit 26: Assessment of required reforestation to compensate fuel needs in Shigar Valley.....</b>	<b>39</b>
<b>Exhibit 27: Economic revenue from Mining in Shigar Valley, 2016 .....</b>	<b>40</b>
Exhibit 28: Climate Change at Shigar Valley in the Perspective of Indigenous Knowledge .....	46
<b>Exhibit 29: Impact of climate change on Pastures of Shigar Valley .....</b>	<b>48</b>
<b>Exhibit 30: Impact of climate change on Biodiversity of Shigar Valley .....</b>	<b>51</b>

## 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 SHIGAR VALLEY

## 1.1. Locality of Shigar Valley

Shigar Valley is part of District Shigar, Baltistan stretches about 170 km from Skardu to Askole and is the gateway to the high mountains of the Karakoram. Shigar valley lies on the Shigar River; a tributary of Indus River. Union of Braldo and Basha River. Valley is situated approximately 2300 meters above sea level. Despite the fact that the Shigar Valley is a remote and to a great extent distant place but still there are more than 34 mini villages in Shigar valley.



Exhibit 1: Link road in Shigar Valley

Exhibit 2: Village locations of Shigar Valley, 2016

Villages	Coordinates		Elevation (m asl)
	N	E	
Alchori	35°31'46.7"	075°38'21.4"	2314
Hashupi/Hurchas/Tharaghama	35°30'40.4"	075°40'20.5"	2330
HaiderAbad /Bala	35°39'32.3"	075°30'02.7"	2344
Kashmal	35°58'31.5"	075°58'21.7"	2317
Kiahonng	35°25'15.0"	075°43'24.6"	2250
Khurid	35°32'55.5"	075°34'13.0"	2273
Lagaf	35° 39'24.8"	075° 27'47.2"	2359
Markonja	35°25'38.2"	075°44'19.2"	2314
Saldi	35°56'81.2"	075°59'17.9"	2310
Skora/Chorka	--	--	--
Soggo	35°37'12.2"	075°29'56.7"	2346
Ticho	35° 57'56.6"	075° 54'18.7"	2276
Tissar centre	35°40'17.5"	075°27'03.2"	2395
Tropi	35°49'11.8"	075°69'13.6"	2293
Youno/Thandoro	35°60'78.9"	075°55'50.2"	2328
Zawapa	35°25'12.3"	075°42'23.5"	2337



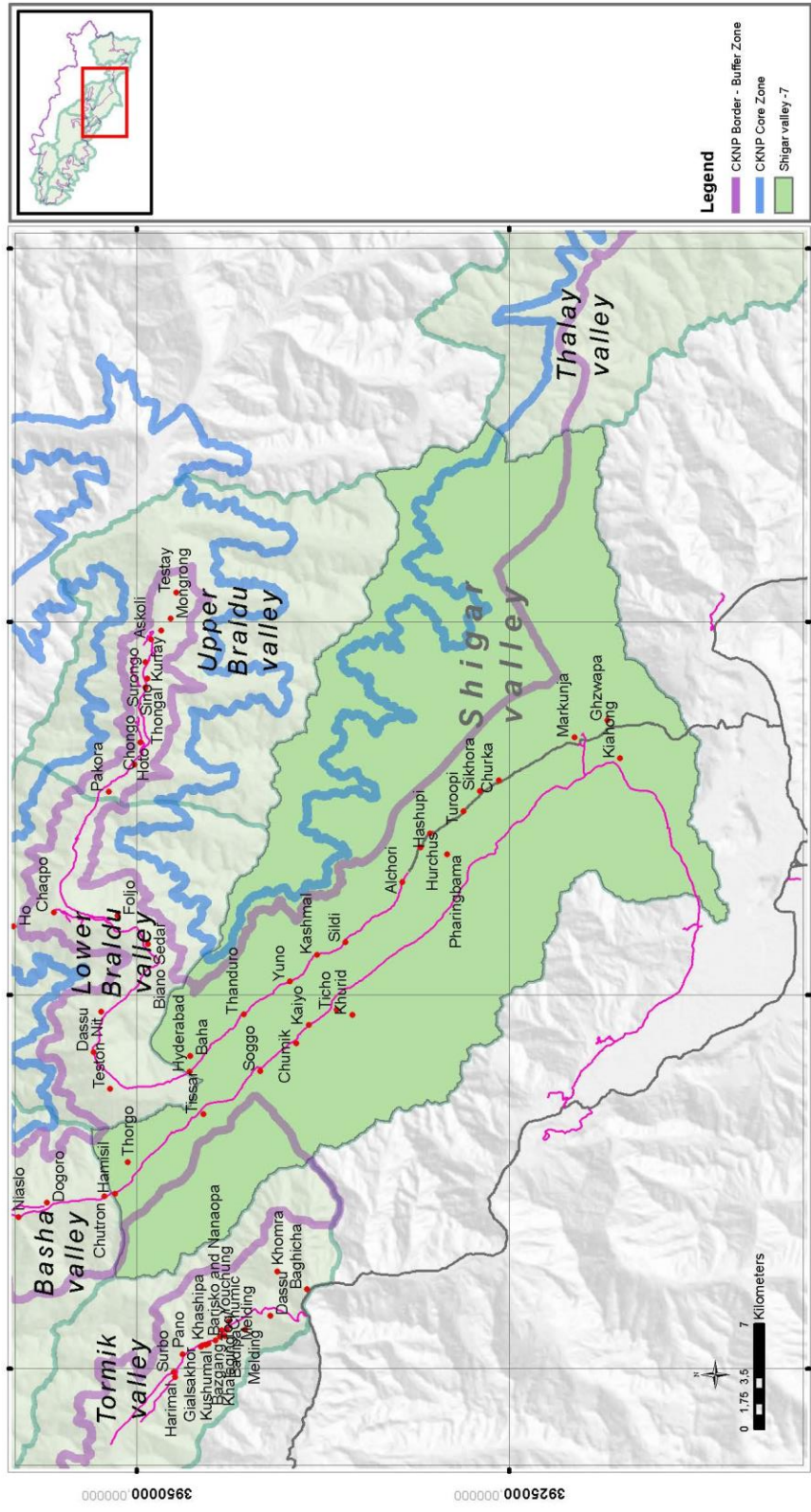


Exhibit 3: Map of Shigar Valley

## 1.2. Ecological Profile of Shigar Valley

Shigar valley presents a view like a sprawling oasis, with the mighty Shigar River crossing the vast river bed to the right of the valley at northern side of Skardu. The valley offers a stunningly contrasting landscape – rocky barren cliffs, cultivated terraces, and orchards all around. With lovely terraced agriculture fields lined with Poplar and Cedar trees on sloppy mountains it shapes the passage to the considerable mountain pinnacles of the Karakoram. Vegetation of the area is the mix of sub-tropical scrub type at lower elevations and dry temperate coniferous forest zone at higher elevations. Shigar valley is representative of 6.1 % broad-leaved, 8.8% coniferous forest and 85.1% 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 Shigar 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 such as Ibex was once common but now it is no more in the area.

## 1.3. Socio-economic Profile of Shigar Valley

### 1.1.1. Demography of Shigar Valley

According to the survey results conducted for VCSDPs of CKNP villages, total number of households is 2838 containing 20295 total population (52% female and 48% male) with an average household size of 7.68. All these villages are based around buffer area of CKNP which spans 2757.88 m<sup>2</sup> and serves as reserves of natural resources for the local people and transitional area between park and local communities. This local community depends heavily upon natural resources both for subsistence and income.

### 1.1.2. Road Access

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 communication 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. The district headquarter, main Shigar town is connected to Skardu through a metal road except this all the villages of Shigar Valley are connected through narrow unpaved road to the main Shigar town.

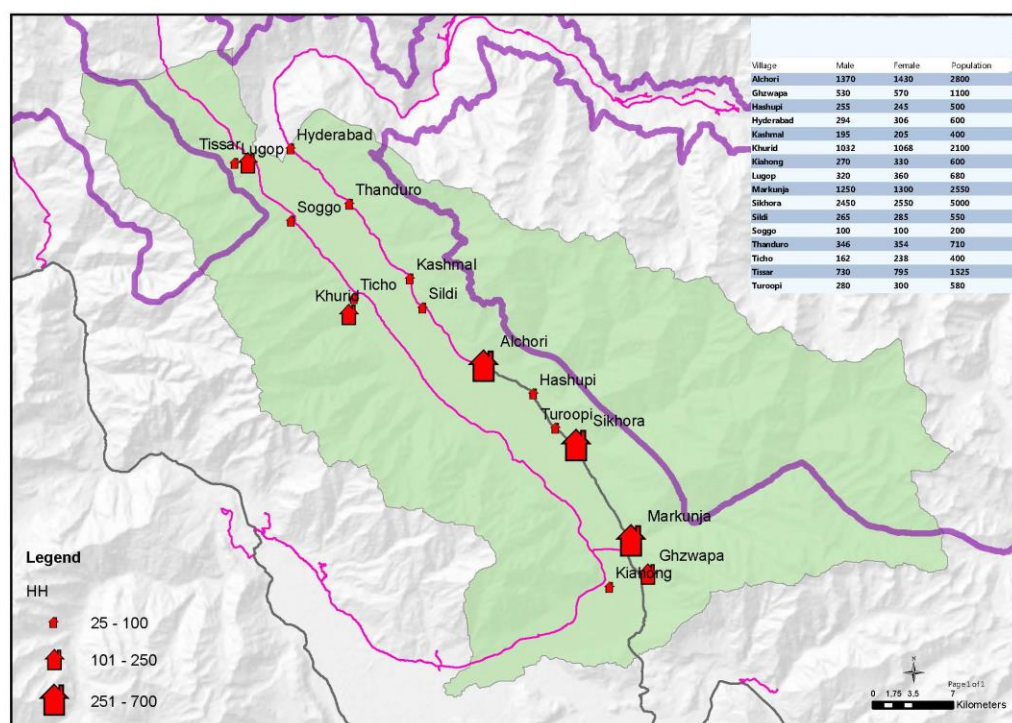
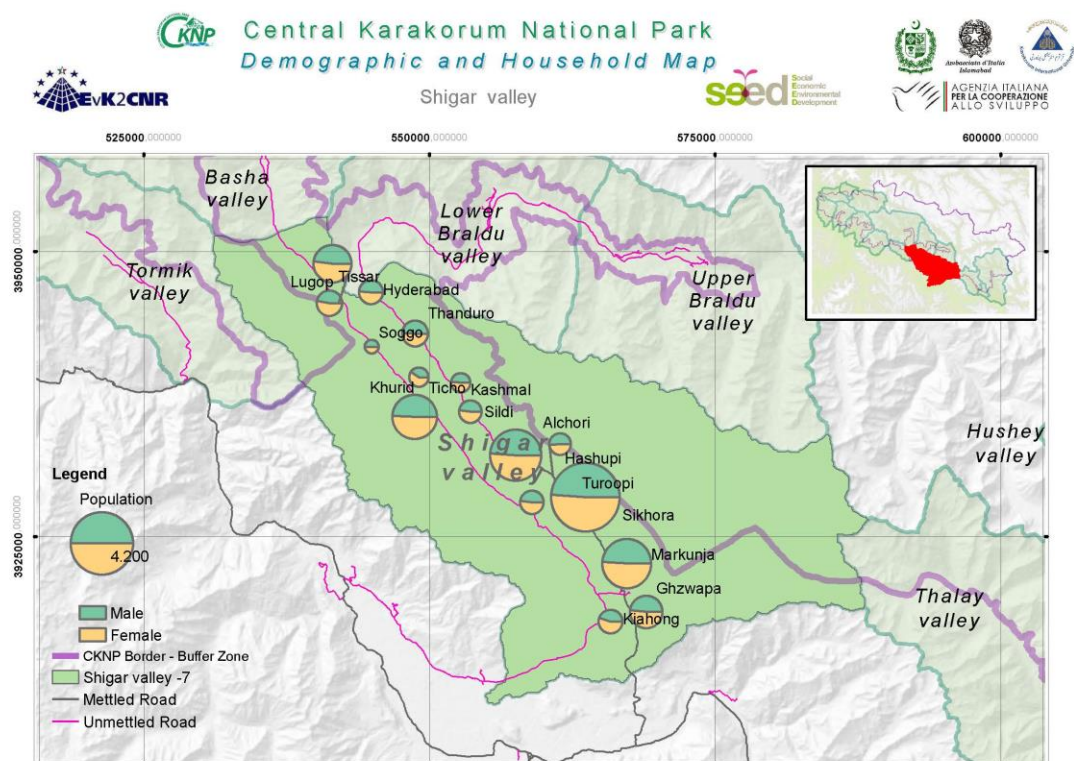


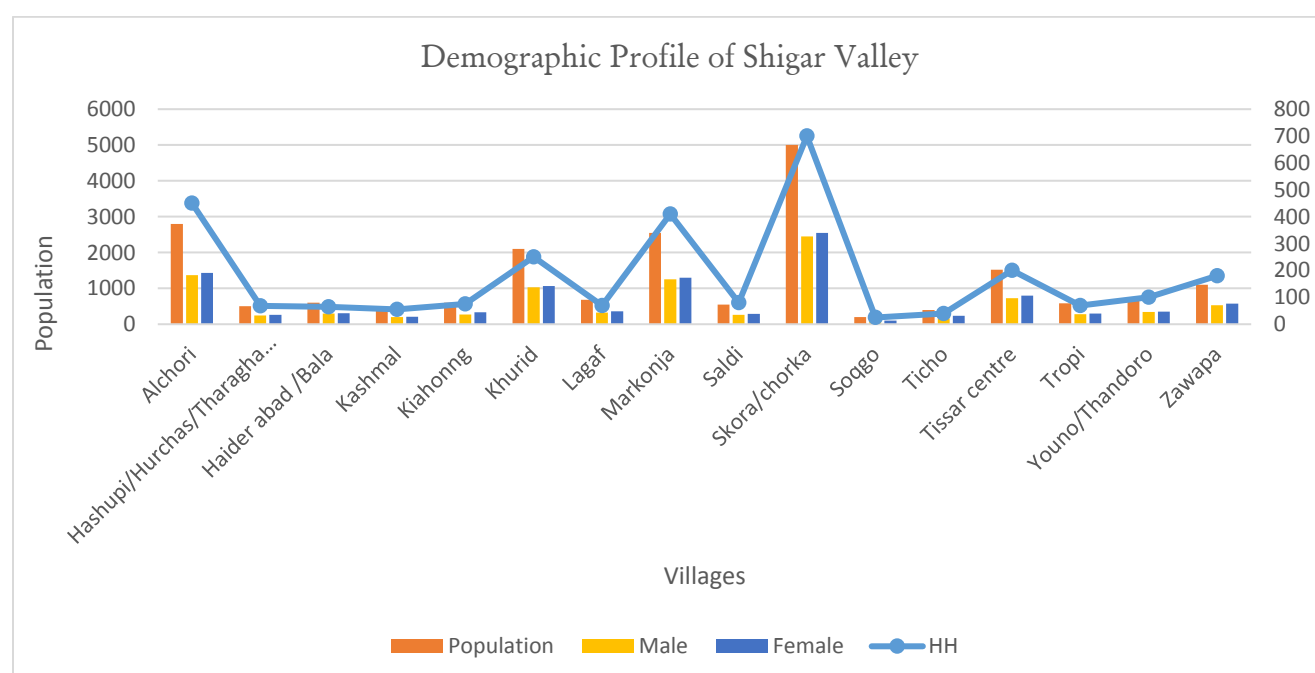
Exhibit 4: Demographic map of Shigar Valley



**Exhibit 5: Demographic profile of Shigar Valley**

Village	HH	Population	Av. HH size	Male	Female	Male: Female
Alchori	450	2800	6	1370	1430	0.95:1.05
Hashupi/Hurchas/Tharaghama	68	500	8	240	260	0.92:1.08
Haider abad /Bala	65	600	9	294	306	0.96:1.04
Kashmal	55	400	7	195	205	0.96:1.04
Kiahonng	75	600	8	270	330	0.95:1.05
Khurid	250	2100	8	1032	1068	0.97:1.03
Lagaf	70	680	10	320	360	0.88:1.12
Markonja	410	2550	6	1250	1300	0.96:1.04
Saldi	80	550	7	265	285	0.92:1.08
Skora/chorka	700	5000	7	2450	2550	0.96:1.04
Soggo	25	200	8	100	100	1:1:0.9
Ticho	40	400	10	162	238	0.68:1.32
Tissar centre	200	1525	8	730	795	0.91:1.09
Tropi	70	580	8	280	300	0.93:1.07
Youno/Thandoro	100	710	7	346	354	0.98:1.02
Zawapa	180	1100	6	530	570	0.93:1.07
<b>Total</b>	<b>2838</b>	<b>20295</b>	<b>7.6875</b>	<b>9834</b>	<b>10451</b>	<b>--</b>

**Exhibit 6: Demographics of Shigar Valley, 2016**



### 1.1.3. Education Facilities

All the villages have primary school education facilities being operated by both public and private sector except the Ticho village. The residents of Ticho village visit Gulabpur for education. Villages like Alchori, Kashmal, Markonja, Skora/Churkah and Tisser have high school education facilities as well. Majority of population visit Skardu and Shigar as well for high school and college level education.

### 1.1.4. Health Facilities

In Shigar valley health care facilities are severely limited; villages like Lagaf, Kiahong, Saldi, Ticho and Tropi are without in basic health facilities. The residents of these villages have to travel to other villages like Tesar, Churkah, Alchor, Gulab pur, Shigar town and Skardu for health facilities. There are three RHCs as well in Markonja, Soqgo and Zawapa.

### 1.1.5. Veterinary Facilities

Shigar 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 dispensaries are located only in Markonja, Zawapa and Kashmal, presents very paltry picture in terms of services to local community. All other villages of Shigar valley depend upon meagre services provided by mentioned veterinary facility. Most commonly reported livestock diseases are Goat pox, Interotoxemia (Goat, sheep and cattle), Black quarter, Mange (Large animal's 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 Dambodas Tehsil of Skardu District or Gilgit City and inject them by themselves devoid of proper training.

### 1.1.6. Electricity

All the villages in Shigar valley has the access to electricity facility provided and managed by Water and Power Department, GB. The sources of electricity are small hydro stations of various capacities in Shigar valley. In Totkhor village there are three (03) small hydro units of 35 KV, 01 MW and 2 MW. In Kayo village there is one (01) hydro power station having capacity of 306KV. One more power station of 500KV in Hashupi village is under construction. The existing facilities are unable to meet the energy demand of the community and hence the 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. Local community residing around CKNP manages this electricity shortage by harvesting wood as a fuel source from the National Park.



**Exhibit 7: Socio-economic Profile of Shigar Valley**

Villages	Education facilities			Health facilities		Veterinary facilities	Electricity
	Category / Level	Ownership	Geographic Location	Gender	Facility	Geographic Location	
Alchori	High	Govt.	35°31'49.8" 75°38'14.1" 2291 m asl	Both	Dispensary	35°31'32.8" 75°38'49.8" 2356 m asl	No facility, community take their livestock to Skardu vet facility
Hashupi/Hurchas/Tharaghama	Primary	Public	35°30'37.7" 75°40'16.4" 2328 m asl	-do-	Basic Health Unit	35°35'28.3" 75°40'28.9" 2341 m asl	No facility, Community take their livestock to Kashmal vet facility
Haider abad /Bala	Middle	Public	35°39'40.5" 75°29'45.6" 2353 m asl	-do-	Dispensary	35°39'35.5" 75°29'51.0" 2350 m asl	No facility, community take their livestock to Skardu vet facility
Kashmal	High	Public	35°58'31.5" 75°58'21.8" 2317 m asl	-do-	Dispensary	35°58'56.4" 75°57'97.9" 2342 m asl	Vet dispensary
Kiahonng	Primary	Public	35°25'13.8" 75°43'29.7" 2253 m asl	-do-	No facility		No facility, community take their livestock to Skardu vet facility
Khurid	Middle	Public	35°33'00.1" 75°33'32.3" 2305 m asl	-do-	No facility		No facility, community take their livestock to Shigar town vet facility
Lagaf	Primary	Public and Private	35°39'29.3" 75°27'45.2" 2362 m asl	-do-	No health facility, community visit Tesar facility	-	No facility, community take their livestock to Molto vet facility
Markonja	High	Private	35°25'30.8' 75°44'18.9' 2305 m asl	-do-	Rural Health Centre	35°25'26.5" 75°44'12.0" 2304 m asl	Dispensary

Villages	Education facilities				Health facilities		Electricity
	Category / Level	Ownership	Geographic Location	Gender	Facility	Geographic Location	
Saldi	Primary	Public	35°56'66.7" 75°79'27.5" 2291 m asl	-do-	No facility, community visits Alchori dispensary		Yes
Skora/churka	High	Public	35°46'99.4" 75°70'95.5" 2316 m asl	-do-	Dispensary	- -	Yes
Soqgo	Primary	Public	35°37'14.8" 75°29'56.1" 2335 m asl	-do-	Rural Health Centre	35°71'05.6" 75°29'59.8" 2320 m asl	Yes
Ticho	No education facility, students have to visit Gulabpur	-	-	-do-	No health facility, community has to visit Gulabpur		Yes
Tissar center	High	Public	35°40'13.6" 75°27'04.2" 2401 m asl	-do-	BHU	35°40'17.5" 75°27'03.2" 2395 m asl	Yes
Tropi	Primary	Private	35°49'08.9" 75°68'67.1" 2285 m asl	-do-	No facility, community visits Churkah dispensary	- - -	Yes
Youno/Thandoro	Primary	Public	35°60'73.2" 75°55'53.8" 2335 m asl	do-	Basic Health Unit	35°60'85.0" 75°55'48.0" 2320 m asl	Yes
Zawapa	Primary	Public	-	do-	Rural Health Centre	-	Yes

### 1.1.7. 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.

There are two (02) LSOs working in Shigar Valley named as Markunja Local Support Organization and Marapi Local Support Organization. VCCs, VOs and WOs are also working but due to the lack of financial resources and community's internal conflict their performance is being hampered so that's why their visibility and coherence are really weak. There are also some VOs having political and religious backgrounds. In the context of natural resource management these organizations facilitate the meetings, execution of activities, monitoring and decisions related to community resources and resolve conflicts. The community seems not satisfied with their performance and not so much functional especially if there is no NGO driven project.





# 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 integral component of a cultural complex that incorporates language, nomenclature, resource use practice, cultural and worldview. 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 it 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

Inhabitants of Shigar valley have established complex irrigation mechanism or water system frameworks and agricultural fields in a long process of water channel development, land leveling and improvement. The glacial melt water is extracted from nearby stream or Nullah following gravitational force and brought to agriculture fields through open water channels. The water related systems and frameworks contrast from one valley to other but water distribution mainly depends upon its availability. In case of water shortage, the usage rights rotate between different agriculture fields and household areas or villages while the usage right within the community is restricted; households get water for a particular time span irrespective of their land holdings.

Mostly due to extreme winter season or due to natural hazard, irrigation channels need continuous maintenance. Customary rules say that every farmer has to take the responsibility of water channel maintenance and its discharge point in order to avoid any potential harm to affiliated fields. Repair work of the main channel is an obligation for water

utilizer group. Each household need to assign one male worker for this task and in case of noncompliance they are fined. Up keeping of channel includes removal of rocks, sediments, silt, anthropogenic matter and repair of side walls.

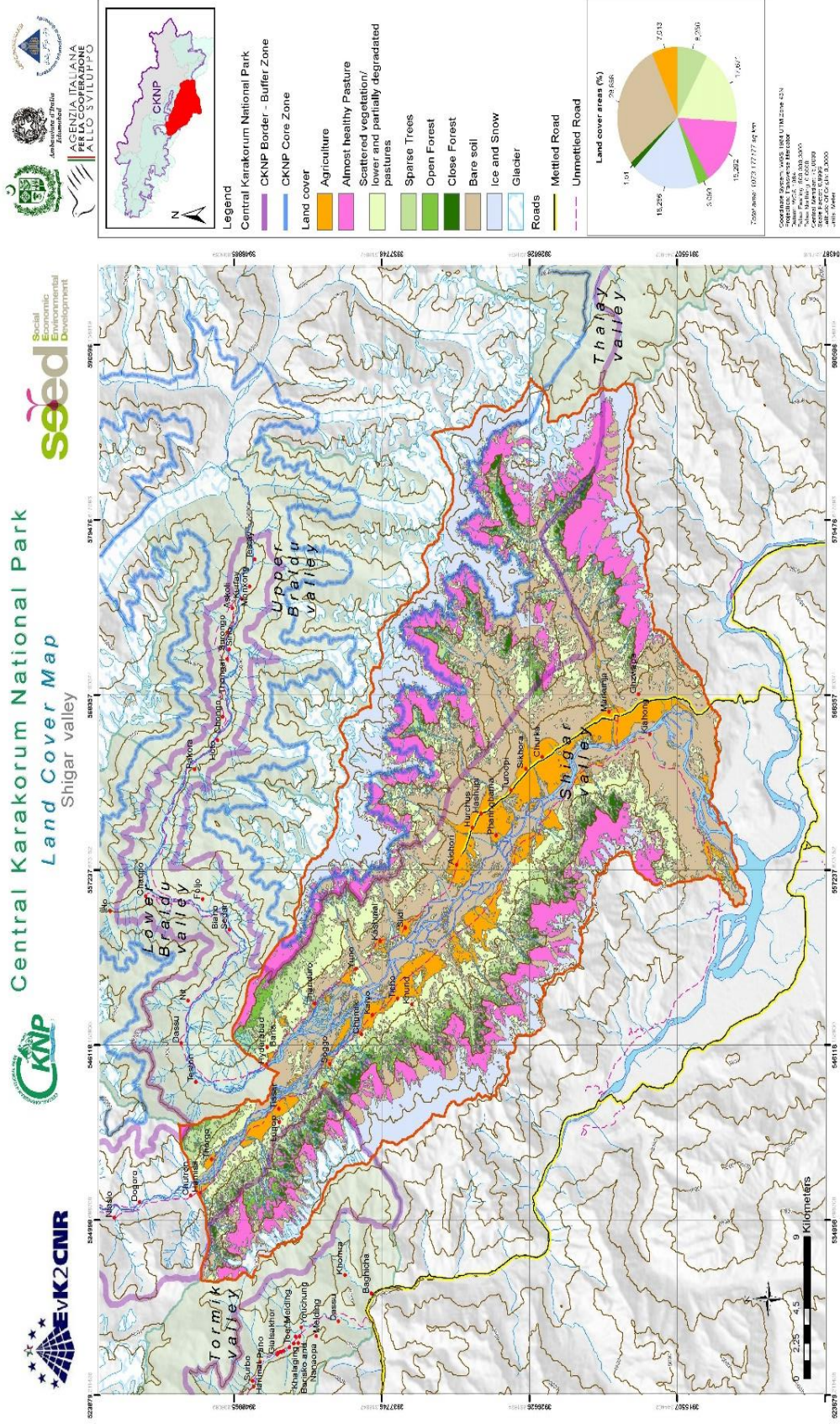


Exhibit 8: Land Cover Map of Shigar Valley

## 2.3 Agriculture

There is subsistence agriculture in Shigar valley, the most important crops are wheat, buckwheat, barley, millet, vegetables (peas) and fruits (apricots) are grown in several different local and adopted varieties. The Shigar valley is a single cropping zone because of the short growing season due to harsh climate which does not allow another cropping cycle. Agriculture in Shigar valley is both irrigated and rain fed. Indigenous cultivars and even the wild relatives of numerous crops are grown with the possibility of “Food for own” but the yield is very low. In average each house hold has 10 Kanals of cultivated land. In the cultivated land most of the people grow wheat and vegetables.

In Shigar valley local farmers have developed terraced patches of agriculture fields through land reclamation at different altitudes around their settlements which is often highly fragmented landscapes. Besides protecting and improving the existing cropping system, terraces provide new planting niches with favorable conditions for specialty crops or for establishing valuable trees. For example, farmers plant fruit and nut trees along the edges of terrace rises and thereby allow the successful establishment of tree crops to manage scarce plain area. The size for the agriculture fields decides the limits for mechanization such as manual tilling or mechanized tilling. To maximize agriculture production conservation tillage in addition to animal manure has also been practiced by local farmers in Shigar valley to avoid erosion and increase in fertility.

Shigar valley has agro based economy, majority of Shigar habitants depend their living on farming. The land use in Shigar valley is dominated by agriculture, fruit gardens and livestock farming and farm forestry. The scenic Shigar valley was once a hub for wheat export to entire Baltistan. But now it experiences wheat shortage and productivity of farms has been stricken by extreme weather conditions, land reduction, rising number of glacial lakes and heavy rainfall-induced calamities.

According to a working paper of International Centre for Integrated Mountain Development (ICIMOD) “Towards a Framework for Achieving Food Security in the Mountains of Pakistan”, 52.4% of the GB population is food insecure and lack adequate access to food due to numerous challenges that are aggravating at express pace.

A large chunk of Shigar population is engaged in agriculture, horticulture, and livestock rearing for household food needs and livelihood. The fickle weather patterns have disturbed natural ecosystem balance and affected the overall traditional food productivity patterns.

Being unable to deal with erratic weather patterns, lack of capacity in acquiring farm inputs including quality seed and absence of extension services; vulnerable farming communities remain at the mercy of divine rescue because, they lack institutional and technical and financial support.



**Exhibit 9: Economic benefits of agriculture production**

Villages	Crops	Consumption (%)	Sale (%)	Av. Income per HH/yr	Av. Income of village/yr
Alchori	Wheat	100	0	400000	18000000
	Barley	N/A	0		
	Maize	100	0		
	Potato	60	40		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Hashupi/Hurchas/	Wheat	100	0	600000	4200000
	Barley	N/A	0		
	Maize	100	0		
	Potato	10	90		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Haider abad /Baha	Wheat	100	0	60000	6000000
	Barley	N/A	0		
	Maize	N/A	0		
	Potato	10	90		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Kashmal	Wheat	100	0	30000	2750000
	Barley	N/A	0		
	Maize	N/A	0		
	Potato	10	90		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Kiahonng	Wheat	100	0	35000	2625000
	Barley	100	0		
	Maize	N/A	0		
	Potato	10	0		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	40	60		
Khurid	Wheat	100	0	70000	17500000
	Barley	N/A	0		
	Maize	100	0		
	Potato	5	95		
	Millet	N/A	0		
	Buckwheat	N/A	0		

Villages	Crops	Consumption (%)	Sale (%)	Av. Income per HH/yr	Av. Income of village/yr
	Vegetable	100	0		
Lagaf	Wheat	100	0	50000	350000
	Barley	100	0		
	Maize	N/A	0		
	Potato	10	90		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Markonja	Wheat	100	0	10000	16400000
	Barley	100	0		
	Maize	N/A	0		
	Potato	5	95		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	N/A	0		
Saldi	Wheat	100	0	70000	560000
	Barley	N/A	0		
	Maize	100	0		
	Potato	60	40		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Skora/Churka	Wheat	100	0	20000	14000000
	Barley	N/A	0		
	Maize	100	0		
	Potato	N/A	0		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Soqgo	Wheat	100	0	80000	2000000
	Barley	100	0		
	Maize	N/A	0		
	Potato	10	90		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Ticho	Wheat	100	0	50000	200000
	Barley	100	0		
	Maize	N/A	0		
	Potato	100	0		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	40	60		

Villages	Crops	Consumption (%)	Sale (%)	Av. Income per HH/yr	Av. Income of village/yr
Tisser Centre	Wheat	100	0	50000	1000000
	Barley	100	0		
	Maize	N/A	0		
	Potato	100	0		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Tropi	Wheat	100	0	100000	24800000
	Barley	N/A	0		
	Maize	100	0		
	Potato	90	10		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	100	0		
Youno/Thandoro	Wheat	100	0	30000	10400000
	Barley	100	0		
	Maize	100	0		
	Potato	5	0		
	Millet	N/A	0		
	Buckwheat	30	0		
	Vegetable	100	0		
Zawapa	Wheat	100	0	35000	400000
	Barley	70	30		
	Maize	30	70		
	Potato	30	70		
	Millet	N/A	0		
	Buckwheat	N/A	0		
	Vegetable	N/A	0		

Exhibit 10: Need fulfillment by Agriculture in Shigar Valley, 2016

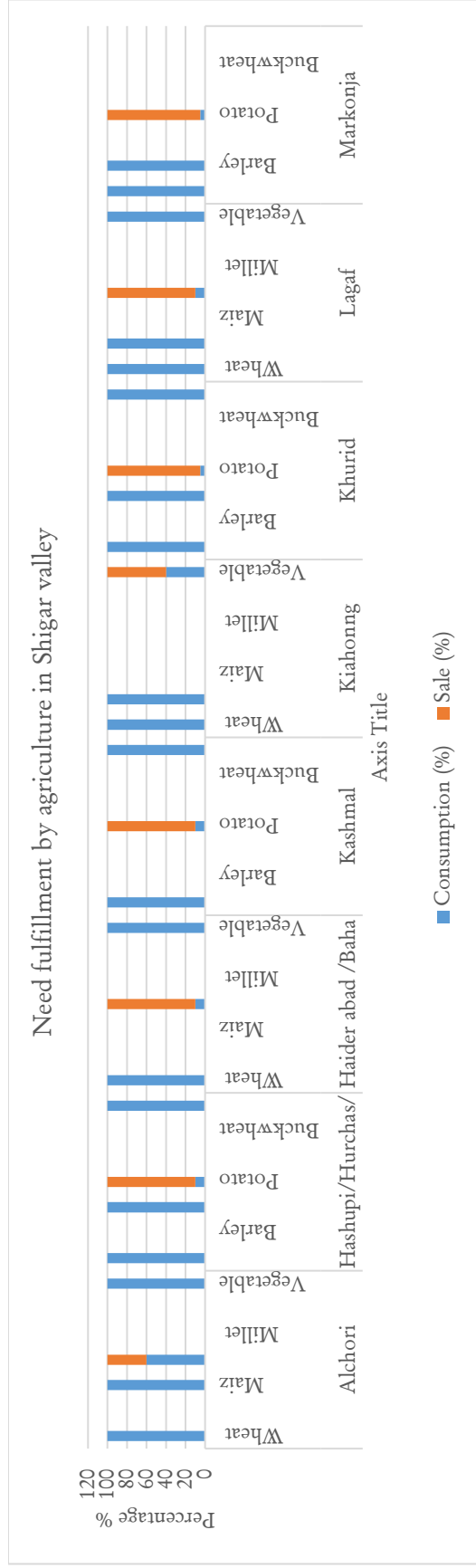
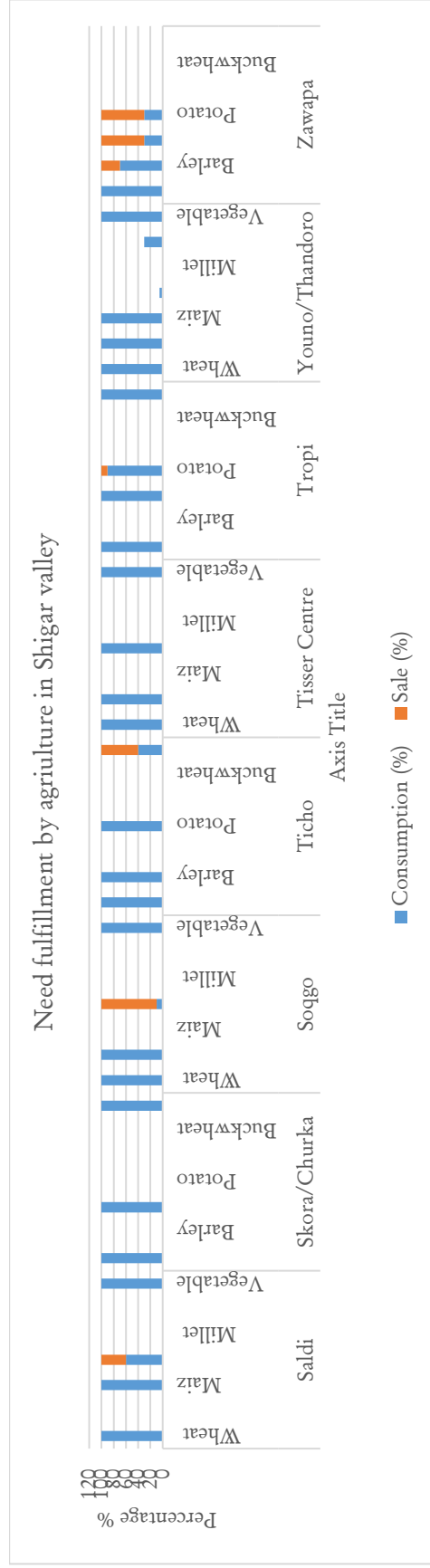


Exhibit 11: Need fulfillment by Agriculture in Shigar Valley, 2016



## 2.4 Livestock

Livestock herding is one of the major sources of livelihood in the CKNP buffer zone and 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. CKNP buffer zone livestock constitutes 20% of the total head of livestock in Gilgit Baltistan, which according to current VCSDP survey are 39430 animals in 20 villages of Shigar valley.

The majorities of the cattle in Shigar are local breed however a portion of the general population likewise raises Jersey dairy cattle and for breeding purpose yaks and bulls are being used. Artificial insemination is just an exception neither do they know about it. Wheat straw, fodder, grasses and leaves are stored and fed to animals in winter. The regular diseases of the domesticated animals are pneumonia, FMD, mastitis, mange, and enterotoxaemia. The primary driver of year-round mortality are illnesses, predation, winter starvation and losses (falls, Avalanches). According to survey the animals rearing trend is still decreasing in Shigar.

In March and April, stockholders take their herds on daily movements to the transitional pastures but not sufficient for the livestock all villages of Shigar. All animals are collected and given to a few men who take them up

to high elevated pastures. On daily movements the flocks are driven to high elevated meadows following the receding snowline as 4500 m. The timing of herding in different parts of the alpine pastures may vary, reflecting perceptions of the value of grass in different places.

The newly born calves, lambs and kids and as well as one or two lactating animals per household for daily milk supply are retained at villages during the whole summer. They are fed with fresh grass and weeds removed from the fields by women. The village community or in some cases the village elderly select a village guardian who protects the crops to ensure that no animal enter any field until the fields are harvested. The guarding usually serves for one year and receives 5kgs of wheat per household as payment for his duty. In addition, if he catches grazing animals in the fields, he receives fines from the owner of a specific animal.



**Exhibit 12: Livestock at Shigar Pasture**



In autumn, when the livestock are driven down from the high pastures, they are turned on to the fields to graze on the stubble. Dried apricots of lower quality are given to them in evening as kind of reward so that they return to stables. Kind of fodder to the livestock during the winter depend not only its availability but also on many beliefs about the appropriate forms and amount of fodder to be given to particular types of animals. Cattles and cross bred are fed straw, and sometimes a little grain. Pregnant cattle are given supplementary fodder, hay, some flour, apricot nuts and sometimes eggs. Generally, all livestock lose weight during the winter. Since the traction power of zo is needed for plowing, they are fed barley and sometimes even apricot oil as supplement three weeks before plowing starts in early spring. Goats and sheep are fed leaves of fruit and other trees during October and November. Women or children tear leaves off the trees or beat the branches with long stick so that the leaves fall down and can be eaten by the stock. During the winter goats are fed hay, dried leaves, and herbs from weeding, sometimes apricot kernel of low quality and also millet straw, when available.

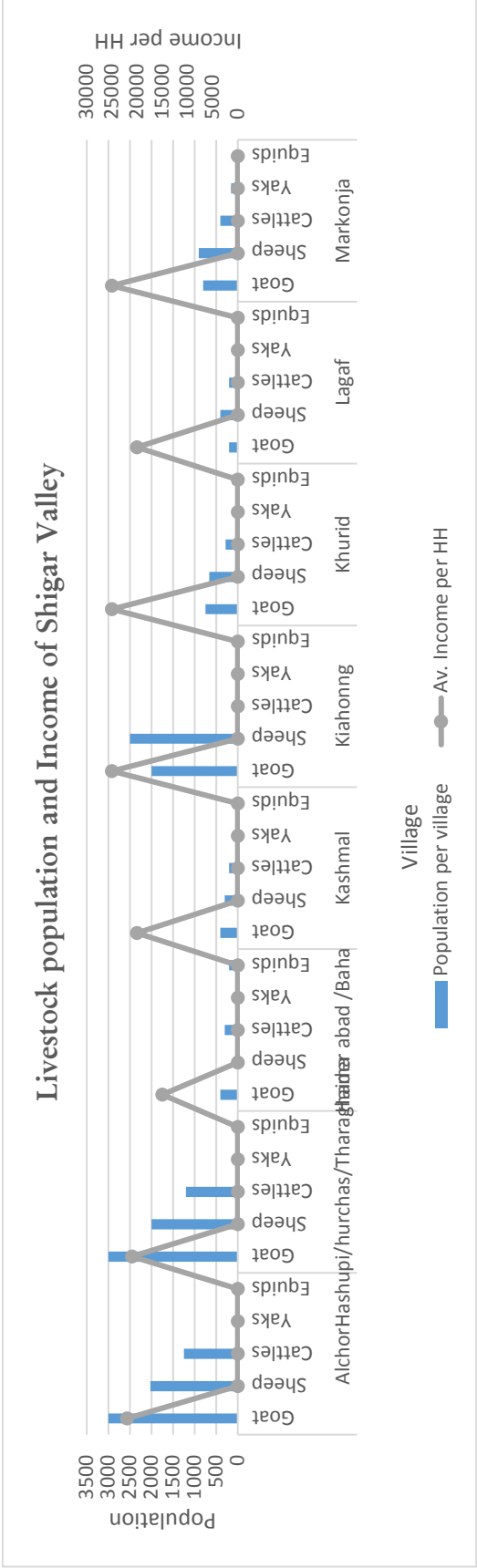
Non lactating goats and all sheep from village are moved to high pastures at a fix day by some villagers while cattle and zomos are driven to high pastures individually by stockholders themselves. On the bloq, however, the livestock is tended by a fix number of villagers who work there as herdsmen on a rotational basis. If animals are killed due to illness, accident, predators or other natural events the herdsmen don't have to pay any compensation to the owner. If animal has to be slaughtered due to any accident or illness, injury, herdsmen are allowed to take the heart and liver while rest of the meat is given to owner. Animals born in high pastures belongs to owner, he usually gives a small reward to the herdsmen. Al animals are marked by scratches on their horns, paint spots on the hides, marks in the ear. This herdsmen arrangement on pay basis is practiced when a particular household is short of men or does not want to send a household member to tend the livestock on bloq or brokh.

For breeding purpose there is usually one bull in each village and owned by the whole village community and usually bought at the age of two to three years. Only bull at the age between four and eight years is suitable for cross breeding while old ones are sold, and from the profit a new younger bull is bought. During winter, bull is held within the stable of one household which receives one basket of straw from every household for the feeding of the animal. Farmers from the same village don't have to pay anything while people from other villages without a village bull must give some money for that purpose.

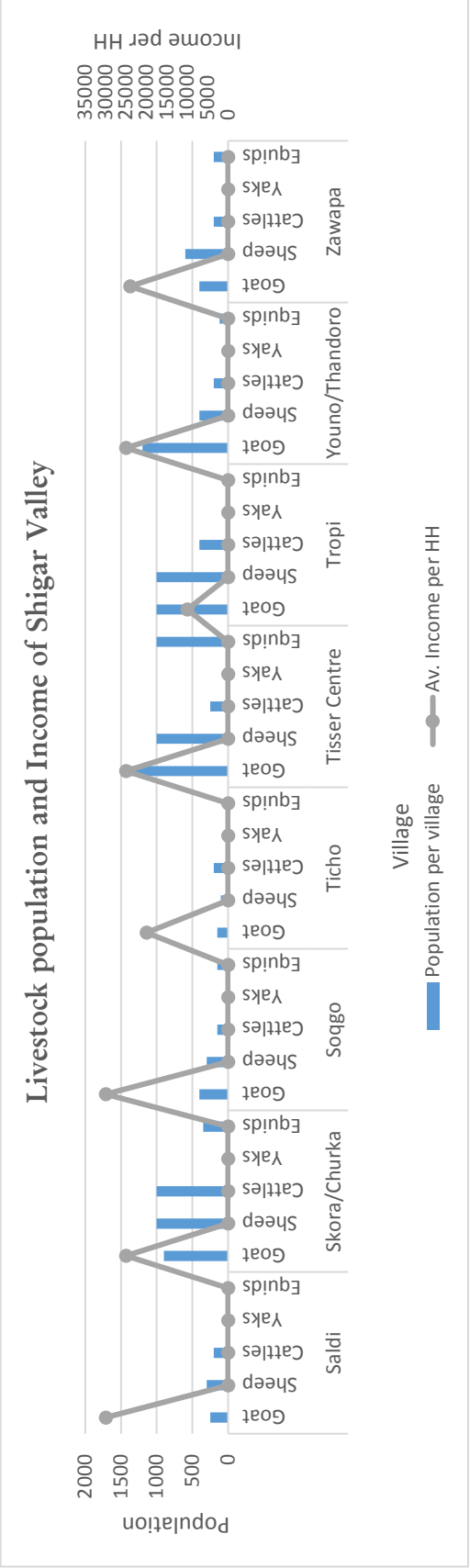
**Exhibit 13: Contribution of livestock in economics of Shigar Valley**

Villages	Kind of livestock	Population per village	Population per HH	Av. Income per HH	Rearing trend
Alchori	Goat	3000	07	22000	Increase
	Sheep	2025	4.5		
	Cattles	1250	03		
	Yaks	05	-		
	Equids	70	0.15		
Hashupi/hurchas/Tharaghama	Goat	3000	44	21000	Decrease
	Sheep	2000	29		
	Cattles	1200	18		
	Yaks	04	-		
	Equids	60	01		
Haider abad /Baha	Goat	400	06	15000	Decrease
	Sheep	100	1.5		
	Cattles	300	05		
	Yaks	05	-		
	Equids	200	03		
Kashmal	Goat	400	07	20000	Decrease
	Sheep	300	05		
	Cattles	200	04		
	Yaks	05	-		
	Equids	50	01		
Kiahonng	Goat	2000	27	25000	Increase
	Sheep	2500	33		
	Cattles	90	1.2		
	Yaks	-	-		
	Equids	40	0.5		
Khurid	Goat	750	03	25000	Decrease
	Sheep	660	2.6		
	Cattles	280	01		
	Yaks	-	-		
	Equids	125	0.5		
Lagaf	Goat	200	03	20000	Decrease
	Sheep	400	06		
	Cattles	200	03		
	Yaks	-	-		
	Equids	70	01		
Markonja	Goat	800	02	25000	Increase
	Sheep	900	2.2		
	Cattles	400	01		
	Yaks	150	0.4		
	Equids	70	0.1		
Saldi	Goat	250	03	30000	Decrease
	Sheep	300	04		
	Cattles	200	2.5		

Villages	Kind of livestock	Population per village	Population per HH	Av. Income per HH	Rearing trend
	Yaks	-	-		
	Equids	20	0.2		
Skora/Churka	Goat	900	1.2	25000	Increase
	Sheep	1000	1.4		
	Cattles	1000	1.4		
	Yaks	50	-		
	Equids	350	0.5		
Soggo	Goat	400	16	30000	Decrease
	Sheep	300	12		
	Cattles	150	06		
	Yaks	-	-		
	Equids	150	06		
Ticho	Goat	150	04	20000	Decrease
	Sheep	100	2.5		
	Cattles	200	05		
	Yaks		-		
	Equids	40	01		
Tisser Centre	Goat	1500	7.5	25000	Decrease
	Sheep	1000	05		
	Cattles	250	1.2		
	Yaks	10	-		
	Equids	1000	05		
Tropi	Goat	1000	14	10000	Decrease
	Sheep	1000	14		
	Cattles	400	06		
	Yaks	-	-		
	Equids	50	0.7		
Youno/Thandoro	Goat	1200	12	25000	Decrease
	Sheep	400	04		
	Cattles	200	02		
	Yaks	04	-		
	Equids	120	1.2		
Zawapa	Goat	400	2.2	24000	Decrease
	Sheep	600	3.3		
	Cattles	200	01		
	Yaks	05	-		
	Equids	200	01		



**Exhibit 14: Livestock population and income of Shigar Valley (Alchori – Markonja)**



**Exhibit 15: Livestock population and income of Shigar Valley (Saldi - Zawapa)**

## 2.5 Pastures

Alpine Meadows and extended grasslands (high pastures) above or near tree line are accessible only for short time period which is peak summer season. Traditional rights of communities in these pastures are usually well defined, and they establish seasonal summer pastures in these areas and some of them are shared between two or more bordering villages. Rights to the utilization of pastures are collectively conferred on entire villages and are not confined to kinship groups. Nomadic economy and labor activities are predominantly based on animal husbandry. Mixed herds are composed of sheep and goats, cattle/yaks for livestock production and camels, horses and donkeys mainly for transport of tents, household goods and utensils. Nomads utilize pastures to which they claim rights of access based on customary law.

Local pastorals at Shigar valley exhibit vertical transhumance patterns with seasonal movements from top mountain pastures to downside. The pasture settlements have sheds for the animals as well and they are fenced as well to avoid attacks of snow leopard and wolves. The FGD interview indicates that 100% pastures of Shigar valley are degrading gradually. Main herbs found in the high pastures of Shigar are Siya , Soqphalo, Lilo, Tijum, Tikta Datora Halo Khampa, Chikerink , Charcho, Lo , Sutra, Pur sutra, Gonaq sutra, Zema mendoq, Shokpa, Phialo, Shano, Ghungshu, Momeran ,Tayalo , Shapor , Thangmarsir, Qurqum, Khasheer, Shanthah , Khashink, Seep, Mindasko, Sikerbo and Makhot.

Community reported that pastures are drying up, less vegetation as compared to past and decrease in wild medicinal plants. Decline in health of pastures is 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 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.

The different pasture settlements vary significantly in size and construction but all of them show the similar features. Such a permanent pasture settlement consists of one or more clusters of small stone built living huts with associated cattle sheds and pens for the livestock. They are just below the main grazing grounds, mostly with a permanent stream close by. The huts are relatively small, irregular in shape, windowless, and with a low roof pole, rafters and stone slabs covered with turf. Unlike other regions in Karakoram, stables and huts are not privately, but commonly owned and are used by the whole village community.



At present, highest concentrations of livestock fed upon pastures of Kiahonng village. The FGD interview indicates that all the pastures in Shigar valley are degrading gradually. Decline in health of pastures is direct indicator of unsustainable harvesting practices due to increasing local population (Exhibit No. 18) 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 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.

Exhibit 16: Grazing Pressure by livestock on pastures of Shigar Valley

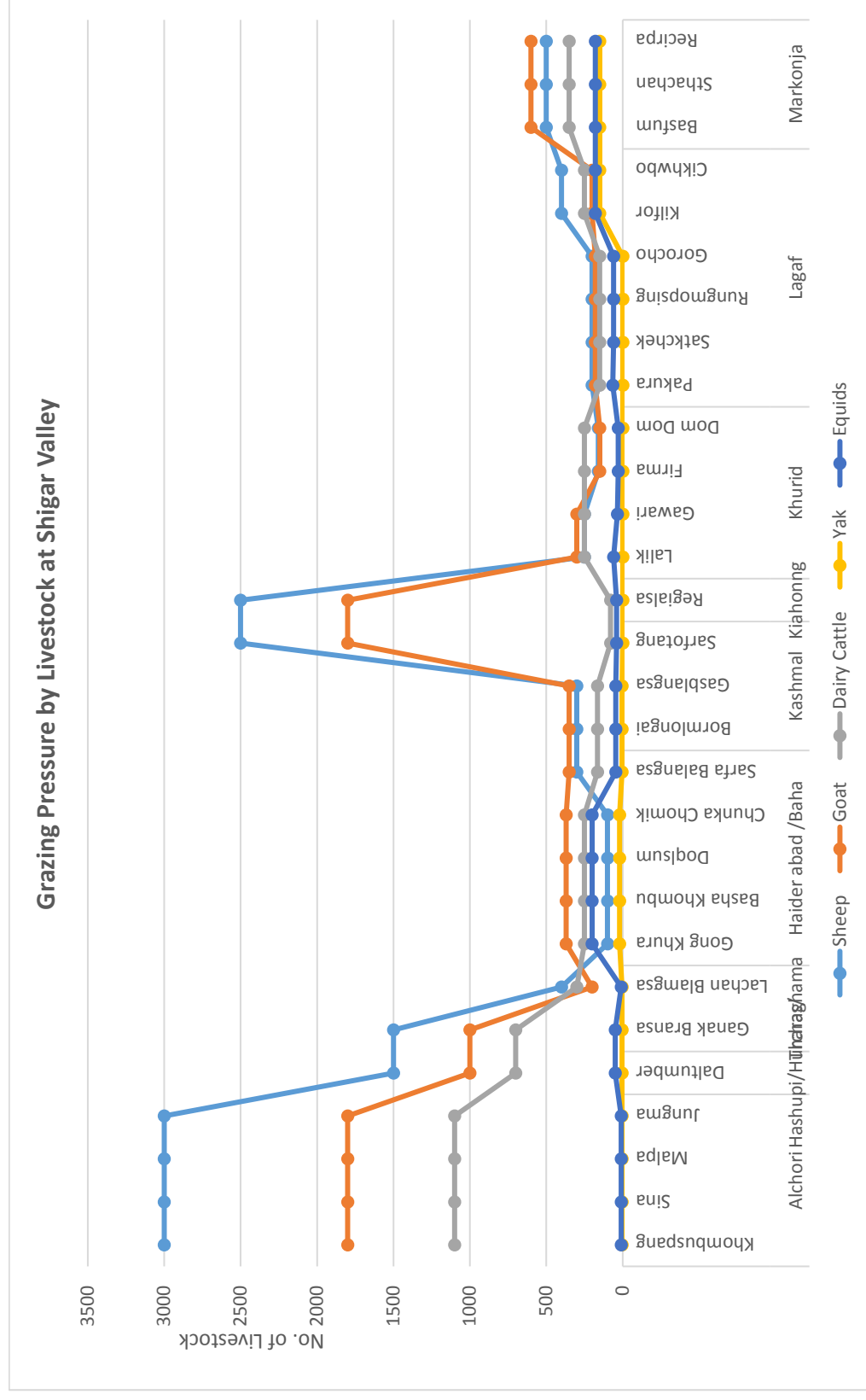
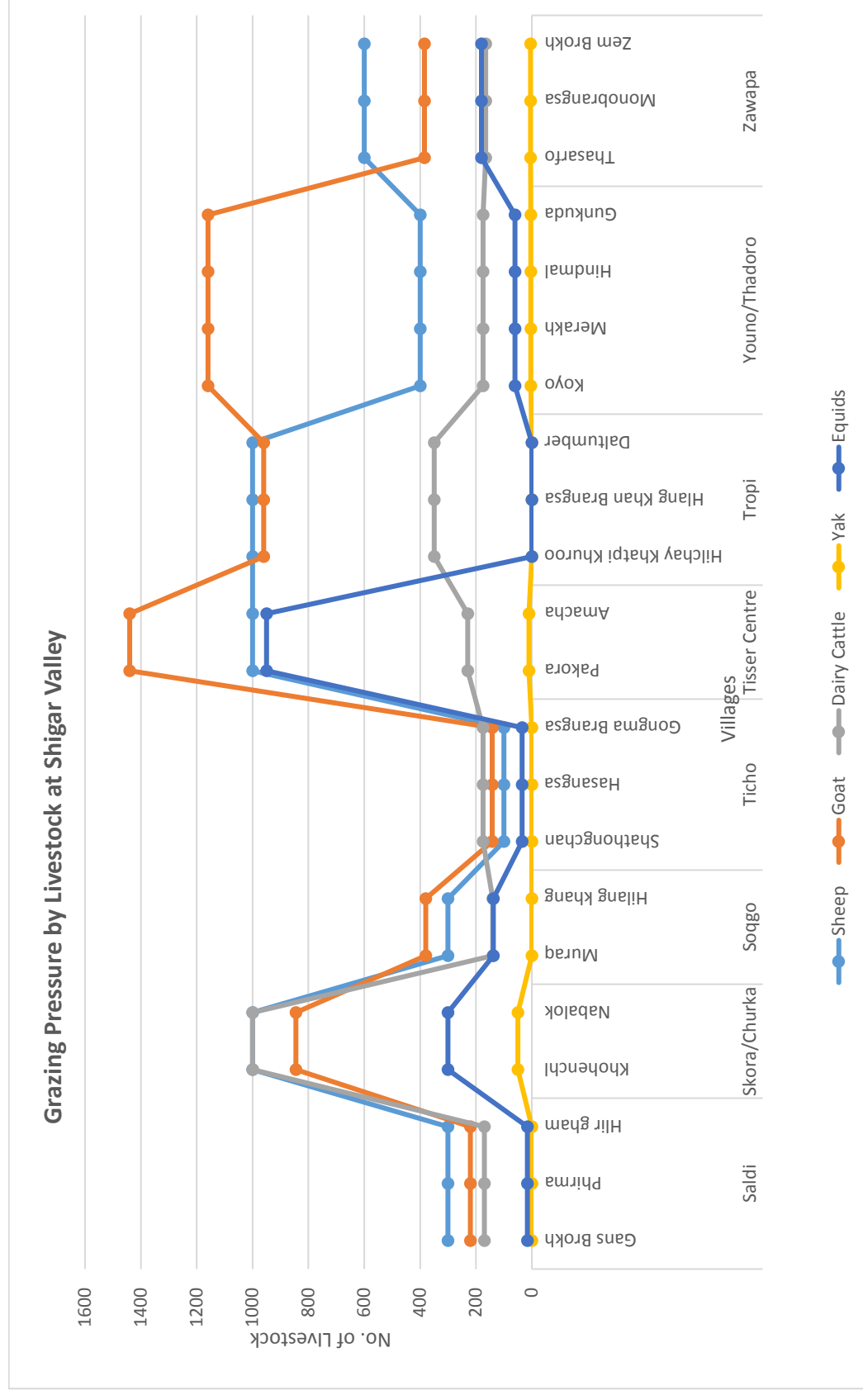


Exhibit 17: Grazing Pressure by livestock on pastures of Shigar Valley



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

Pastures	Village	Other Uses	Status	Grazing Period	Livestock classes					
					Sheep	Goat	Dairy Cattle	Yak	Equids	Total
Khombuspang	Alchori	Fuel wood and medicinal herbs	PD	June-September	3000	1800	1100	05	10	5,915
Sina					3000	1800	1100	05	10	5,915
Malpa					3000	1800	1100	05	10	5,915
Jungma					3000	1800	1100	05	10	5,915
Daltumber	Hashupi/Hurchas/Tharaghama	Fuel wood and medicinal herbs	PD	Jun-Sep	1500	1000	700	04	50	3,254
Ganak Bransa					1500	1000	700	04	50	3,254
Lachan Blamgsa					400	200	300	04	10	914
Gong Khura	Haider abad /Baha	Fuel wood and medicinal herbs	PD	June-July	100	370	250	20	200	940
Basha Khombu				Aug-Sep	100	370	250	20	200	940
Doqlsum				June-July	100	370	250	20	200	940
Chunka Chomik				Aug-Sep	100	370	250	20	200	940
Sarfa Balangsa	Kashmal	Fuel wood and Medicinal herbs	PD	Apr-May	300	350	165	05	45	865
Bormlongai				June-July	300	350	165	05	45	865
Gasblangsa				Aug-Sep	300	350	165	05	45	865
Sarfotang	Kiahonng	Fuel wood and Medicinal herbs	PD	Mar-May	2500	1800	80	-	40	4,420
Regialsa				June-Sep	2500	1800	80	-	40	4,420
Lalik	Khurid	Fuel wood and Medicinal herbs	PD	Jun-Aug	250	300	250	-	60	860
Gawari					250	300	250	-	35	835
Firma					160	150	250	-	30	590
Dom Dom				Aug-Sep	160	150	250	-	30	590
Pakura	Lagaf	Fuel wood and	PD	Jun-Aug	200	180	150	-	65	595
Satkchek	Aug- Sep		200	180	150	-	60	595		
Rungmopsing	Aug-Sep		200	180	150	-	60	595		

Pastures	Village	Other Uses	Status	Grazing Period	Livestock classes					
					Sheep	Goat	Dairy Cattle	Yak	Equids	Total
Gorocho		Medicinal herbs		Sep-Oct	200	180	150	-	60	595
Kilfor					400	200	250	150	180	1,180
Cikhwbo		Fuel wood and Medicinal herbs			400	200	250	150	180	1,180
Basfum	Markonja		PD	Apr-Sep	500	600	350	150	180	1,780
Sthachan					500	600	350	150	180	1,780
Recirpa					500	600	350	150	180	1,780
Gans Brokh		Fuel wood and Medicinal herbs		June	300	220	170	-	16	706
Phirma	Saldi		PD	May	300	220	170	-	16	706
Hlir gham				August-Sep	300	220	170	-	16	706
Khohenchl					1000	845	1000	50	300	2,295
Nabalok	Skora/Churka	Fuel wood and Medicinal herbs	PD	May-Sep	1000	845	1000	50	300	2,295
Muraq		Fuel wood and Medicinal herbs		May-June	300	380	140	-	138	958
Hilang khang	Soqgo		PD	July-Aug	300	380	140	-	138	958
Shathongchan		Fuel wood and Medicinal herbs		March-Apr	100	142	175	-	35	452
Hasangsa	Ticho		PD	Aug-Sep	100	142	175	-	35	452
Gongma Brangsa				May-June	100	142	175	-	35	452
Pakora		Fuel wood and Medicinal herbs		May-July	1000	1440	230	10	950	3,630
Amacha	Tisser Centre		PD	Aug-Sep	1000	1440	230	10	950	3,630
Hilchay Khatpi Khuroo		Fuel wood and Medicinal herbs			1000	960	350	-	-	2,310
Hlang Khan Brangsa	Tropi		PD	June-Sep	1000	960	350	-	-	2,310
Daltumber					1000	960	350	-	-	2,310
Koyo	Youno/Thadoro		PD	Apr-May	400	1160	175	04	60	1,799



Pastures	Village	Other Uses	Status	Grazing Period	Livestock classes					
Merakh		Fuel wood and Medicinal herbs		May-July	Sheep	Goat	Dairy Cattle	Yak	Equids	Total
Hindmal				August	400	1160	175	04	60	1,799
Gunkuda				Aug-Sep	400	1160	175	04	60	1,799
Thasarfo		Fuel wood and Medicinal herbs			600	385	165	05	180	1,335
Monobrangsa	Zawapa		PD	June-Sep	600	385	165	05	180	1,335
Zem Brokh					600	385	165	05	180	1,335

- Pastures marked with \* are shared between two or more villages

## 2.6 Fuel Wood Collection/ Timber Harvesting

Shigar valley which lies at dry north eastern side of CKNP has comparatively fragmented and spares forest with approximately 34.1km<sup>2</sup> vegetation cover and its average ABG is 1755.5 MgKm<sup>-2</sup> and CAI of 435.6 Mg/year (Ferrari, 2014). Vegetation cover is 46.9% (23% grasslands, 1.4% close forest, 2.3% open forests, 20.2 % for both scattered and sparse vegetation). High density of timber trees are found in south-western valleys of CKNP than North eastern valleys.

As a consequence of increasing population; expansion of villages is common phenomenon in Shigar valley like other valleys and thus construction of settlements/houses is also on rise. The timber for construction purposes is either purchased from Skardu timber market or from natural/artificial plantations. In Shigar valley 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 Shigar valley. From a large tree, locals usually obtain around 50 logs. The trees harvested for timber in each village of Shigar valley are listed in Exhibit below. The value of a large tree harvested, divided into logs and transported to the nearest city (Skardu), can vary



**Exhibit 19: Timber collection from forest**

between 100,000 Rupees (*Picea*) and 125,000 (*Pinus*) depending upon type and quality of wood.

Household fuel sources in Shigar are *Artemisia*, Sea buckthorn, Dung, pruning from plantations and wood from forests. Area under vegetation in whole Braldo valley is only 34.1 km<sup>2</sup> comprises of 85.1 % Junipers, 8.8% coniferous and 6.1% broad leaves and also the artificial plantation sites of *Populus* spp. along with *Artemisia* shrub-land, and sea



**Exhibit 20: Fuel harvest from natural vegetation**

buckthorn. The community reported a decrease in vegetation on mountain slopes.

Poplar varieties are common plantations aided significantly to alleviate stress on natural forests. They are preferred due to high annual biomass, higher pest resistance, site adaptability, and easy vegetative propagation. Due to *Artemisia*'s regular presence, this

valley is also called as Artemisia Shrub land. Apart from being component of the fuel sources, it is also used by livestock during winter. Juniper trees are found in isolation at inaccessible locations on steep mountain slopes and grows well where water availability is up to the requirement of the tree. Junipers are preferred species for fuel because of its dryness and aroma. Our data collected during the survey reports that approximately 2433 households living in Shigar valley harvests about 28.119 Mg/year/valley of the natural resources (Artemisia, Sea buck thorn, Juniper, Forest, Riparian vegetation, Shrub



**Exhibit 21: Artificial plantation in Shigar**

and grasses) and 3.74 Mg/year/ valley from natural forests and 5.625 Mg/year from junipers as fuel. Natural plantation contributes to 41% of the basic fuel needs.

Among the alternative fuel wood resources electricity, gas cylinders and kerosene oil are usually employed. Plantations by local community on private lands have help alleviate strains on natural flora considerably. Even sustainable and productive forest systems may experience pervasive and severe levels of small-scale chronic disturbance by harvesting then the consumption of 41% natural flora annually will soon turns the forest areas into barren lands.

Majority of the fuel sources are common to the community and within community; there is no restriction on fuel wood collection but selling of wood is not encouraged socially. These regulations do not apply to private resources and plantations. Community restricts over exploitation from common resources. Bushes, mainly Artemisia which is quite common in CKNP is frequently used as fuel for ignition purpose in Shigar.

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. In Shigar which has scarce forest reserves, timber and fuel harvest is usually unchecked and unmonitored, evidently contributes significant share in total household livelihood revenues. Customary laws although allow the use up to need basis and don't allow sale of wood extracted from natural forests but this is hardly practiced and locals decide by themselves where and how much to cut (FGD interview, 2016). Although these practices do not allow sale of timber neither address the maximum amount of wood harvest from the buffer area. There are several other gaps in customary laws which provoke the need of revitalization of customary practices/laws in addition to reinforcement of statutory laws

essential for natural resources conservation and restoration. There is 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 22: Timber harvesting and use at Shigar valley**

Village	Houses constructed in last 5 years (2010-2015)	Number of trees used	Tree species used
Alchori	40	100	Poplar
Hashupi/hurchas/Tharaghama	100	50	Poplar
Haider abad /Baha	40	40	Poplar
Kashmal	10	30	Poplar
Kiahonng	50	50	Poplar
Khurid	55	50	Poplar
Lagaf	20	50	Poplar
Markonja	20	60	Poplar, Mulberry
Saldi	10	40	Poplar
Skora/choroka	10	60	Poplar
Soggo	10	40	Poplar
Ticho	40	120	Poplar
Tissar centre	40	100	Poplar, Willow
Tropi	8	60	Juniper and Pine
Youno/Thandoro	15	20	Poplar, Willow
Zawapa	100	50	Poplar

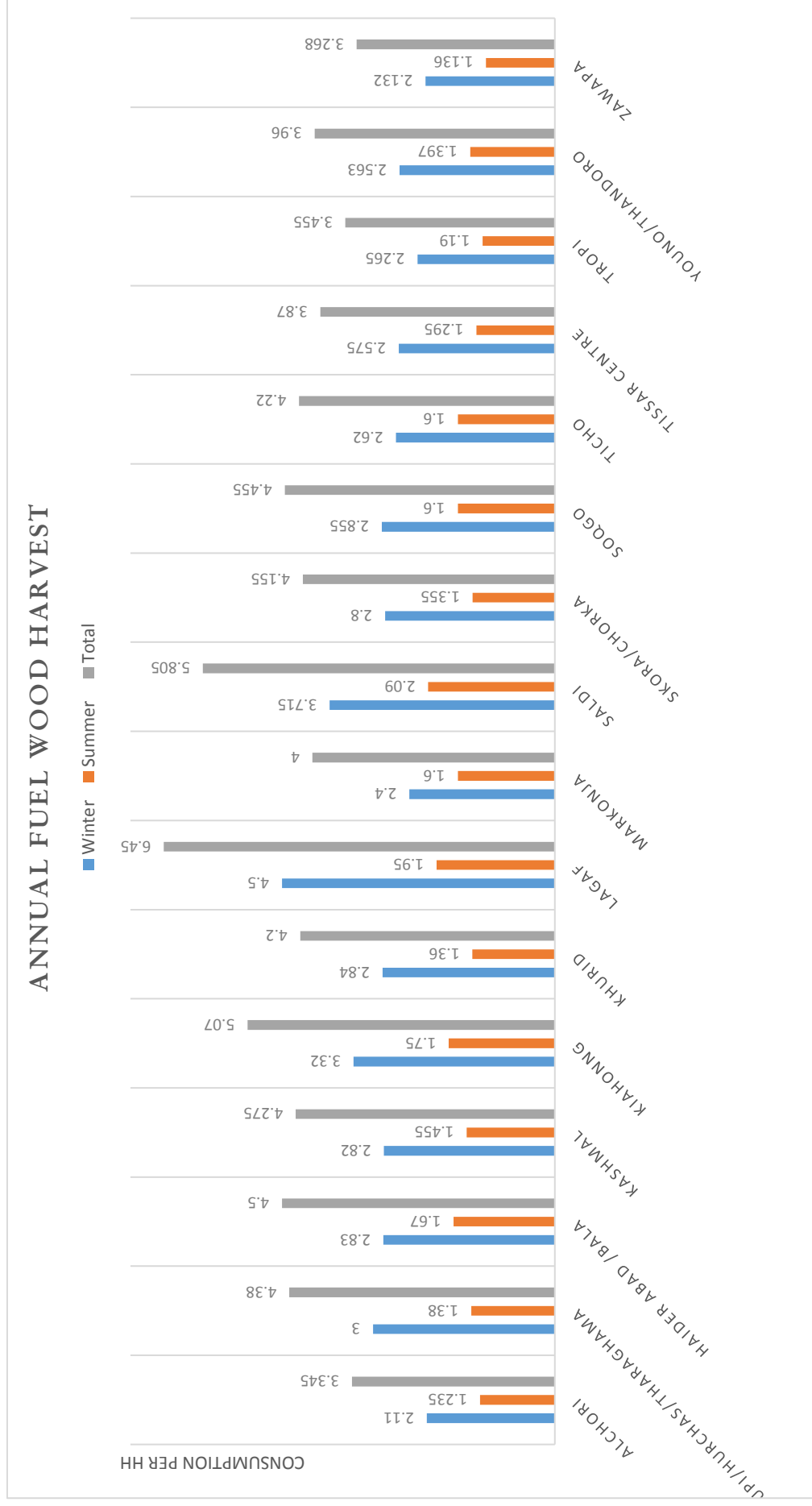
**Exhibit 23: Summary of Fuel Wood harvest and Consumption in Shigar Valley**

Village	HH	Consumption Per Household (Mg)			Consumption Per Village (Mg)		
		Winter	Summer	Total	Winter	Summer	Total
Alchori	450	2.11	1.235	3.345	949.5	555.75	1505.25
Hashupi/hurchas/Tharaghama	68	03	1.38	4.38	204	93.84	297.84
Haider abad /Bala	65	2.83	1.67	4.5	183.95	108.55	292.5
Kashmal	55	2.82	1.455	4.275	155.1	80.025	235.125
Kiahonng	75	3.32	1.75	5.07	249	131.25	380.25



Village	HH	Consumption Per Household (Mg)				Consumption Per Village (Mg)			
		Winter	Summer	Total		Winter	Summer	Total	
Khurid	250	2.84	1.36	4.2		710	340	1050	
Lagaf	70	4.5	1.95	6.45		315	136.5	451.5	
Markonja	410	2.4	1.6	04		984	656	1640	
Saldi	80	3.715	2.09	5.805		297.2	167.2	464.4	
Skora/chorka	700	2.8	1.355	4.155		1960	948.5	2908.5	
Soqgo	25	2.855	1.6	4.455		71.375	40	111.375	
Ticho	40	2.62	1.6	4.22		104.8	64	168.8	
Tissar centre	200	2.575	1.295	3.87		515	259	774	
Tropi	70	2.265	1.19	3.455		158.55	83.3	241.85	
Youno/Thandoro	100	2.563	1.397	3.96		256.3	139.7	396	
Zawapa	180	2.132	1.136	3.268		383.76	204.48	588.24	

Exhibit 24: Annual fuel wood harvest, Shigar valley



**Exhibit 25: Details of fuel wood harvested per household from several sources (Mg)**

Villages/Sources	Alchori		Hashupi/Hurchas/ Tharaghama		Haider abad/ Baha		Kashmal		Kiahonng		Khurid		Lagaf		Markonja		Saldi		Skora/Churka	
	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
Artemisia	0.3	0.2	0.2	0.1	0.1	0.1	0.4	0.2	0.2	0.1	0.4	0.2	0.8	0.3	0.0	0.0	1.5	0.9	0.4	0.2
Sea buckthorn	0.0	0.0	0.7	0.3	0.8	0.4	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
Junipers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.8	0.7	0.3
Shrubs/ Grasses	0.0	0.0	0.0	0.0	0.3	0.1	0.2	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.6	0.4	0.0	0.0	0.0	0.0
Dung	0.3	0.2	0.2	0.2	0.7	0.5	0.4	0.2	0.3	0.25	0.4	0.2	1.0	0.6	0.0	0.0	0.1	0.09	0.4	0.2
Natural forest	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.3	0.15	0.2	0.1	0.0	0	0.75	0.3	0.0	0.0	0.0	0.0
Fruit trees	1.0	0.6	0.9	0.4	0.7	0.3	0.7	0.3	0.8	0.4	1	0.6	0.6	0.2	0.7	0.5	0.5	0.3	0.6	0.3
Other riparian vegetation	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Plantation	0.3	0.2	1.0	0.4	0.2	0.14	0.6	0.3	1.4	0.7	0.6	0.2	1.2	0.4	0.3	0.3	0	0	0.7	0.4
Market	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	0.0	0.0	0.0	0.0

**Exhibit 26: Assessment of required reforestation to compensate fuel needs in Shigar Valley**

Valley	Average Fuel consumption Forest (Mg/yr/valley)	Natural	Annual CAI (Mg/yr)**	Required credit to sustain fuel needs	Harvest Pressure
Shigar	21810.03		246.8	-21563.2	Unsustainable

## 2.7 Mining

The history of geological formation gifted the entire region of GB by most diverse and high-quality deposits of economic grade are being extracted. Adequate deposits of various precious and semi-precious stone mining activities are being excavated from Shigar Valley. The major mining area is in upper mountain range of Youno, Kashmal, Saldi, Alchori and Hushupi village which is shared as common mining area by all villages. The most common mining stones in this mining areas are Aquamarine, Tourmaline, Topaz, Ruby, Fluorite, Beroj, Quartz, Morganite. The mine was banned more than for a decade and some three years before reopened.

**Exhibit 27: Economic revenue from Mining in Shigar Valley, 2016**

Village	Si nc e	No of Mining Groups	Mining products	Revenue/Ye ar/Village (Rs.)	Revenue/Ye ar/Group (Rs.)
Alchori	20 00	08	Quartz, Beroj, topas	10,000,000	1250000
Hashupa/hurc hus/Tharagha ma	19 95	06	Topaz, Quartz, Beroj,	7,050,000	1,175,000
Saldi	19 94	03	Aquamarine, quartz, Beroj, Topaz	3,000,000	1,000,000
Kashmal	19 85	03	aquamarine, Tourmaline, Topaz, Ruby, Fluorite, Beroj, Quartz, Morganite	3,000,000	1,000,000
Youno/Thand oro	19 95	10	Aquamarine, Tourmaline, Topaz, Beroj, Quartz,	11,500,000	1,150,000

## 2.8 Tourism

Shigar is a beautiful valley having beautiful natural landscapes to fascinate the tourists. Shigar valley is a popular destination for tourists and trekkers and contains many historical buildings of architectural significance associated with the Noor bakhshi Sufi community. The town is inhabited mostly by Balti people of Tibetan descent. It is a gateway to great mountain range of Karakoram including K2, the world's 2nd highest peak. Popular historical tourist sites in the valley include Shigar Fort, Amburik Mosque, Khilingrong Mosque, Marapi Ranga, Ree masjid, Astana of Syed Mir Yahya and Jarbazo (Blind) lake. With the emerging domestic tourism in Baltistan, current scenario of tourist facilities can be improved by taking suitable actions to offer the locals an earning opportunity.



# 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 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 Shigar valley were well aware of changes that are happening in their climate and responded all the questions effectively. 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 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. 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 mountains and affect people and ecosystems in the surrounding lowlands.

#### 3.2 Temperature variability and seasonal shifts

The climate of Shigar valley can be categorized as dry continental Mediterranean. Gradual increase in temperature has been reported by local community during last 30 years. Community reported a rapid increase of temperature during last 10 years. Regarding decrease in winter season, the community members responded that temperature in winter has increased and occasional snowfall. The community reported that 20 years ago, once the

minimum temperature fell to -36C and now the minimum temperature is -13. 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. 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. Warmer summer temperatures have led to longer forest growing seasons but have also increased summer drought stress, vulnerability to insect pests.

### 3.3 Precipitation

In addition, changes in climate, such as reduced snowfall and increased rainfall, are reported across the area by 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 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 local community snow season has also showed significant delay and is getting more delayed year by year in different valleys. Community reported 38% decline in amount of snow fall over last 10 years is reported. As result of this sharp decline in frequency and magnitude of snowfall locals are facing shortage of alpine pastures productivity which affects negatively both to natural resources sustainability and economy of valley.

### 3.4 Drought

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.

As a consequence of climate shift drought is at continuous increase from regional climate scenario as reported by local community. Due to warmer temperature the snow deposits are melting before time and increased 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 regeneration of forest and pastures. It is difficult to mitigate the issue by water uplifting from rivers due to the required capital.

The local community so-far is unable to assess the intensity of drought and to adapt it accordingly. Therefore, to enhance the resilience of 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 by 25% since last 30 years. However, the flood frequency was also reported to be increased by 21% since last 30 years. Since change in flood pattern is being observed over last three decades but over last half a decade, a sharp increase in both frequency and magnitude of flood is observed.

### 3.6 Landslides

Floods are the regulating factors of the land slides. 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 moves it to the nearby rivers and ultimately it becomes the part of Indus basin.

According to the survey conducted to gather information about the driving factors of climate events by local community, it is assessed that landslides have increased considerably (15%) since last 30 years. These landslides wither soil from 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 the irrigation systems are mostly built along rough mountain ranges and are more prone to landslide. As a result of broken and disconnected irrigation channels community face water shortage sometimes even for months and subsequently decreased agriculture production.

**Exhibit 28: Climate Change at Shigar Valley in the Perspective of Indigenous Knowledge**

Factors	Status	Change (days/ %age)	Trends		
			30 y ago (1985)	10 y ago (2006)	Future prediction
Rain	Decrease	17	Rain pattern was normal	Frequency increased but magnitude has become abnormal.	Decrease in the frequency of rain is expected
Snow	Decrease	38	Normal with slight decrease	Decreased drastically year by year.	Decreasing trend of snow is expected
Temperature	Increase	16	Increasing	Increasing	Temperature will increase
Summer season duration	Increase	16	Summer was slightly increasing	Increase	Crops reap some 10-15 days earlier than its normal time and this trend is increase, which indicates early start and late end of summer
Winter season duration	Decrease	16	It was slightly decreasing but no considerable change seen	Decrease	Length of winter season is decreasing but magnitude of cold increasing
Glacier recession	Decrease	22	No visible change observed	Increase	Based on the indigenous knowledge of locals over last few years most of glaciers have receded or changed their place and this trend will keep increasing in the future as well in response to increasing temperature
Land slides	Increase	15	Normal	Increase	Land sliding in almost all villages are increasing and expected to be increased in the upcoming years
Flood frequency	Increase	21	Normal	Increase	The frequency of flood is increasing every year and supposed to be increasing in the future



Factors	Status	Change (days/ %age)	Trends		
			30 y ago (1985)	10 y ago (2006)	Future prediction
Flood magnitude	Increase	25	Increasing	Increase	The local people confirmed that magnitude and devastation of flood is becoming powerful which indicates a high increase in the future
Drought	Increase	20	Normal but slight increase observed	Increase	In most of the villages in the valley drought is frequently observed. The Indigenous observation of locals show expected increase in drought in the future.
GLOF Frequency	Increase	30	Normal	Increase	A very small frequency of change is being seen but compare to the past it is increasing and the trend shows increase in the future too.
GLOF Magnitude	Increase	25	Normal	Increase	The magnitude of GLOF is observed increasing as more damage to infrastructure and agriculture land is happening, based on which it can be foreseen as increasing

### 3.7 Pastures

Regional climate scenarios for CKNP valleys show prolonged growing seasons and shifts in temperature and precipitation as currently happening in the Shigar valley. 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 areas 21% degradation has been observed. Mid and low land grazing areas have declined 32%. According to community the pastures are drying up; medicinal plants on pastures are decreasing due to less precipitation both in

snow and rainfall. This resulting drying up of grasses, less germination, less greenery on mountains which badly affected the availability of fodder for livestock.

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 29: Impact of climate change on Pastures of Shigar Valley**

Pastures	Status	Change (days/%age)	Trend			Adaptation Measures by local community
			30 y ago (1985)	10 y ago (2006)	Future prediction	
Alpine and sub-alpine pastures	Degrading	21	Less degraded as compared to present	Degrading	More degradation is expected	Nil
Mid and low land grazing	Degrading	32	Less degraded as compared to present	Degrading	More degradation	Nil

## 3.8 Biodiversity

### 3.1.1. Agriculture and Fruits

Climate factors such as temperature, precipitation, CO<sub>2</sub> concentrations, and water availability directly impact the health and well-being of fruit trees and agriculture crops. With increased temperature and CO<sub>2</sub>, 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 Shigar. 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.

Some farmers reported that despite of using high yielding seed varieties and inorganic fertilizers, the average crop productivity is less as compared to past years. Farmers reported rapid increase in weeds and pests during 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 Shigar 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.

### 3.1.2. 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 stand of Shigar valley represents a mix of woody and non woody vegetation. Major floral species are cheer, pine, junipers, willow, sea buckthorn, artemisia, mulberry and medicinal plants include Tumoro, Siah and Phialo.

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

- a) Rising temperature and CO<sub>2</sub> as a consequence of climate change has impacted the local forest ecosystem of Shigar by providing 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 CO<sub>2</sub> 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 Nullah 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 in Shigar valley.
- 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 local community knows about the impact of climate change on the forest but don't know about the mitigation strategies. These strategies are needed to be designed by thorough research and impact. Long term impact of the small-scale forest disturbances which cannot be observed via satellite systems must be assessed and counter measures should be adopted. 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 need to assess that how long the present floral species will survive and which species should be planted to continue the forest sustainability. This entire question

needs research-based answer and capacity building of the community accordingly to ensure the ecosystem viability.

### 3.1.3. Wildlife and associated biodiversity

The multiple components of climate change are anticipated to affect all the levels of biodiversity, from organism to biome levels. 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 Shigar valley, faunal biodiversity which was once common is now at decline. During FGD sessions the participants reported 41% decline in Ibex population over last 30 years that refers to out migration of species either due to climate change and rapid illegal poaching. 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 changing climate.

Considering the birds like wild pigeon, sparrow, monal pheasant, crows, vultures, eagle and falcon and butterflies have 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 decline. The community also reported that the arrival of migratory birds decreased and even their arrival time has been changed. The apparent reasons are the absence of favorable climate for 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 the Shigar 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.

**Exhibit 30: Impact of climate change on Biodiversity of Shigar Valley**

Biodiversity	Status	Altitudinal Shift	Trend		Adaptation Measures by local community
			30 y ago (1985)	10 y ago (2005)	
Agriculture crops and fruit trees	Degrading	N/A	No considerable change observed	Degrading as diseases increase and production is decreasing	Irregular water availability due to increased flood, diseases and irregular precipitation patterns will lead to productivity decline.
Natural Forest	Degrading	Increasing	Forest patches were dense and healthy	Increasing	More degradation is expected
<b>Wildlife</b>					
Ibex	Decreasing	Increasing	Population was relatively good in number but illegal poaching proved a disaster	The Ibex population almost depleted	Populations will be increasing if conservation practices adapted strictly, otherwise complete depletion is expected. Astor Markhor was existing in the area some decade earlier but now the existence has finished in the area
Birds	Decreasing	N/A	Population and diversity were good	Bird population is increasing	Declining Natural resource and hunting can cause decrease in birds' population
Butterflies	Decreasing	--	Butterflies of several types were common	Diversity of species has declined	The trend seems to be decreasing in the future because some of the species are disappearing
Fishery	N/A				



### 3.9 Water

Shigar community unanimously reported an extreme decline in precipitation level. Snow fall has declined up to 38% and rainfall has declined up to 17% according to the perception of local community. At present, snowfall happens 2-3 times in winter in the valley; however, mountains do get a considerable amount of snow. Community members also reported reduction in the size of glaciers and increase in the frequency of GLOF events. The altered precipitation pattern has caused the differential availability of water during different seasons. During end summer and winter season water become scarce and leads to unsustainable water management, however during the start of summer season flood in the streams increase and irrigation channels and creates water unavailability/scarcity coupled with poor water quality.

### 3.10 Tourism

Huge domestic tourism in GB over a couple of year has provided income earning opportunity opportunities for many remote communities and it is a valuable opportunity for people of Shigar valley to advertise their touristic points and manage proper facilities and services for tourist, which can help them in earning income from tourism.

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. Shigar valley is a tourism dependent valley but lack of tourist and visibility facilities and poor accessibility hampering tourism sector.



# CONSERVATION MANAGEMENT ISSUES & PROBLEM OF SHIGAR VALLEY







## 4. MANAGEMENT ISSUES AND PROBLEMS

Present scenario of Shigar 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 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 Shigar 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.

### 4.1 Agriculture

A smaller area of arable land is cultivated in Shigar valley by traditional varieties of fodder, crops, fruit trees and commercial trees. 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:** With increasing population and emerging nuclear family system in Shigar valley, arable land fragmentation is taking place and area of land holding per household is shirking year by year.
- 2) **Irrigation and Water Rights:** Customary rights about water sharing between villages and among the households are not documented anywhere. This generates confusion and rivalry among the land holders for water needed for irrigation. Situation becomes worse during the spring and autumn season which foster low availability of water in streams.
- 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 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 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 same in Shigar 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 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 Shigar 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. Farmers are 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

Majority of the pastures in Shigar valley is declining at rapid rates. The pasture sustainability is also facing lot of pressures from livestock more than carrying capacity, medicinal plants extraction, landslides and floods. The most common factor over last ten years is infrequent snow fall which causes declining growth of natural vegetation in alpine & sub-alpine pastures and rangeland, and largely contributing to declining livestock rearing trend in the valley.

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 Shigar valley 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 capacities 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:** 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 Shigar 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 Shigar 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:** Shigar 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.

#### 4.3 Water

Water is the key ingredient and symbol of life. All the changes in climate pattern are directly and indirectly playing with water quantity. Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community in Shigar 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.

#### 4.4 Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other 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 and resulted degradation and reduced distribution of entire forest ecosystem. It increased the wood harvesting opportunity for the local community from Shigar valley for subsistence purposes at the cost of degenerating forest.
- 2) **Harvest Pressure:** Heavy collections of timber and non-timber products from the forests allow 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 Shigar valley 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 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 CO<sub>2</sub> 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.

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, 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 Shigar valley offers.

## 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.

*“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 27<sup>th</sup>, 2012).*

This mining provides some of the valleys around CKNP with a good opportunity to earn livelihood. In Shigar valley, 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 27<sup>th</sup>, 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 accidentally 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, annual 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 Shigar 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 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 SHIGAR 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 needs 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 settlement 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 Shigar 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 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 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 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. 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

- 1) **Upgradation of customary laws:** Customary practices should be amended in such ways that ensure 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 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.
- 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 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 Data base:** 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 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.
- 11) **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.

### 5.3 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 Shigar 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:** 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 Shigar 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 CO<sub>2</sub> 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 their environmental consequence seems 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 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.

## 5.6 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.

## 5.7 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 has 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.

## 6. STATUARY VS CUSTOMARY PRACTICES IN SHIGAR 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 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.

S. No.	Consumptive uses of Park Resources	Community practices	CKNP MP/OP rules	Recommendation
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



## 7. RECOMMENDED ACTION PLAN FOR SHIGAR 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	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 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 Organizations	2.1. Develop Structural/ Institutional framework of social organizations	Insufficient support of LSO to CKNP directorate	Weak communication linkages of Lack effective conflict management mechanisms	2.1.1. Develop appropriate networking for 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 originations	Poor implementation of interventions implementations	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

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
3.	Health	3.1. Promote health facilities	and subsequent sustainability		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
			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 plans	Tropi, Saldi	Urgent	Long term
					3.1.2. Provision of Medicines 3.1.3. Provision of new diagnosis equipment				
			Lack of access community health facilities		3.1.4. Establishment of new dispensaries	Suggested for inclusion in community development plans	Kiahong, Lagaf and Ticho	Urgent	Long term
			Unhygienic practices by locals		3.1.5. Awareness conferences about hygienic practices	Suggested for inclusion in revised	All	Urgent	Short term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
					3.1.6. Dissemination of brochures and pamphlets to educate community about prevention of sporadic diseases and hygienic practices by women and children through workshops, campaign and social organizations	MP/OP activities Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
	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 of Lack of alternative fuel options	4.1.1. Promotion of fuel-efficient stoves at high altitudes 4.1.2. Develop and Motivate usage of alternative sources	Activity No. 14.2.1 -do-	All Khurid and Tisser	Urgent Urgent	Short term Short term
5.	Education	5.1. Curb electricity	Prevalence of unsustainable practices	Lack of needful development infrastructure and human resource	5.1.1. Increase the capacity of existing schools	Suggested for inclusion in revised MP/OP activities	All	Medium	Long term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
6.	Agriculture	Lack of sufficient food and future food security			5.1.2. Creation of new educational facilities	Suggested for inclusion in revised MP/OP activities	Ticho	Medium	Long term
				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
			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 crops related adaptable to local climatic conditions 6.1.2. Capacity building of farmers about modern techniques to enhance productivity. 6.1.3. Construction and repair of water channels and for barren lands	Suggested for inclusion in revised MP/OP activities Activity No. 17.1.1.	All	Medium	Medium term
				Water Scarcity		Suggested for inclusion in revised MP/OP activities	All	High	Medium Term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
				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 6.1.7. Creation of new job to enhance economic capacity of the local community 6.1.8. 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  Skora/Zwapa	Medium  Urgent  Medium	Medium Term  Long term  Long term
				Less arable land per household	6.1.9. Development of barren land patches	Suggested for inclusion in revised	All	Medium	Medium Term



S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
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 regeneration with lesser productivity	7.1.1. Improvement of existing vet facilities  7.1.2. Establishment of new vet facilities 7.1.3. Livestock insurance scheme	MP/OP activities Suggested for inclusion in community development plans	All	Medium	Medium Term
			Depredation of livestock by wildlife Poor breeds with lesser productivity		7.1.4. Training regarding animal husbandry	Activity No. 9.4 Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
			Disease outbreak		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	All	Urgent	Short term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
						MP/OP activities			
			Over grazing Degraded pastures resulting in loss of food for Wildlife	Uncontrolled number of livestock Insufficient growth time for pastures	8.1.2. Promotion of supplementation with stall feeding	Suggested for inclusion in revised MP/OP activities	All	High	Medium
				Poor and dangerous accessibility to pastures	8.1.3. Promotion of fodder cultivation on suitable land patches	Suggested for inclusion in revised MP/OP activities	All	Moderate	Medium term
					8.1.4. Awareness of herders/professional shepherd about sustainable herding practices Revive the use of indigenous grazing system		All	High	
			Unknown Carrying capacity	Lack of Research studies	8.1.5. Research studies about the carrying capacity and adaptability of Pasture to climate change	Activity No. 9.2.1.	All	Urgent	Long Term
					8.1.6. Establishment of enclosure to measure productivity	Suggested for inclusion in revised	One healthy/least degraded pasture in whole valley	Urgent	Long Term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
					with surrounding pastures	MP/OP activities			
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 a total 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       Activity No. 9.1.3.	All  All  All  All  All	Urgent	Long Term
10.	Wildlife	10.1. To improve and maintain healthy wildlife population	Unsustainable hunting Habitat degradation	Habitat fragmentation and degradation	10.1.1. Dedicated zones for wildlife, restrict grazing in those areas	Suggested for inclusion in revised	Jula Jula, Paju, Urdukas	High	Long term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
			Diseases from livestock resulting in unnatural mortality	Poaching 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	MP/OP activities -do- -do- -do-	Jula, Paju, Urdukas  All  Jula, Paju, Urdukas	High  High  High	Long term  Medium term  Medium term
					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- Activity No. 6.1 -do-	All  All  All  All	High  High  High  High	Short term  Long Term  Medium term  Long term

S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
11.	Tourism	11.1. Promotion of tourism as a sustainable economic avenue	Loss of economic opportunities Loss of support for conservation and development opportunities	Poor structure of Skardu - Askoli road Insufficient facilities of road and stay Lack of interpretation of resources i.e. Hot springs Lack of mechanism to attract tourist/visitor	11.1.1. Maintenance of road throughout the touristic season  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 11.1.5. Establishment of bath rooms, rest area and promotion of hot springs sites	-do- Suggested for inclusion in revised MP/OP activities  -do-  -do-  -do-	Kaiwa near Pakura Village  All  Jhula, Payu and Urdukas  Askoli  Thongal	High  High  Urgent  Medium  Medium  Medium	Short term  Short term  Medium term  Medium term  Medium term



S. No.	Sector	Management objectives	Conservation/ Development Issues/Gaps	Root cause(s)	Proposed Management Action	Ref. to MP/OP	Village/s	Priority	Time scale
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	All	High	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		Alchori, Hashupa/hurchus/Tharagha ma,  Saldi, Kashmal,  Youno/Thandoro	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 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 Shigar, 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 Shigar and CKNP Directorate. The DFO Shigar 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 Shigar and endorsed by the chairman of DCC with recommendations from CKNP Director and DFO Shigar. The DCC Shigar 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 Shigar, 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 Shigar, 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 Shigar 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

## Lower Braldo Valley

### Central Karakorum National Park

#### Gilgit Baltistan





# Conservation and Sustainable Development Plan 2016-2026

## Lower Braldo Valley

### Central Karakoram National Park

#### Gilgit-Baltistan



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PLAN EDORSEMENT

Signed by President LSO Lower Braldo .....

Endorsed Director CKNP .....

Approved by Deputy Commissioner/ .....  
Chairman District Conservation Committee  
For Shigar in ..... meeting  
held .....

Dated.....



## LIST OF CONTENTS

Abbreviations.....	i
1. Introduction of Lower Braldo Valley .....	1
1.1. Ecological Profile Of Lower Braldo Valley .....	2
1.2. Socio-economic Profile of Lower Braldo Valley .....	2
1.2.1. Demography of Lower Braldo Valley .....	2
1.2.2. Road Access.....	4
1.2.3. Education facilities .....	4
1.2.4. Health facilities.....	4
1.2.5. Veterinary facilities.....	6
1.2.6. Electricity .....	6
1.2.7. Traditional Governance system.....	6
2. Assessment of Customary Practices for sustainable use of natural resources .....	11
2.1. Requirement of revitalization of indigenous knowledge.....	11
2.2. Water .....	11
2.3. Agriculture .....	13
2.4. Livestock .....	17
2.5. Pastures.....	20
2.6. Fuel Wood Collection/ Timber Harvesting.....	25
2.7. Mining.....	30
2.8. Tourism.....	30
3. ASSESSMENT OF CLIMATE CHANGE IMPACT ON NATURAL RESOURCES	34
3.1. Climate Change in the perspective of Indigenous knowledge.....	34
3.2. Temperature variability and seasonal shifts .....	34
3.3. Precipitation.....	35
3.4. Drought .....	35
3.5. Flood .....	36
3.6. Landslides .....	36
3.7. Pastures .....	37
3.8. Biodiversity .....	38
3.8.1. Agriculture and Fruits.....	38
3.8.2. Forest.....	38
3.9. Water .....	41
3.10. Tourism .....	41
4. Management issues and problems .....	44

4.1.	Agriculture.....	44
4.2.	Pasture .....	45
4.3.	Water .....	46
4.4.	Forest and NTFP Issues.....	47
4.5.	Eco-tourism .....	48
4.6.	Mining .....	48
4.7.	Wildlife and Protected areas .....	49
5.	Proposed Management Interventions .....	52
5.1.	Agriculture.....	52
5.2.	Pasture .....	54
5.3.	Water .....	55
5.4.	Forest and NTFP .....	56
5.4.	Eco-tourism .....	57
5.5.	Mining .....	57
5.6.	Wildlife and Protected areas .....	57
6.	Statuary Vs Customary Practices In Lower Braldo Valley .....	59
7.	Recommended Action Plan for Lower BRALDO Valley .....	61
8.	Implementation and Monitoring Mechanism.....	81

## LIST OF EXHIBITS

Exhibit 1: View of Lower Braldo .....	1
Exhibit 2: Village locations of Lower Braldo Valley, 2016 .....	1
Exhibit 4: Demographic profile of Lower Braldo .....	2
Exhibit 3: Map of Lower Braldo Valley .....	3
Exhibit 5: Demographics of Lower Braldo Valley, 2016.....	4
Exhibit 6: Demographic Map of Lower Braldo Valley .....	5
Exhibit 7: Socio-economic Profile of Lower Braldo Valley .....	8
Exhibit 8: Land Cover Map of Lower Braldo .....	12
Exhibit 9: Economic benefits of agriculture production.....	14
Exhibit 10: Need fulfillment by agriculture in Lower Braldo Valley, 2016 .....	16
Exhibit 11: Contribution of livestock in economics of Lower Braldo Valley .....	17
Exhibit 12: Livestock Population at Lower Braldo Valley .....	19
Exhibit 13: Grazing Pressure by livestock on pastures of Lower Braldo Valley .....	22
Exhibit 14: Grazing Pressure by livestock on pastures of Lower Braldo Valley .....	24
Exhibit 15: Timber harvesting and use at Lower Braldo Valley .....	27
Exhibit 16: Summary of Fuel Wood harvest and Consumption (Mg/yr-1) in Lower Braldo Valley .....	27
Exhibit 17: Details of fuel wood harvested per household from several sources of Lower Braldo Valley (Mg/yr -1).....	28
Exhibit 18: Assessment of required reforestation to compensate fuel needs in Lower Braldo Valley (Mg/yr -1) .....	28
Exhibit 19: Annual fuel wood harvest, Lower Braldo Valley .....	29
Exhibit 20: Economic revenue from mining in Lower Braldo.....	30
Exhibit 21: Climate Change at Lower Braldo Valley in the Perspective of Indigenous Knowledge .....	36
Exhibit 22: Impact of climate change on Pastures of Lower Braldo Valley .....	37
Exhibit 23: Impact of climate change on biodiversity of Lower Braldo Valley .....	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 LOWER BRALDO VALLEY

Braldo valley is situated in UC Dasso, Tehsil and District Shigar at a distance of 135 km from the district Headquarter Skardu, and is accessible by a Skardu- Askoli Road. Lower Braldo is located at little less elevation than upper Braldo but still close to snow covered peaks and glaciers. Due to its location at North-eastern side of CKNP, it is one of the coldest regions with xeric vegetation. It comprises of eight villages named: Bianco, Chaqpo, Foljo/Apo Ali gon,



**Exhibit 1: View of Lower Braldo**

Hoo, Nit/Tahir Abad, Teston, Dasso bala, and Dasso paeen on the bank of River Braldo. Braldo has the qualification of being the minimum meddled with, of all settlements of Baltistan, and one of the last few surviving social settlements of Baltistan from the perspective of indigenous practices. The culture is still untouched by the winds of progress and modernization. Lower Braldo is presently most loved destination for trekkers. The area is irrigated by nearby streams and glacial melt.

**Exhibit 2: Village locations of Lower Braldo Valley, 2016**

Villages	Coordinates		Elevation (m asl)
	N	E	
Biano/Sider	-	-	--
Chaqpo	35°41'59.2"	75°01'54.9"	2563
Dasso bala	35°71'83.3"	75°52'01"	2613
Dasso paeen	35°71'55.2"	75°51'70.5°	2426
Foljo/Apo Ali gon	35°41'59.2"	75°01'54.9"	2562
Hoo	35°41'59.2"	75°01'54.9"	2561
Nit/ Tahir Abad	35°71'36.3"	75°54'0,08"	2532
Teston	35°71'16.1"	75°48'85"	2422

## 1.1. Ecological profile of Lower Braldo Valley

Lower Braldo is a narrow valley with villages located on terraces close to passage of Braldo River. The harsh climate of the valley depicts semi desert environment. Most vegetation is of xeric type and adapted to cold and harsh climatic conditions. Forest cover is fragmented and sparse with lower densities, stand biomass and increments both due to harvest pressure and extreme climate. Forest cover comprises of dry temperate coniferous and sub-alpine broadleaved. Adapted to this cold-xeric habitat are the *Artemisia* shrub-land including *Agrostis* spp, *Astragalus* spp. and trees like Juniper and Birch. Broadleaved species as willows (*Salix* spp.), poplars (*Populus* spp.), sea-buckthorns (*Hippophae rhamnoides* spp.) and Tamarix (*Tamarix ramosissima*) are the prominent species. Scenic pastures with patches of Birch and Juniper forest abound in aromatic and medicinal herbs like *Artemisia* and Sea buckthorn add to the ecological and aesthetic value of the valley. Snow accumulation and avalanche guarantee water availability throughout the short growing season (June-September). Inhabiting these sparse, fragmented forests and pastures in snow covered peaks are Snow leopard, Wolf, Brown bears, Marmots, Markhor and Ibex and several species of birds and butterflies. Reptiles such as Black Augama has also been observed while basking on the stony patches during day time.

## 1.2. Socio-economic Profile of Lower Braldo Valley

### 1.2.1. Demography of Lower Braldo Valley

According to the survey conducted for VCSDPs development, the population of lower Braldo valley is 5952 with male to female ratio 1.1:0.9. All these villages are based around buffer area of CKNP which spans 2757.88 m<sup>2</sup> and serves as reserves of natural resources for the local people and transitional area between park and local communities. This local community depends heavily upon natural resources both for subsistence and income.

**Exhibit 3: Demographic profile of Lower Braldu**

Village	HH	Av. HH size	Population	Male	Female	Male: Female
Biano/Sider	107	08	860	470	390	1.2:0.8
Chapgo	50	08	405	219	186	1.2:0.8
Dasso bala	62	10	623	330	293	1.1:0.9
Dasso paeen	76	11	837	425	412	1.0:1.0
Foljo/Apo Ali gon	86	09	776	411	365	1.1:0.9
Hoo	45	10	450	235	215	1.1:0.9
Nit/Tahir Abad	155	09	1396	740	656	1.1:0.9
Teston	60	10	605	329	276	1.2:0.8
<b>Total</b>	<b>641</b>	<b>9.40</b>	<b>5952</b>	<b>3159</b>	<b>2793</b>	<b>1.1:0.9</b>



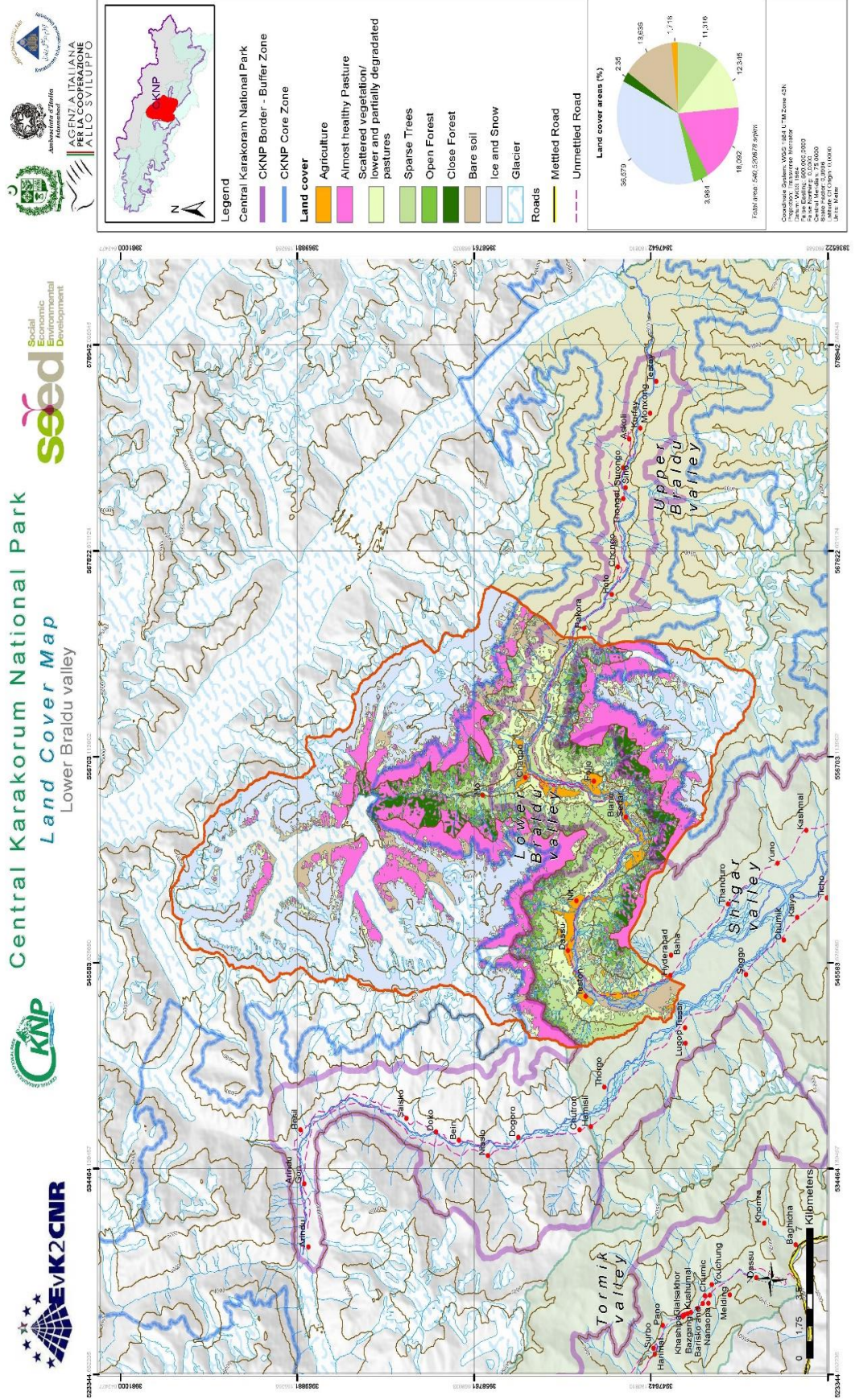
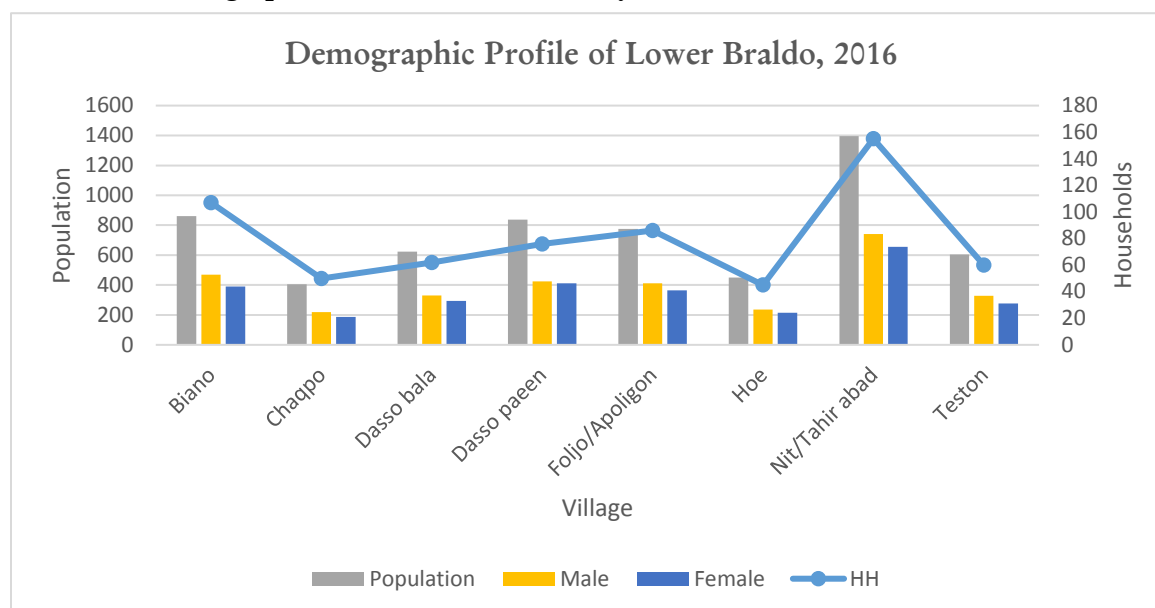


Exhibit 4: Map of Lower Braldu Valley

**Exhibit 5: Demographics of Lower Braldo Valley, 2016**



### 1.2.2. Road Access

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 communication with the outside world. This lack can be attributed to difficult topography and low population densities in respect to lowland areas, factors that increase investment and maintenance costs. Lower Braldo valley is connected to downtown by Skardu - Askoli road, which is a 120 Km dusty, jeep able road. Jeep takes seven hours, so basically a whole day. Except Skardu - Askoli road, the road infrastructure is literally absent in Lower Braldo Valley.

### 1.2.3. Education Facilities

All the villages have the primary education facility supported by either government or private partnership both for girls and boys except Ho. Aspiring students with economically sound backgrounds move to Shigar or Skardu higher and secondary school education, rest of them quit the school education and get involved in daily household activities.

### 1.2.4. Health Facilities

Access to primary healthcare services is critical for Lower Braldo residents even though the population is in great need of medical assistance and health education owing to a series of endemic diseases caused by poor sanitation and unhealthy habits. There is only government dispensary in the whole valley in Dasso paeen. The infrastructure and facilities of this dispensary were very poor prior to Ev-K2-CNR SEED Project initiatives. Ev-K2-CNR through SEED project strengthened the facility into “A” class dispensary. A doctor and other staff have been appointed, medicines were provided and improvements in the building infrastructure were made.



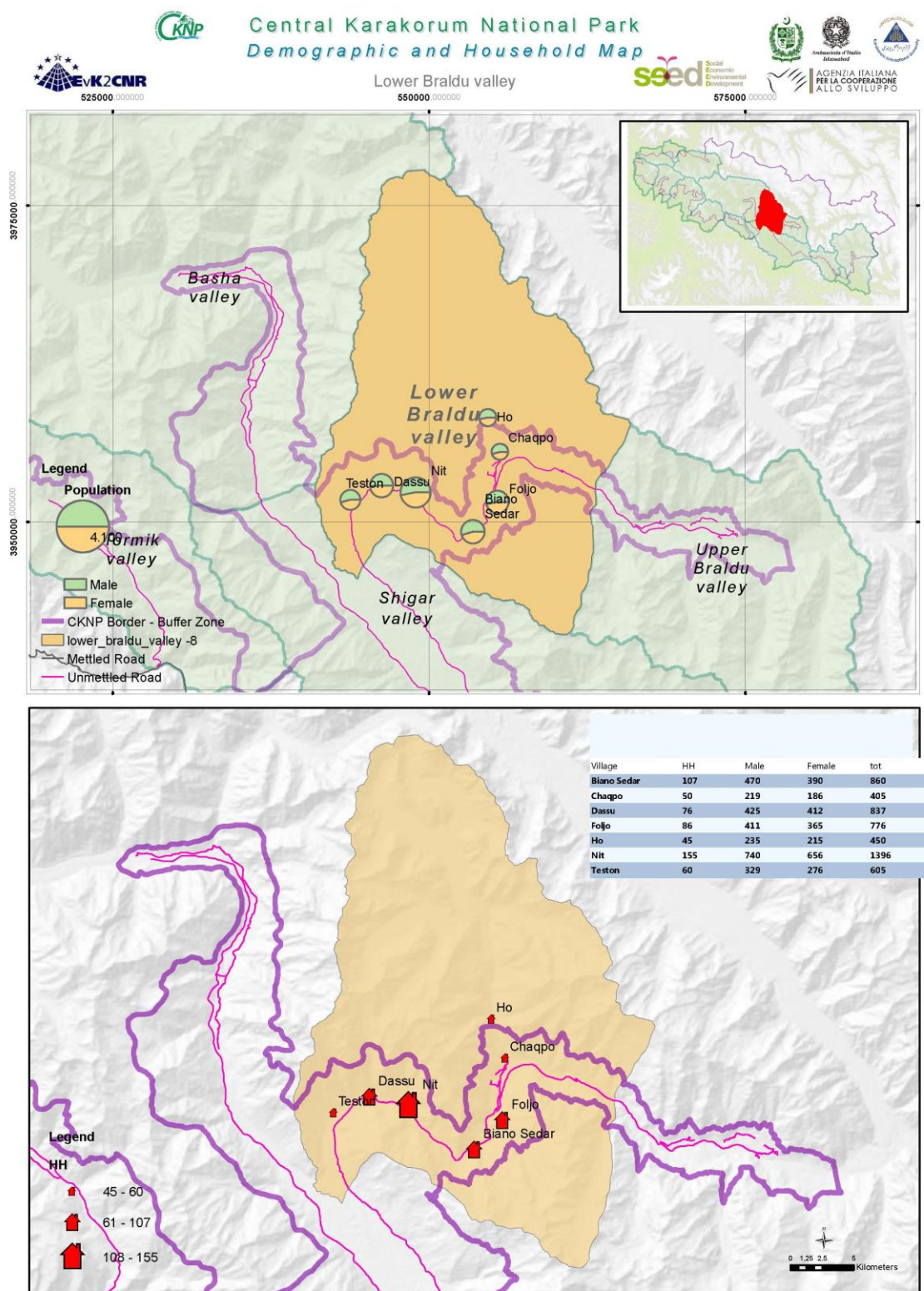


Exhibit 6: Demographic Map of Lower Braldu Valley

Due to lack of basic health facilities and awareness on health and hygiene practices, diseases like diarrhea in children and skin diseases are common in the villages of Lower Braldo.

#### 1.2.5. Veterinary Facilities

Veterinary facilities like dispensary is available only in Dasso paeen village, there is another government dispensary in Dasso bala but that is not functional. Non-governmental organizations like Ev-K2-CNR in their last project SEED phase I had a massive livestock vaccination campaign in the valley. People mostly take their animals to Shigar or Skardu or NGOs run vaccination campaigns. People also avail the services of private vet technicians in case of any problem or disease outbreak.

The common diseases of the livestock are pneumonia, FMD, mastitis, mange and enterotoxaemia. The main causes of year round mortality are diseases, predation, winter starvation and casualties (falls, Avalanches).

#### 1.2.6. Electricity

All the villages in Lower Braldo 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 . 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.

#### 1.2.7. 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 serve as umbrella for VCCs, VO's, and WO's. 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.



There is LSO working in Lower Braldo Valley named as Dasso Local Support Organization. VCCs, VO's and WO's are also working but due to the community's internal conflict their performance is being hampered so that's why their visibility and coherence is really weak. There are also some VO's having political and religious backgrounds. In the context of natural resource management these organizations facilitate the meetings, execution of activities, monitoring and decisions related to community resources and resolve conflicts. The community seems not fully satisfied with their performance and there were mix responses for and against regarding the performance of the social organizations.

**Exhibit 7: Socio-economic Profile of Lower Braldo Valley**

Village	Education Facilities			Health Facilities			Veterinary Facilities	Electricity
	Category/ Level	Ownership	Geographic Location	Gender	Category/ Level	Geographic location		
Biano	Primary school	Private	-	Girls and boys both	No facility	-	Community take livestock to Shigar vet dispensary	Yes
Chaqpo	Primary school	Government	-	Girls and boys both	No facility	-	No facility, Community take livestock to Skardu vet dispensary	Yes
Dasso bala	Primary school	Primary	-	Girls and boys both	No facility	-	Yes but non-functional and Community take livestock to Dasso paeen vet dispensary	Yes
Dasso paeen	Primary school	Govt. and private both	-	Girls and boys both	Dispensary	-	Yes	Yes
Foljo/ Apo Ali gon	Primary school	Govt. and private both	-	Girls and boys both	No facility	-	No facility, take livestock to Dasso paeen vet dispensary	Yes
Hoo	No facility	-	-	-	No facility	-	No facility, take livestock to Mopa vet dispensary	Yes
Nit/ Tahir Abad	Primary school	Govt. and private both		Girls and boys both	No facility	-	No facility, take livestock to Skardu vet dispensary	Yes
Teston	Primary school	Private		Both	No facility	-	No facility, take livestock to Dasso vet dispensary	Yes



# 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 integral component of a cultural complex that incorporates language, nomenclature, resource use practice, cultural and worldview. 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

Inhabitants of Lower Braldo valley have established complex irrigation mechanism or water system frameworks and agricultural fields in a long process of water channel development, land leveling and improvement. The glacial melt water is extracted from nearby stream or nullah following gravitational force and brought to agriculture fields through open water channels. The water related systems and frameworks contrast from one valley to other but water distribution mainly depends upon its availability. In case of water shortage, the usage rights rotate between different agriculture fields and household areas or villages while the usage right within the community is restricted; households get water for a particular time span irrespective of their land holdings.



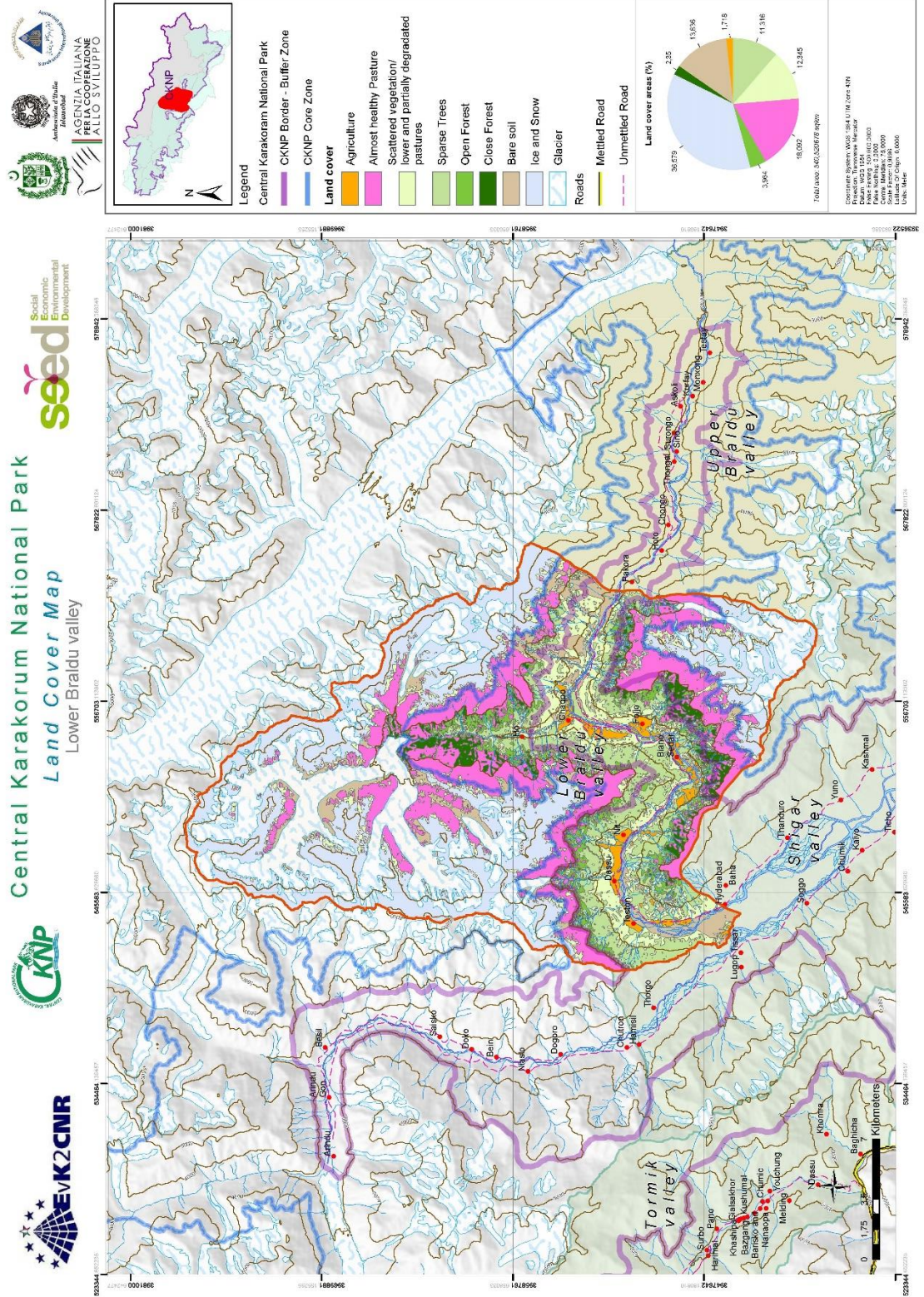


Exhibit 8: Land Cover Map of Lower Braldo

The customary rules say that every farmer has to take the responsibility of water channel maintenance discharge so that any potential harm to affiliated fields could be avoided. Repair work of the main channel is an obligation for water utilize group. Each household need to assign one male worker for this task and in case on noncompliance they will be fined. Up keeping of channel includes removal of rocks, sediments and silt. Mostly due to extreme winter season or due to natural hazard, the channels need continuous maintenance.

### 2.3. Agriculture

The Lower Braldo is a single cropping zone because of the short growing season due to harsh climate which does not allow another cropping cycle. In average each household has 10 Kanals of cultivated land. Households use their cultivated lands for growing cereal crops, fruit trees, vegetables, plantation for timber and fuel.

Approximately 100% of households have agriculture lands and are both irrigated and rain fed. There is subsistence agriculture in Lower Braldo valley, the most important crops are wheat, buckwheat, barley, vegetables (peas) and fruits (apricots) are grown in several local and adopted varieties. Indigenous cultivars and even the wild relatives of numerous crops are grown to ensure the household food security but fails miserably due to very low yield, and obtain additional food products such as flour, rice etc. from the market.

Local farmers of the valley have developed terraced patches of agriculture fields through land reclamation at different altitudes around their settlements which is often highly fragmented landscapes. Besides protecting and improving the existing cropping system, terraces provide new planting niches with favorable conditions for specialty crops or for establishing valuable trees. For example, farmers plant fruit and nut trees along the edges of terrace rises and thereby allow the successful establishment of tree crops to manage scarce plain area. The size for the agriculture fields decides the limits for mechanization such as manual tilling or mechanized tilling. To maximize agriculture production conservation tillage in addition to animal manure has also been practiced by local farmers in Lower Braldo valley to avoid erosion and increase in fertility.

Over the last three decades the depletion and degradation of natural resources emerged as the most powerful negative trend affecting the well-being of poor people in GB. The reduction in land availability per household principally due to land fragmentation, but also to erosion and landslides and crop diseases are perceived as the most threatening trend with direct impacts on the economic survival and well-being of rural households. The fall in average household landholdings has contributed to a corresponding reduction over the preceding three decades in average livestock holdings, traditionally a major source of livelihood for local people after farming.

The existing status of agriculture in Lower Braldo is miserable and requires quick consideration. Primitive local cultivars, absence of good soil management techniques and post-harvest losses are reasons of poor crop production. Small land holding, quality seed, conventional agricultural frameworks, and untrained manpower are the major obstructions in venture to dynamic cultivation. Outdated practices, indigenous seed varieties and post-harvest losses are very common and thus bringing on the decrease in quality and perishing the items before markete

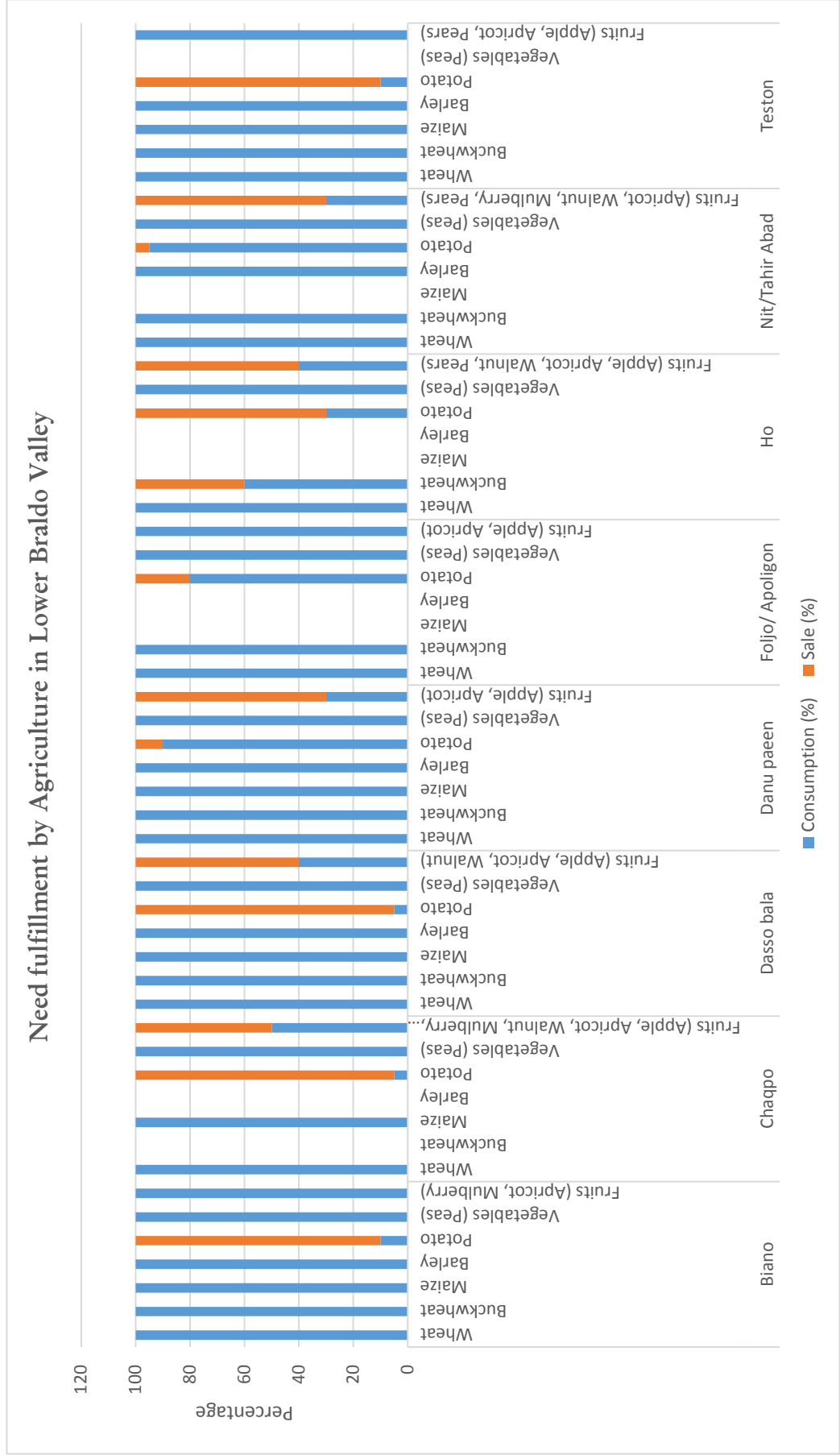
**Exhibit 9: Economic benefits of agriculture production**

Village	Crops	Consumption (%)	Sale (%)	Av. income/ HH	Av. Value/ HH
Biano	Wheat	100	-	12000	45700
	Buckwheat	100	-		
	Maize	100	-		
	Barley	100	-		
	Potato	10	90		
	Vegetables (Peas)	100	-		
	Fruits (Apricot, Mulberry)	100	-		
Chaqpo	Wheat	100	-	50000	80000
	Buckwheat	-	-		
	Maize	100	-		
	Barley	-	-		
	Potato	05	95		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot, Walnut, Mulberry, Pears)	50	50		
Dasso bala	Wheat	100	-	55000	90000
	Buckwheat	100	-		
	Maize	100	-		
	Barley	100	-		
	Potato	05	95		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot, Walnut)	40	60		
Danu paeen	Wheat	100	-	45000	70000
	Buckwheat	100	-		
	Maize	100	-		
	Barley	100	-		
	Potato	90	10		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot)	30	70		
Foljo/ Apo Ali gon	Wheat	100	-	17000	42200
	Buckwheat	100	-		
	Maize	0	-		
	Barley	0	-		

Village	Crops	Consumption (%)	Sale (%)	Av. income/ HH	Av. Value/ HH
Hoo	Potato	80	20		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot)	100	-		
	Wheat	100	-		
	Buckwheat	60	40		
	Maize	0	-		
	Barley	0	-	65,000	100,000
	Potato	30	70		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot, Walnut, Pears)	40	60		
Nit/ Tahir Abad	Wheat	100	-		
	Buckwheat	100	-		
	Maize	-	-		
	Barley	100	-	55,000	80,500
	Potato	95	5		
	Vegetables (Peas)	100	-		
	Fruits (Apricot, Walnut, Mulberry, Pears)	30	70		
	Wheat	100	-		
	Buckwheat	100	-		
	Maize	100	-		
Teston	Barley	100	-	30,000	65,000
	Potato	10	90		
	Vegetables (Peas)	100	-		
	Fruits (Apple, Apricot, Pears)	100	-		



Exhibit 10: Need fulfillment by agriculture in Lower Braldo Valley, 2016





## 2.4. Livestock

The general population of Braldo Valley makes their earnings from subsistence agricultural farming and animal domestication. Livestock herding is one of the major sources of livelihood in the CKNP buffer zone. CKNP buffer zone livestock constitutes 20% of the total head of livestock in Gilgit Baltistan, which according to current VCSDP survey are 30,205 animals in nine villages of Lower Braldo valley.

They keep diverse sort of animals including sheep, goat, bull, yak, zo, zomo, and yakhmo and poultry breeds. The majority of the cattle in Lower Braldo are local breed however a portion of the general population likewise raise Jersey dairy cattle and for breeding purpose yaks and bulls are being used. Artificial insemination is just an exception neither do they know about it. Wheat straw, fodder, grasses and leaves are stored and fed to animals in winter. The regular diseases of the domesticated animals are pneumonia, FMD, mastitis, mange, and enterotoxaemia. The primary driver of year round mortality are illnesses, predation, winter starvation and losses (falls, Avalanches). According to survey the animals rearing trend is still decreasing in Lower Braldo.

**Exhibit 11: Contribution of livestock in economics of Lower Braldo Valley**

Village	Kind of livestock	Population per village	Av. Income per HH (PKR)	Rearing trend
Biano	Goat	150	20,000	Decreasing
	Sheep	250		
	Cattles	230		
	Yaks	290		
	Equids	310		
Chaqpo	Goat	800	30,000	Decreasing
	Sheep	400		
	Cattles	700		
	Yaks	100		
	Equids	600		
Dasso bala	Goat	300	20,000	Decreasing
	Sheep	300		
	Cattles	150		
	Yaks	70		
	Equids	150		
Dasso paeen	Goat	250	35,000	Decreasing
	Sheep	300		
	Cattles	200		
	Yaks	300		
	Equids	250		
Foljo/Apo Ali gon	Goat	600	28,000	Decreasing
	Sheep	500		
	Cattles	300		
	Yaks	195		
	Equids	100		
Hoo	Goat	200	30,000	Decreasing

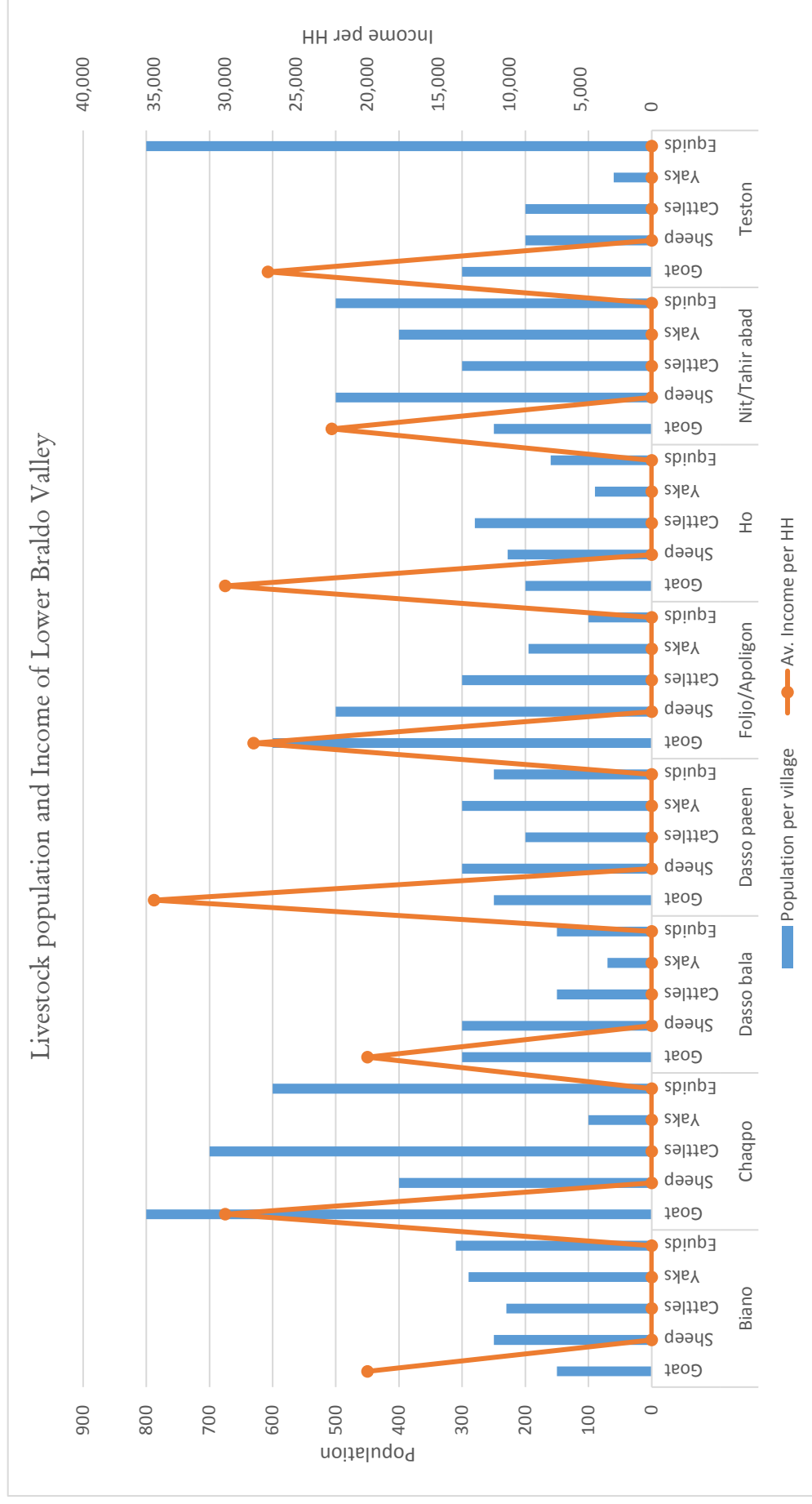
Village	Kind of livestock	Population per village	Av. Income per HH (PKR)	Rearing trend
	Sheep	228		
	Cattles	280		
	Yaks	90		
	Equids	160		
Nit/Tahir abad	Goat	250	22,500	Decreasing
	Sheep	500		
	Cattles	300		
	Yaks	400		
	Equids	500		
Teston	Goat	300	27,000	Decreasing
	Sheep	200		
	Cattles	200		
	Yaks	60		
	Equids	800		

In March and April, stockholders take their herds on daily movements to the transitional pastures but not sufficient for the livestock all villages of Lower Braldo. All animals are collected and given to a few men who take them up to high elevated pastures. On daily movements the flocks are driven to high elevated meadows following the receding snowline as 4500 m. The timing of herding in different parts of the alpine pastures may vary, reflecting perceptions of the value of grass in different places.

The newly born calves, lambs and kids and as well as one or two lactating animals per household for daily milk supply are retained at villages during the whole summer. They are fed with fresh grass and weeds removed from the fields by women. The village community or in some cases the village elderly select a village guardian who protects the crops to ensure that no animal enter any field until the fields are harvested. The guarding usually serves for one year and receives 5kgs of wheat per household as payment for his duty. In addition if he catches grazing animals in the fields, he receives fines from the owner of a specific animal.

In autumn, when the livestock are driven down from the high pastures, they are turned on to the fields to graze on the stubble. Dried apricots of lower quality are given to them in evening as kind of reward so that they return to stables. Kind of fodder to the livestock during the winter depends not only its availability but also on many beliefs about the appropriate forms and amount of fodder to be given to particular types of animals. Cattles and cross bred are fed straw, and sometimes a little grain. Pregnant cattle are given supplementary fodder, hay, some flour, apricot nuts and sometimes eggs. Generally, all livestock lose weight during the winter.

Exhibit 12: Livestock Population at Lower Braldo Valley



Since the traction power of zos is needed for plough they are fed barley and sometimes even apricot oil as supplement three weeks before plowing starts in early spring. Goats and sheep are fed leaves of fruit and other trees during October and November. Women or children tear leaves off the trees or beat the branches with long stick so that the leaves fall down and can be eaten by the stock. During the winter goats are fed hay, dried leaves, and herbs from weeding, sometimes apricot kernel of low quality and also millet straw, when available.

Non lactating goats and all sheep from village are moved to high pastures at a fix day by some villagers while cattle and zomos are driven to high pastures individually by stockholders themselves. On the broq, however, the livestock is tended by a fix number of villagers who work there as herdsmen on a rotational basis. If animals are killed due to illness, accident, predators or other natural events the herdsmen don't have to pay any compensation to the owner. If animal has to be slaughtered due to any accident or illness, injury, herdsmen are allowed to take the heart and liver while rest of the meat is given to owner. Animals born in high pastures belongs to owner, he usually gives a small reward to the herdsmen. All animals are marked by scratches on their horns, paint spots on the hides, marks in the ear. This herdsmen arrangement on pay basis is practiced when a particular household is short of men or does not want to send a household member to tend the livestock on broq or brokh.

For breeding purpose there is usually one bull in each village and owned by the whole village community and usually bought at the age of 2 to three years. Only bull at the age between four and eight years is suitable for cross breeding while old ones are sold, and from the profit a new younger bull is bought. During winter, bull is held within the stable of one household which receives one basket of straw from every household for the feeding of the animal. Farmers from the same village don't have to pay anything while people from other villages without a village bull must give some money for that purpose.

The different pasture settlements vary significantly in size and construction but all of them show the similar features. Such a permanent pasture settlement consists of one or more clusters of small stone built living huts with associated cattle sheds and pens for the livestock. They are just below the main grazing grounds, mostly with a permanent stream close by. The huts are relatively small, irregular in shape, windowless, and with a low roof pole, rafters and stone slabs covered with turf. Unlike other regions in Karakoram, stables and huts are not privately, but commonly owned and are used by the whole village community.

## 2.5. Pastures

Animal rearing dominates land use with pastures and water management being guided by customary rules in Lower Braldo Valley. Community depends upon pastures for livestock herding, fuel wood collection, medicinal plants harvest and other consumable products. These areas are accessible only during the peak summer season due to snow in winter season. Traditional rights of communities in these pastures are usually well defined, and they establish seasonal summer pastures in these areas. Utilization of pastures are collectively conferred on entire villages and are not confined to kinship groups. Sometimes pastures are shared by the

neighboring villages if it borders two or more villages. Nomadic economy and labor activities are predominantly based on animal husbandry. Mixed herds are composed of sheep and goats, cattle/yaks for livestock production and camels, horses and donkeys mainly for transport of tents, household goods and utensils. Nomads utilize pastures to which they claim rights of access based on customary law.

The villagers of the Lower Braldo were effectively left alone to tend their livestock in summer pastures along the glaciers. Vertical transhumance of local livestock population to this high altitude area is a common practice all over the study area during the summer months. The pasture settlements have sheds for the animals as well and they are fenced as well to avoid attacks of snow leopard and wolves.

The FGD interview indicates that 50% pastures of Lower Braldo valley are healthy while other 50% are degrading gradually. Decline in health of pastures is 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 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 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.

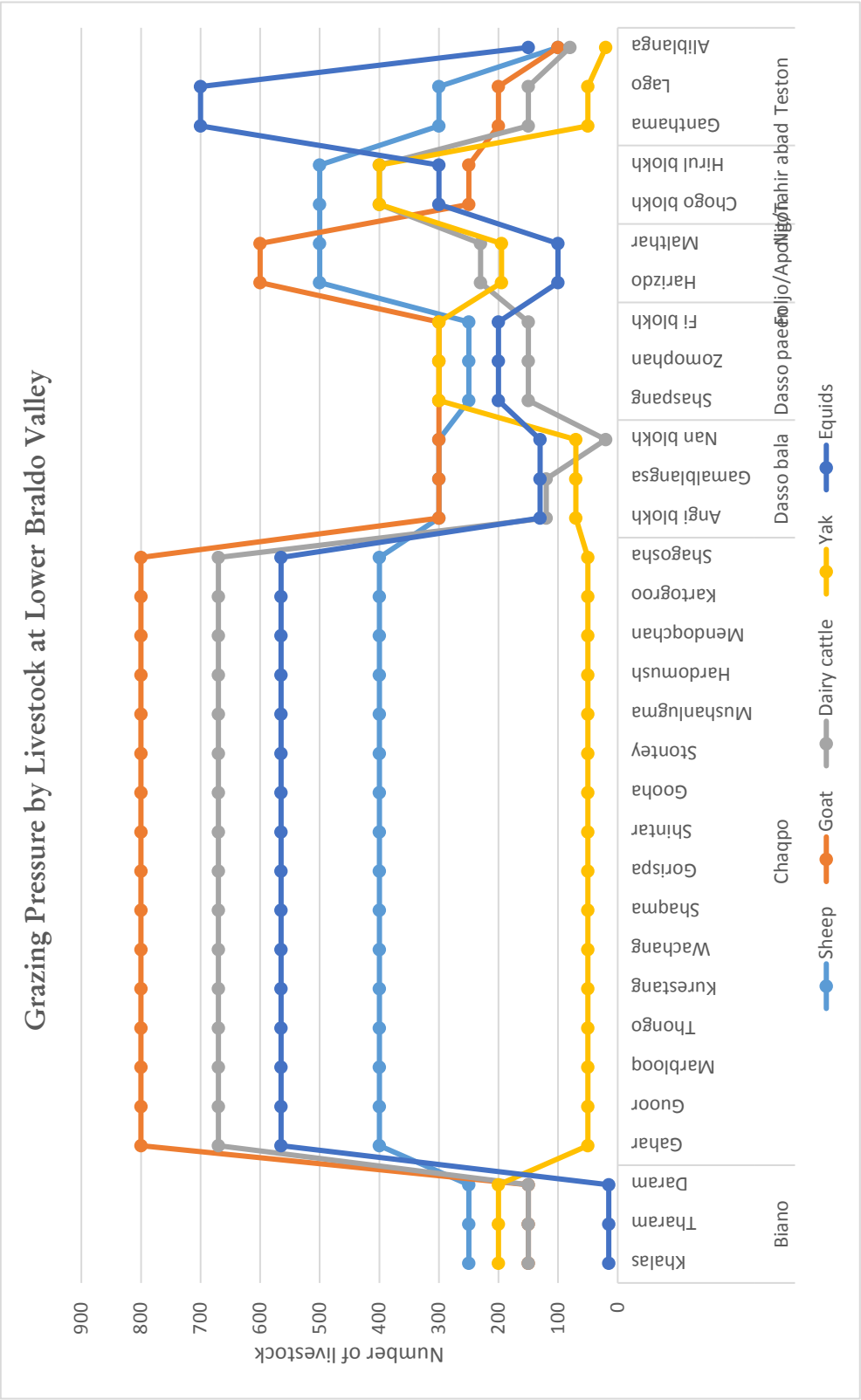


**Exhibit 13: Grazing Pressure by livestock on pastures of Lower Braldo Valley**

Pastures	Village	Other uses	Status	Grazing period	Livestock class					
					Sheep	Goat	Dairy cattle	Yak	Equids	Total
Khalas	Biano	Fuel wood and Medicinal herbs	PD	Jun-Jul	250	150	150	200	15	765
Tharam				-do-	250	150	150	200	15	765
Daram				Aug-Sep	250	150	150	200	15	765
Gahar	Chaqpo	Fuel wood and Medicinal herbs	Healthy	Round the year	400	800	670	50	565	2485
Guoor					400	800	670	50	565	2485
Marblooq					400	800	670	50	565	2485
Thongo					400	800	670	50	565	2485
Kurestang					400	800	670	50	565	2485
Wachang					400	800	670	50	565	2485
Shaqma					400	800	670	50	565	2485
Gorispa					400	800	670	50	565	2485
Shintar					400	800	670	50	565	2485
Gooha					400	800	670	50	565	2485
Stontey	Mushanlugma	Fuel wood and Medicinal herbs	Healthy	Round the year	400	800	670	50	565	2485
Mushanlugma					400	800	670	50	565	2485
Hardomush					400	800	670	50	565	2485
Mendoqchan					400	800	670	50	565	2485
Kartogroo					400	800	670	50	565	2485
Shagosha					400	800	670	50	565	2485
Angi blokh	Dasso bala	Fuel wood	PD		300	300	120	70	130	920

Pastures	Village	Other uses	Status	Grazing period	Livestock class					
					Sheep	Goat	Dairy cattle	Yak	Equids	Total
Gamalblangsa			D	Round the	300	300	120	70	130	920
Nan blokh			D	year	300	300	20	70	130	920
Shaspang					250	300	150	300	200	1200
Zomophan					250	300	150	300	200	1200
Fi blokh				Mar -Sep	250	300	150	300	200	1200
Harizdo	Foljo/Apo Ali gon	Fuel wood and Medicinal herbs	PD	Aug- Apr	500	600	230	195	100	1625
Malthar				May-Jul	500	600	230	195	100	1625
Hoo	Community did not share the information due to conflict between CKNP and the community									
Chogo blokh										
Hirul blokh	Nit/Tahir abad	Fuel wood		Round the	500	250	400	400	300	1850
				year	500	250	400	400	300	1850
Ganthama	Teston	Fuel wood and Medicinal herbs	PD	May-Jun	300	200	150	50	700	1400
Lago				Aug-Sep	300	200	150	50	700	1400
Aliblanga				May-Sep	100	100	80	20	150	450

Exhibit 14: Grazing Pressure by livestock on pastures of Lower Braldo Valley



## 2.6. Fuel Wood Collection/ Timber Harvesting

Lower Braldo valley which lies at dry north eastern side of CKNP has comparatively fragmented and spares forest with approximately 160.9 km<sup>2</sup> vegetation cover and its average ABG is 1428.6 MgKm<sup>-2</sup> and CAI of 1616.5 Mg/year (Ferrari, 2014). Vegetation cover is 9.01 % (16.8% grasslands, 3.5% close forest, 1.5% open forests, 24.8 % for both scattered and sparse vegetation). High density of timber trees are found in south-western valleys of CKNP than North eastern valleys.

As a consequence of ever increasing population villages are expanding and thus construction of settlements/houses is also on rise. Our data collected during the survey reports that approximately 641 households living in Lower Braldo valley harvest about 17,226.8 Mg annually of the natural vegetation and 3942.15 Mg from forests and 4,256.24 Mg from junipers as fuel. Forests and juniper contribute to 30% of the basic fuel need. Among the alternative fuel wood resources electricity, gas cylinders and kerosene oil are usually employed. Plantations by local community on private lands have help alleviate strains on natural flora considerably. Even sustainable and productive forest systems may experience pervasive and severe levels of small-scale chronic disturbance by harvesting then the consumption of 30% natural flora annually will soon turns the forest areas into barren lands.

The species composition around whole Braldo valley including lower and upper Braldo comprised of 83.5 % Junipers, 5.3% coniferous and 11.2% broad leaves and also the artificial plantation sites of *Populus* spp. Poplar varieties are common plantations aided significantly to alleviate stress on natural forests. They are preferred due to high annual biomass, higher pest resistance, site adaptability, and easy vegetative propagation has made poplar a commercially valuable energy crop. The household fuel sources in Lower Braldo are shrubs, *Artemisia*, branches of fruit trees, sea buckthorn, dung, wood from plantations and forests. Old fruit trees either having low productivity due to age or disease are also harvested for same purpose Majority of the fuel sources are common to the community and within community; there is no restriction on fuel wood collection but selling of wood is not encouraged socially. These regulations are not applied to privately owned resources and plantations. Community restricts over exploitation from common resources. Bushes, mainly from *Artemisia* shrub lands are often used as firewood in Lower Braldo which is quite common in Lower Braldo. Apart from being one of the sources of fuel, this is also used by livestock in winter months. Juniper trees are found in in isolation at inaccessible locations on steep mountain slopes and grow well where water is frequently available. Juniper trees are favored species for fuel because of its dryness and sweet smell.

Customary laws are being followed in the valley for exploitation of natural resources. They allow the collection of fuel wood and timber up to need basis only. Juniper is harvested extensively by local community without taking into consideration its slow growth. 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 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 (Melo *et al.*, 2013) and incorporate the findings into laws to ensure sustainable and healthy environment in order to mitigate the haphazard changes of climate.



**Exhibit 15: Timber harvesting and use at Lower Braldo Valley**

Village	Houses constructed in last 5 years (2010-2015)	Number of trees used	Tree species used
Biano	05	60	Poplars
Chaqpo	15	45	Poplars
Daso bala	50	300	Poplars
Dasu paeen	40	280	Poplars
Foljo/Apo Ali gon	15	50	Poplars
Hoo	05	15	Poplars
Nit/Tahir abad	15	30	Poplars
Teston	-	-	-

**Exhibit 16: Summary of Fuel Wood harvest and Consumption (Mg/yr-1) in Lower Braldo Valley**

Village	No. of HH	Consumption per HH			Consumption per village		
		W	S	Tot	W	S	Tot
Biano	107	3.2	1.5	4.7	342.4	160.5	502.9
Chaqpo	50	6	2.8	8.8	300	140	440
Dasso bala	62	5	1.7	6.7	310	105.4	415.4
Dasso paeen	76	4.8	1.6	6.4	364.8	121.6	486.4
Foljo/ Apo Ali gon	86	3.2	1.4	7.4	275.2	120.4	395.6
Ho	45	5.2	2.2	4.6	234	99	333
Nit/ Tahir Abad	155	6	2.6	8.6	930	403	1333
Teston	60	3.5	1.6	5.1	210	96	306

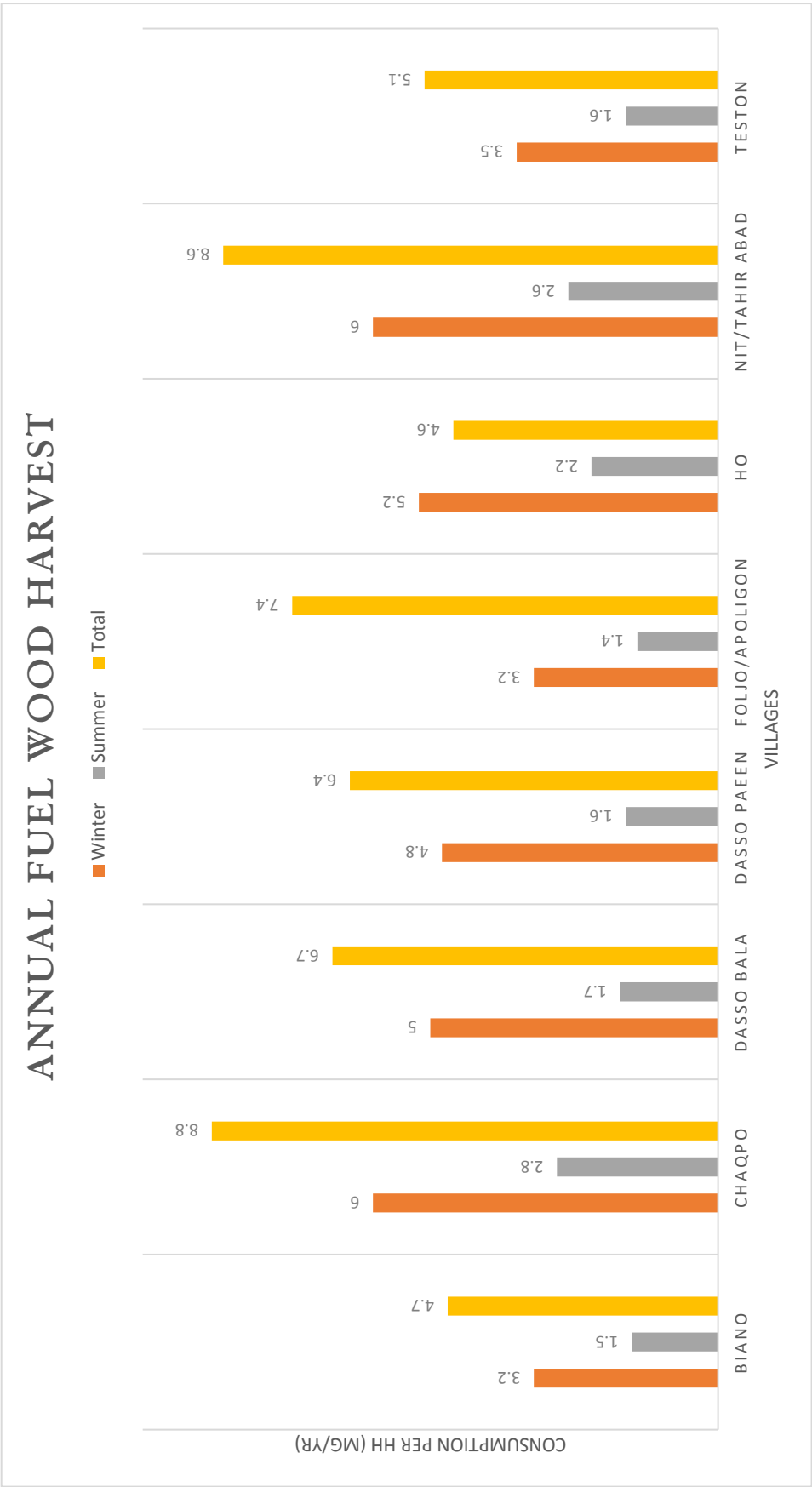
**Exhibit 17: Details of fuel wood harvested per household from several sources of Lower Braldo Valley (Mg/yr -1)**

Village / Source	Biano		Chaqpo		Dasso bala		Dasso paeen		Foljo/ Apo Ali gon		Ho		Nit/ Tahir Abad		Teston	
	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
Artemisia	0.7	0.3	0.5	0.3	0.8	0.3	0.7	0.3	0.7	0.3	0.0	0.0	0.5	0.2	0.6	0.3
Sea-buckthorn	0.0	0.0	0.0	0.0	0.2	0.1	0.7	0.2	0.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Shrubs	0.2	0.1	0.0	0.0	0.5	0.1	0.0	0.0	0.4	0.2	0.0	0.0	0.4	0.2	0.0	0.0
Grasses	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
Dung	0.3	0.2	0.5	0.3	0.4	0.2	1.4	0.6	0.4	0.2	0.0	0.0	1.0	0.5	0.4	0.3
Juniper	0.2	0.1	1.5	1.1	0.0	0.0	0.7	0.2	0.6	0.2	0.0	0.0	0.6	0.2	0.4	0.2
Natural forest	0.0	0.0	1.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.3	0.6	0.3
Fruit trees	0.3	0.2	0.6	0.4	1.1	0.4	0.8	0.2	0.3	0.1	0.0	0.0	1.2	0.5	0.4	0.2
Other riparian vegetation	0.0	0.0	0.0	0.0	0.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Plantation	1.4	0.7	1.5	0.4	1.1	0.4	0.5	0.1	0.4	0.2	0.0	0.0	1.5	0.6	0.9	0.39
Market	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

**Exhibit 18: Assessment of required reforestation to compensate fuel needs in Lower Braldo Valley (Mg/yr -1)**

Valley	Average Fuel consumption from Natural Forest (Mg/yr/valley)	Annual CAI (Mg/yr)*	Required credit to sustain fuel needs	Harvest Pressure
Lower Braldo	7192	971	- 6221	Unsustainable

Exhibit 19: Annual fuel wood harvest, Lower Braldo Valley



## 2.7. Mining

Mining for precious and semi-precious stones is being done since 1970's nearly in all villages of Lower Braldu. But the produce lacks in both quality and quantity because of primitive mining technologies including blasting and absence of contemporary equipment and tool. The techniques of mining being used are high in scarp rate, risky for personal safety and health and high negative environmental impacts. Ev-K2-CNR/SEED Project organized several training workshops, provided necessary mining tool, advance blasting techniques with less environmental impact and high quality product for Braldo and Basha valleys.

**Exhibit 20: Economic revenue from mining in Lower Braldo**

Village	Si nc e	No of Mining Groups	Mining products	Revenue/Yea r/Village (PKR)	Revenue/Yea r/Group (PKR)
Biano/Side r	20 08	11	Aquamarine, Tourmaline, Topaz, Ruby, Quartz	700,000/-	63,636/-
Chaqpo	19 76	07	Aquamarine, Tourmaline, Topaz, Ruby, Quartz,	420,000/-	60,000/-
Dasso bala	19 94	12	Aquamarine, Tourmaline, Topaz, , Quartz, Emerald	840,000/-	70,000/-
Dasso paen	20 06	30	Aquamarine, Tourmaline, Topaz, , Quartz, Emerald	2,250,000/-	75,000/-
Foljo/Apo Ali gon	20 08	4	Garnets, Diopside, Ruby, Pargasite, Emerald, Topaz, Amethyst, Scheelite, and Quartz.	320,000/-	80,000/-
Hoo	19 81	08	Tourmaline, Topaz, Ruby	440000/-	55,000/-
Nit/Tahir Abad	19 96	40	Golden Topaz Aquamarine, tourmaline, Morganite, Apatite, Quartz and Emerald	2600,000/-	65,000/-
Teston and Hyderabad	19 95	10	Golden Topaz, Aquamarine, Tourmaline, Morganite, Apatite, Quartz and Emerald	500,000/-	50,000/-

## 2.8. Tourism

Tourism can be 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. These protected areas are ideal places to address the wide ranging interests of the tourists. Lower Braldo is en-route of mountaineering expeditions to world's famous peaks including K2. This adventure tourism provides important opportunities for cash income generation of local residents through provision of different services to mountaineering teams. Localized services include camping site fee and provision of good and services to mountaineering teams It include provision of porters to carry loads, sardars, guides and cooks. Porter charges PKR500 per day and cook PKR600.



# 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 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 Lower Braldo valley were well aware of changes that are happening in their climate and responded all the questions effectively. 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 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. 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 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 local community during last 30 years. Community reported a rapid increase of temperature during last 10 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. 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. Warmer summer temperatures have led to longer forest growing seasons but have also increased summer drought stress, vulnerability to insect pests. Both in FGD's and individual interviews, community reported an early start of 19 days for summer season and equal days decrease in winter. This shows an increasing impact of unpredictability in weather.

### 3.3. Precipitation

In addition, changes in climate, such as reduced snowfall and increased rainfall, are reported across the area by 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 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 local community snow season has also showed significant delay and is getting more delayed year by year in different valleys. Community reported 53% decline in amount of snow fall over last 30 years is reported. As result of this sharp decline in frequency and magnitude of snowfall locals are facing shortage of alpine pastures productivity which affects negatively both to natural resources sustainability and economy of valley.

### 3.4. Drought

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.

As a consequences of climate shift drought is at continuous increase of 15% from regional climate scenario as reported by local community. Due to warmer temperature the snow deposits are melting before time and increased 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 regeneration of forest and pastures. It is difficult to mitigate the issue by water uplifting from rivers due to the required capital.

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

Devise the research to determine natural indicators to measure the intensity of drought for local community.

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 by 35% since last 30 years. However, the flood frequency was also reported to be increased by 19% since last 30 years. Since change in flood pattern is being observed over last three decades but over last half a decade, a sharp increase in both frequency and magnitude of flood is observed.

### 3.6. Landslides

Floods are the regulating factors of the land slides. 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 Indus basin.

According to the survey conducted to gather information about the driving factors of climate events by local community, it is assessed that landslides have increased considerably (27%) since last 30 years. These landslides wither soil from 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 the irrigation systems are mostly built along rough mountain ranges and are more prone to landslide. As a result of broken and disconnected irrigation channels community face water shortage sometimes even for months and subsequently decreased agriculture production.

**Exhibit 21: Climate Change at Lower Baldo Valley in the Perspective of Indigenous Knowledge**

Factors	Status	Change (days/ %age)	Trend		
			30 y ago (1985)	10 y ago	Future prediction
Rain	Increase	Minor Increase	Less rains as compared to present	Decrease	Decrease
Snow	Decrease	53	More snow as compared to present	Decrease	Decrease
Temperature	Increase	10	Less as compared to present	Increase	Increase
Summer season duration	Increase	19	Summer starts early and ends late. Temperature is comparatively high in summer now a day	Increase	Increase

Factors	Status	Change (days/ %age)	Trend		
			30 y ago (1985)	10 y ago	Future prediction
Winter season duration	Decrease	19	Winter starts late and ends early. Winter is still quite cold any dry	Decrease	Decrease
Glacier recession	Increase	19	Glaciers were not stable	Increase	Increase
Land slides	Increase	27	They were not frequent	Decrease	Increase
Flood frequency	Increase	19	Less flood as compared to present	Increase	Increase
Flood magnitude	Increase	35	Less magnitude as compared to present	Increase	Increase
Drought	Increase	15	Less drought as compared to present due to less snow	Increase	Increase
GLOF Frequency	Increase	05	Minor increase in GLOF events	Increase	Increase

### 3.7. Pastures

Regional climate scenarios for CKNP valleys shows prolonged growing seasons and shifts in temperature and precipitation as currently happening in the Lower Braldo valley. 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 areas 18 % degradation has been observed. Mid and low land grazing areas have declined 28%.

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 22: Impact of climate change on Pastures of Lower Braldo Valley

Pastures	Status	Change (days/ %age)	Trend			Adaptation Measures by local community
			30 y ago	10 y ago	Future prediction	
Alpine and sub-alpine pastures	Degrading	18	Less degraded as compared to present		More degradation	Build creeks to hold snow and rain water in pastures
Mid and low land grazing	Degrading	28	Less degraded as compared to present		More degradation	



### 3.8. Biodiversity

#### 3.8.1. Agriculture and Fruits

Climate factors such as temperature, precipitation, CO<sub>2</sub> concentrations, and water availability directly impact the health and well-being of fruit trees and agriculture crops. With increased temperature and CO<sub>2</sub>, 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 Lower Braldo. Aided to these additional stress 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 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 Lower Braldo 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 stand of Lower Braldo valley represents 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.

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

- a) Rising temperature and CO<sub>2</sub> as a consequence of climate change has impacted the local forest ecosystem of Lower Braldo by providing 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 CO<sub>2</sub> 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 Nullah 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 in Lower Braldo.
- 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 local community knows about the impact of climate change on the forest but don't know about the mitigation strategies. These strategies are needed to be designed by thorough research and impact. Long term impact of the small scale forest disturbances which cannot be observed via satellite systems must be assessed and counter measures should be adopted. 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 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 question need research based answer 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. 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 Lower Braldo valley, faunal biodiversity which was once common is now at decline. During FGD sessions the participants reported that Urial that existed in Lower Braldo over last 30 years the population of decreased significantly which refers to out migration of species either due to climate change and rapid illegal poaching. Ibex population also irrespective of conservation efforts is continuously decreasing. 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 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 decline. The apparent reasons are the absence of favorable climate for 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 the Lower Braldo 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.

**Exhibit 23: Impact of climate change on biodiversity of Lower Braldo Valley**

Biodiversity	Status	Altitudinal Shift	Trend		Adaptation Measures by local community
			30 y ago	10 y ago	
Agriculture crops and fruit trees	Degrading	N/A	Pests and crop infections were not frequent Artificial fertilizers were not	New pest varieties have been reported required	Weeds will become common Irregular precipitation patterns will lead to productivity decline Use of fertilizers has been increased
Natural Forest	Degrading	Reported for some non woody vegetation	Forest patches were dense and healthy	Degrading	No adaptation yet
<b>Wildlife</b>					
Ibex	Decreasing	Increasing	Population was good in number	Less population due to hunting and habitat shrinkage	Population will increase due to the conservation efforts Poaching and Illegal hunting is controlled due to trophy hunting initiatives but it is not the part of customary laws
Urial	N/A	--	--	--	--
Markhor	Decreasing	Increasing	Population was so less that it was rarely seen	Population was good and is increasing continuously	Population is increasing but at low rates than it should be Illegal hunting and poaching has been controlled to ensure the population increase
Birds	Decreasing	--	Population and diversity was good	Bird population and diversity was less	Bird population can either decrease due to removal of natural vegetation or it can be expected to increase due to increase in their prey No adaptations
Butterflies	Decreasing	--	Butterflies of several types were common	Due to absence of flowering plants butterflies are no more common	They will decrease because of land erosion and shrinking of natural vegetation areas Not adaptation has been done yet

### 3.9. Water

Irrigation remains central for the continued viability of Lower Braldo community and their settlements, and for the fulfillment of a majority of households' subsistence needs. Gravity-flow hill irrigation system sourcing water from glacial or snow-field melt-water, springs and/or directly from river flows are found in Lower Braldo. Owing to the recent climate changes the water availability has been changed. Snow fall has declined up to 53 % and slight increase in rainfall according to the perception of local community. The altered precipitation pattern has caused the differential availability of water during different seasons. During end summer and winter season water become scarce and leads to unsustainable water management, however during the start of summer season flood in the streams increase and irrigation channels and creates water unavailability/scarcity coupled with poor water quality.

### 3.10. Tourism

Huge domestic tourism in GB over a couple of year has provided income earning opportunity opportunities for many remote communities and it is a valuable opportunity for people of Lower Braldo valley to advertise their touristic points and manage proper facilities and services for tourist, which can help them in earning income from tourism.

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. Lower Braldo valley is not a tourism dependent because of lack of tourist attractions and facilities. The difficult terrain of treks become more rough and inaccessible with increasing extreme events and discourages the tourist activities.

However we have arranged the base camp much below - in settlement Apo Ali gon, named by the name of the old man, which has created here the irrigation structures and has transformed this place in oasis (on Pakistani standard, this settlement owed therefore refer to as Apo Ali gonabad, but everyone call simply Apo Ali gon).



# CONSERVATION MANAGEMENT ISSUES & PROBLEM OF LOWER BRALDO VALLEY







## 4. MANAGEMENT ISSUES AND PROBLEMS

Present scenario of Lower Braldo 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 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 Lower Braldo 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.

### 4.1. Agriculture

A smaller area of arable land is cultivated in Lower Braldo valley by traditional varieties of cereal and fodder crops, fruit trees and commercial trees. 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:** Average household irrigated landholding is 10 Kanals. With increasing population, arable land fragmentation is taking place and area of land holding per household is shirking year by year.
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. Situation become worse during the spring and autumn season which foster low availability of water in streams.
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 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 same in Lower Braldo 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 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 Lower Braldo 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. Farmers are 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

Majority of the pastures Lower Braldo valley is declining at rapid rates. The pasture sustainability is also facing lot of pressures from livestock more than carrying capacity, medicinal plants extraction, landslides and floods. The most common factor over last ten years is infrequent snow fall which causes declining growth of natural vegetation in alpine & sub-alpine pastures and rangeland, and largely contributing to declining livestock raring trend in the valley.

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. 60% pastures of Lower Braldo valley 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 also 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 of Lower Braldo 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 Lower Braldo 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:** Lower 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.

#### 4.3. Water

Water is the key ingredient and symbol of life. All the changes in climate pattern are directly and indirectly playing with water quantity. Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community in Lower Braldo 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.

#### 4.4. Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other 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 and resulted degradation and reduced distribution of entire forest ecosystem. It increased the wood harvesting opportunity for the local community from Lower Braldo valley 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 continuously increasing population dependence of local community is also increasing on these natural resources. Fuel wood harvest of Lower Braldo valley 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 CO<sub>2</sub> 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.

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 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 Lower Braldo valley offers.

#### 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.

*“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 27<sup>th</sup>, 2012).*

This mining provides some of the valleys around CKNP with a good opportunity to earn livelihood. In Lower Braldo valley, 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 27<sup>th</sup>, 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.

#### 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 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 decreasing in Lower Braldo is increasing and encroaching into the natural areas for settlements and agriculture. 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 INTERVENTION FOR LOWER BRALDO 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 needs 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 Lower Braldo 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 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 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 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 crops productivity and transport, optimum economic benefits from every suitable crops 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. 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

1. **Up gradation of customary laws:** Customary practices should be amended in such a way that ensure 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 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.
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 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 resources 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 Data base:** 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 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.
11. **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.

### 5.3. 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 Lower Braldo 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:** 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 Lower Braldo 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 CO<sub>2</sub> 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 seems 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 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.

### 5.6. 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.

### 5.7. 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 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 LOWER BRALDO 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 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	--
		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	--

S. No.	Consumptive uses of Park Resources.	Community practices	CKNP MP/OP rules	Recommendation
		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

## 7. RECOMMENDED ACTION PLAN FOR LOWER BRALDO 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 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 of Lack 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
				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	Activity 5.2.1	All	Urgent	Short term

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)
					organizations to ensure conservation of park resources and sustainable resource used				
					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	Suggested for inclusion in community development plans	Dasso Paeen		
					3.1.2. Provision of Medicines		Dasso Paeen	Urgent	Long term
					3.1.3. Provision of new diagnosis equipment		Dasso Paeen		
					3.1.4. Establishment of new dispensaries	Suggested for inclusion in community development plans	Biano	Urgent	Long term
					3.1.5. Awareness conferences about hygienic practices	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
					3.1.6. Dissemination of brochures and pamphlets to educate community about	Suggested for inclusion	All	Urgent	Short Term
3.	Health	3.1. Promote health facilities	Prevalence of Diseases  Lack of access community health facilities  Unhygienic practices by locals	Lack of basic health facilities in existing dispensaries Lack of sufficient dispensaries					



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)
					prevention from sporadic diseases  3.1.7. Promotion of healthy and hygienic practices by women and children through workshops, campaign and social organization	in revised MP/OP activities  Suggested for inclusion in revised MP/OP activities			
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 of Lack of alternative fuel options	4.1.1. Promotion of fuel-efficient stoves at high altitudes	Activity No. 14.2	All  Ho, Foljo, Apo Ali gon	Urgent	Short term
					4.1.2. Develop and Motivate usage of alternative sources	Activity 14.2.1.			
5.	Education	5.1. Curb electricity	Prevalence of unsustainable practices	Lack of needful development infrastructure and human resource	5.1.1. Increase the capacity of existing schools	Suggested for inclusion in revised MP/OP activities	All	Medium	Long term
					5.1.2. Creation of new educational facilities	Suggested for inclusion in revised			
							Dasso Paen and Ho	Medium	Long term

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)
						MP/OP activities			
			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
				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	6.1.4. Promotion of small-scale solar driers	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
6.	Agriculture	6.1. Lack of sufficient food and future food security	Out-migration Malnutrition and related disease						

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)
						MP/OP activities			
				Lack of jobs and economic opportunities in agriculture and related crops	6.1.5. Improvement of existing economic opportunities	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
					6.1.6. Creation of new job to enhance economic capacity of the local community	Suggested for inclusion in revised MP/OP activities	All	Urgent	Long term
				Less arable land per household	6.1.7. 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 regeneration	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	Dassu Paen  Foljo/Apo Ali gon, Nit, Teston	Medium	Medium Term

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)
8.	Pastures and Rangelands	8.1. To maintain ecologically healthy ecosystem	Depredation of livestock by wildlife	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
			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
			Uncontrolled number of livestock		8.1.2. Promotion of supplementation with stall feeding	Suggested for inclusion in revised MP/OP activities	All	High	Medium
			Insufficient growth time for pastures		8.1.3. Promotion of fodder cultivation on suitable land patches	Suggested for inclusion in revised MP/OP activities	All	Moderate	Medium term
			Poor and dangerous accessibility to pastures		8.1.4. Awareness of herders/professional shepherd about	Suggested for inclusion in revised MP/OP activities	All	High	Short term
			Over grazing Degraded pastures resulting in loss of food for Wildlife						

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)
					sustainable practices Revive the use of indigenous grazing system		All	Urgent	Short term
					8.1.5. Research studies about the carrying capacity and adaptability of Pasture to climate change	Activity No. 9.2.1.	All	Urgent	Long Term
			Unknown Carrying capacity	Lack of Research studies	8.1.6. Establishment of enclosure to measure productivity with surrounding pastures	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	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	9.1.1. Enhance productivity through Reforestation and afforestation  9.1.2. Promotion of farm forestry	Suggested for inclusion in revised MP/OP activities	All  All	Urgent	Long Term





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)
				Lack of eco-tourism opportunities	threatened species wildlife 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- Activity No. 6.1.3	Ho, Foljo, Apo Ali gon  All  All  All  All	High  High  High  High  Moderate	Medium term  Short term  Long Term  Medium term  Long term
11.	Tourism	11.1. Promotion of tourism as a sustainable economic avenue	Loss of economic opportunities Loss of support for conservation and development opportunities	Poor structure of Skardu - Askoli road Insufficient facilities of road and stay	11.1.1. Maintenance of road throughout the touristic season	Suggested for inclusion in revised MP/OP activities  -do-	All  All	High  High	Short term

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)
				Lack of interpretation of resources i.e. Hot springs Lack of 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 11.1.5. Establishment of bath rooms, rest area and promotion of hot springs sites	-do-  -do-  -do-		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 12.1.3. Establishment of new water supply scheme	Suggested for inclusion in revised MP/OP activities	All  All  Foljo, Chaqpo, Dasso	High	Long term

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)
13.	Mining	13.1. 11.1. 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 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.	Suggested in community development plans	Teston	Medium	Short term
					13.1.2. Enhance the direct linkages between local miners and market	-do-	All	Medium	Short Term
					13.1.3. Establishment of local service units for gem cutting and polishing	-do-	All	Medium	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 Shigar, 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 Shigar and CKNP Directorate. The DFO Shigar 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 Shigar and endorsed by the chairman of DCC with recommendations from CKNP Director and DFO Shigar. The DCC Shigar 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 Shigar, 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 Shigar, 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 Shigar 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

## Upper Braldo Valley

### Central Karakorum National Park

#### Gilgit Baltistan







# CONSERVATION AND SUSTAINABLE DEVELOPMENT PLAN 2016-2026

## UPPER BRALDO VALLEY

## CENTRAL KARAKORAM NATIONAL PARK

## GILGIT-BALTISTAN



**Citation:** Naureen Mustafa, Muhammad Aurang Zaib, Ghulam Musa Shimshali, Ashiq Ahmad Khan, Maurizio Gallo, Arif Hussain, Riaz Ul Hassan, Elisa Vuillermoz, Luca Listo, Muhammad Raza, Nadeem Nazar, Yasir Abbas, Aman Ullah Khan, Ruby Pyara, Raja Abid and Yasir Abbas Rizvi. (2016). Conservation and Sustainable Development Plan for Upper Braldo valley of CKNP. Ev-K2-CNR Pakistan, 66 pages.

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[www.cknp.org.pk](http://www.cknp.org.pk)

## PLAN EDORSEMENT

Signed by President LSO Upper Braldo

.....

Endorsed Director CKNP

.....

Approved by Deputy Commissioner/

.....

Chairman District Conservation Committee

for Shigar in ..... meeting

held .....

Dated.....

## CONTENTS

ABBREVIATIONS .....	i
1. Introduction of Upper Braldo Valley .....	1
1.1. Locality of Upper Braldo.....	1
1.2. Ecological Profile of Upper Braldo Valley .....	1
1.3. Socio-economic Profile of Upper Braldo Valley.....	3
1.3.1. Demography of Upper Braldo Valley .....	3
1.3.2. Road Access .....	5
1.3.3. Education facilities .....	5
1.3.4. Health facilities .....	5
1.3.5. Veterinary facilities .....	6
1.3.6. Electricity .....	6
1.3.7. Traditional Governance System.....	8
2. Assessment of Customary Practices for sustainable use of natural resources.....	13
2.1. Requirement of revitalization of indigenous knowledge .....	13
2.2. Water .....	13
2.3. Agriculture .....	15
2.4. Livestock .....	19
2.5. Pastures.....	24
2.6. Fuel Wood Collection/ Timber Harvesting.....	28
2.7. Tourism.....	32
3. Assessment of Climate change impact on natural resources .....	35
3.1. Climate Change in the perspective of Indigenous knowledge .....	35
3.2. Temperature variability and seasonal shifts .....	35
3.3. Precipitation .....	35
3.4. Drought .....	36
3.5. Flood .....	36
3.6. Landslides .....	36
3.7. Pastures.....	37
3.8. Biodiversity.....	38
3.8.1. Agriculture and Fruits.....	38
3.8.2. Forest .....	38
3.8.3. Wildlife and associated biodiversity .....	39
3.9. Water .....	39
3.10. Tourism .....	40

4. Management issues and problems.....	45
4.1. Agriculture.....	45
4.2. Pasture.....	46
4.3. Water.....	47
4.4. Forest and NTFP Issues .....	48
4.5. Eco-tourism.....	48
4.6. Wildlife and Protected areas.....	49
5. Proposed Management Interventions.....	53
5.1. Agriculture.....	53
5.2. Pasture.....	55
5.3. Water.....	56
5.4. Forest and NTFP .....	57
5.5. Eco-tourism.....	58
5.6. Wildlife and Protected areas.....	58
6. Statuary Vs Customary Practices In Upper Braldo Valley.....	60
7. Recommended Action Plan for Upper Braldo Valley.....	62
8. Implementation and Monitoring Mechanism.....	73
8.1. Implementation Mechanism .....	73
8.2. Monitoring Mechanism.....	73
8.2.1. CKNP Directorate .....	73
8.2.2. District Conservation Committee Meetings.....	74
8.2.3. Community Agreements.....	74
8.2.4. CBCSDOs Audit and Record Keeping .....	74
8.2.5. CBCSDO Visitor Diary .....	74
8.2.6. Relevance in Assignments.....	74
8.2.7. Network of CBCSDOs .....	75



## LIST OF EXHIBITS

Exhibit 1: Village locations of Upper Braldo Valley, 2016 .....	1
Exhibit 2: Map of Upper Braldo Valley .....	2
Exhibit 3: Demographic profile of Upper Braldo valley .....	3
Exhibit 4: Demographic map of Upper Braldo Valley.....	4
Exhibit 5: Demographic graph of Upper Braldo Valley, 2016 .....	5
Exhibit 6: Socio-economic Profile of Upper Braldo Valley .....	7
Exhibit 7: Land Cover Map of Upper Braldo Valley .....	14
Exhibit 8: Economic benefits of agriculture production.....	15
Exhibit 9: Need fulfillment by Agriculture in Upper Braldo Valley, 2016.....	18
Exhibit 10: Contribution of livestock in economics of Upper Braldo Valley .....	21
Exhibit 11: Livestock Population and income of Upper Braldo Valley:.....	23
Exhibit 12: Assessment of grazing pressure from each livestock classes on pastures of Upper Braldo Valley .....	25
Exhibit 13: Grazing Pressure by livestock on pastures of Upper Braldo .....	27
Exhibit 14: Timber harvesting and use at Upper Braldo valley .....	29
Exhibit 15: Summary of Fuel Wood harvest and Consumption in Astak Valley .....	29
Exhibit 16: Annual fuel wood harvest, Upper Braldo .....	30
Exhibit 17: Details of fuel wood harvested per household from several sources (Mg/HH/Year) .....	31
Exhibit 18: Assessment of required reforestation to compensate fuel needs in Upper Braldo Valley .....	31
Exhibit 19: Impact of Climate Change at Upper Braldo Valley in the Perspective of Indigenous Knowledge .....	37
Exhibit 20: Impact of Climate change on the pastures.....	38
Exhibit 21: Impact of climate change on Biodiversity of Upper Braldo 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 UPPER BRALDO VALLEY

## 1.1. Locality of Upper Braldo

Braldo valley is situated in UC Braldo, Tehsil and District Shigar at a distance of 135 km from the district Headquarter Sakardu, and is accessible by a link road. It provides gateway to K2 and many other gigantic peaks. Due to its location at extreme North-eastern of CKNP, it is one of the isolated and the far-flung areas of Baltistan region. It comprises of nine villages naming Askoli, Chungo, Hoto, Korfe, Pakura, Sino, Mongron / Testy, Thongal and Surungo. Upper Braldo starts 40 Km north of Shigar valley and is one of the secluded and scanty inhabited valleys. To enter the Braldo Valley, one must take after the Jeep trail gradually turning towards north. Upper Braldo is wrapped in snow-secured crests and biggest icy masses outside polar region. In any case, there is nothing equivalent to the awesome perspective of these glaciers. Braldo has the qualification of being the minimum meddled with, of all settlements of Baltistan, and one of the last few surviving social settlements of Baltistan from the perspective of indigenous practices. The culture is still untouched by the winds of progress and modernization, Upper Braldo is presently a most loved destination for trekkers.

**Exhibit 1: Village locations of Upper Braldo Valley, 2016**

Villages	Coordinates		Elevation (m)
	N	E	
Askoli	35°40'56.4"	075°48'59.8"	3046
Chungo	35°41'24.1"	075°44'0.4"	2995
Hoto	35°41'14.0"	075°43'44.4"	2959
Korfe	35°40'30.0"	075°4'839.10"	3015
Pakura	35°41'50.0"	075°42'43.2"	2963
Sino	35°40'42.0"	075°46'5.5"	2985
Testy/Mongron	35°40'56.4"	075°48'59.8"	2998
Thongal	--	--	--
Surungo	35°39'44.6"	075°51'06.1"	3116

## 1.2. Ecological Profile of Upper Braldo Valley

Upper Braldo is a narrow valley with villages located on terraces several meter above the Braldo River. All villages' clusters just like oases in the semi desert environment. Most vegetation is of xeric type and adapted to cold and harsh climatic conditions. Forest cover is fragmented and sparse with lower densities, stand biomass and increments both due to harvest pressure and extreme climate. Forest cover comprises of dry temperate coniferous and sub-alpine broadleaved. Adapted to this cold-xeric habitat are the *Artemisia* shrub-land including *Agrostis* spp, *Astragalus* spp. and trees like Juniper and Birch. Broadleaved species as willows (*Salix* spp.), poplars (*Populus* spp.), sea-buckthorns (*Hippophae rhamnoides* spp.) and Tamarix (*Tamarix ramosissima*) are the prominent species.

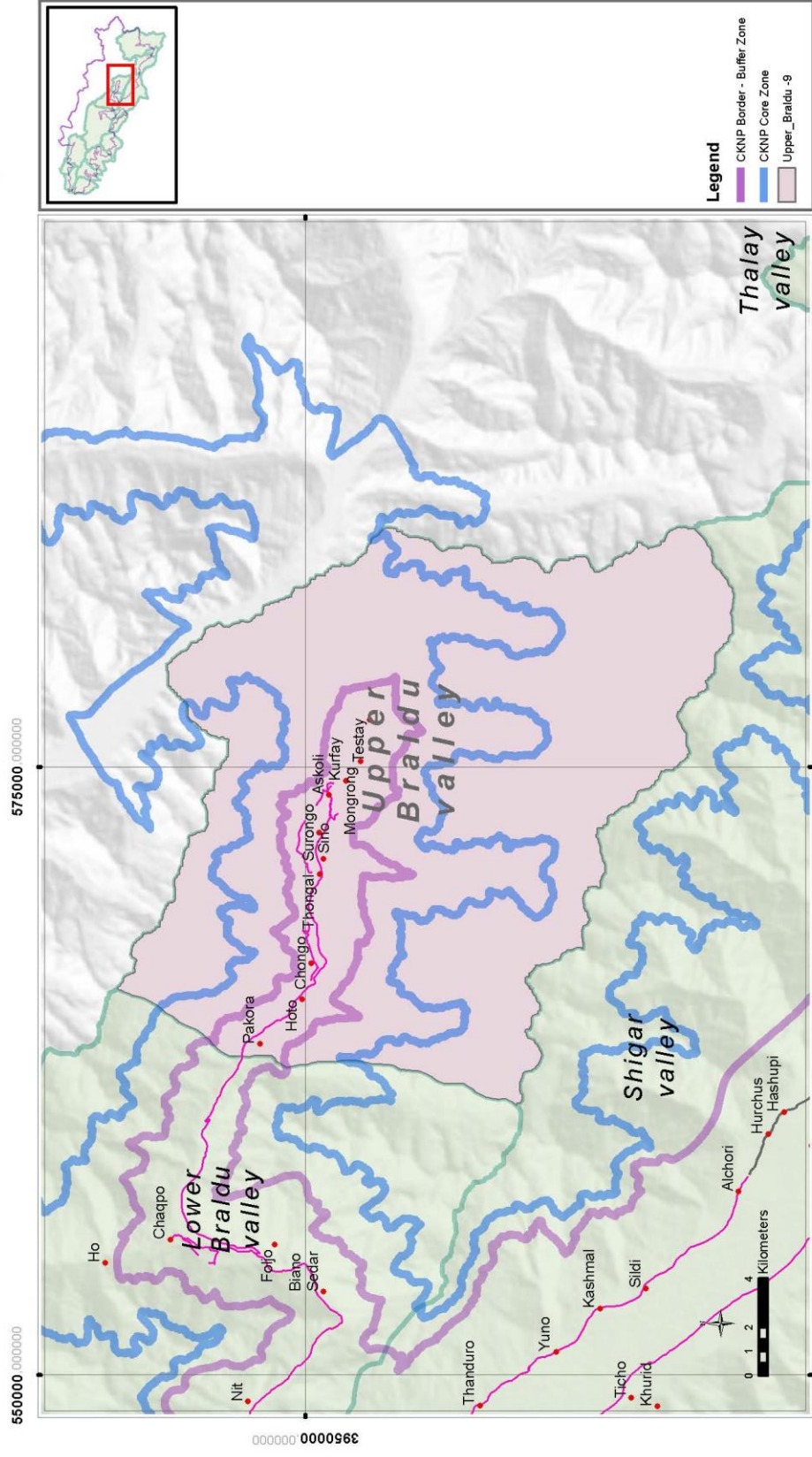


Exhibit 2: Map of Upper Braldu Valley

Scenic pastures with patches of Birch and Juniper forest abound in aromatic and medicinal herbs like Artemisia and Sea buckthorn add to the ecological and aesthetic value of the valley. Snow accumulation and avalanche guarantee water availability throughout the short growing season (June-September). Inhabiting these sparse, fragmented forests and pastures in snow covered peaks are Snow leopard, Wolf, Brown bears, Marmots, Markhor and Ibex and several species of birds and butterflies. Reptiles such as Black Augama has also been observed while basking on the stony patches during day time.

Valley falls in single cropping zone with main crops being wheat and barley. Minor crops include wheat, buckwheat and millet, and peas but they ripe fully. Numerous fruit trees especially apricots in variety are grown in gardens or along irrigation channels. Farm lands and gardens are fenced with stone walls and thorny hedges for protection against livestock. Irrigated and stone walled meadows are situated at the edge of the cultivated areas, mostly at steep slope or at places with poor soil quality. Agriculture depends entirely on irrigation. Apart from a few exceptions, land holdings are very small; therefore, many households barely meet subsistence needs.

### 1.3. Socio-economic Profile of Upper Braldo Valley

#### 1.3.1. Demography of Upper Braldo Valley

According to the survey conducted for VCSDPs development, there is some increase in population. The total population of the valley is 3557 of which 1807 are females and 1650 males with average male to female ratio of 0.90. All these villages are based around buffer area of CKNP which spans 2757.88 m<sup>2</sup> and serves as reserves of natural resources for the local people and transitional area between park and local communities. This local community depends heavily upon natural resources both for subsistence and income.

**Exhibit 3: Demographic profile of Upper Braldo valley**

Village	No. of HH	Average HH size	Population	Male	Female	Male: Female
Askoli	72	9	654	307	347	1.2:0.8
Chungo	34	9	306	146	160	1.1:0.9
Hoto	32	7	224	108	116	1.1:0.9
Korfe	40	8	335	160	175	1.1:0.9
Pakura	42	8	336	106	130	1.2:0.8
Sino	50	7	355	175	180	1.1:0.9
Testy/ Mongron	68	9	622	307	315	1.1:0.9
Thongal	55	8	440	207	233	1.1:0.8
Surungo	35	8	285	134	151	1.1:0.8
<b>Total</b>	<b>428</b>	<b>8</b>	<b>3557</b>	<b>1650</b>	<b>1807</b>	<b>1.1:0.9</b>



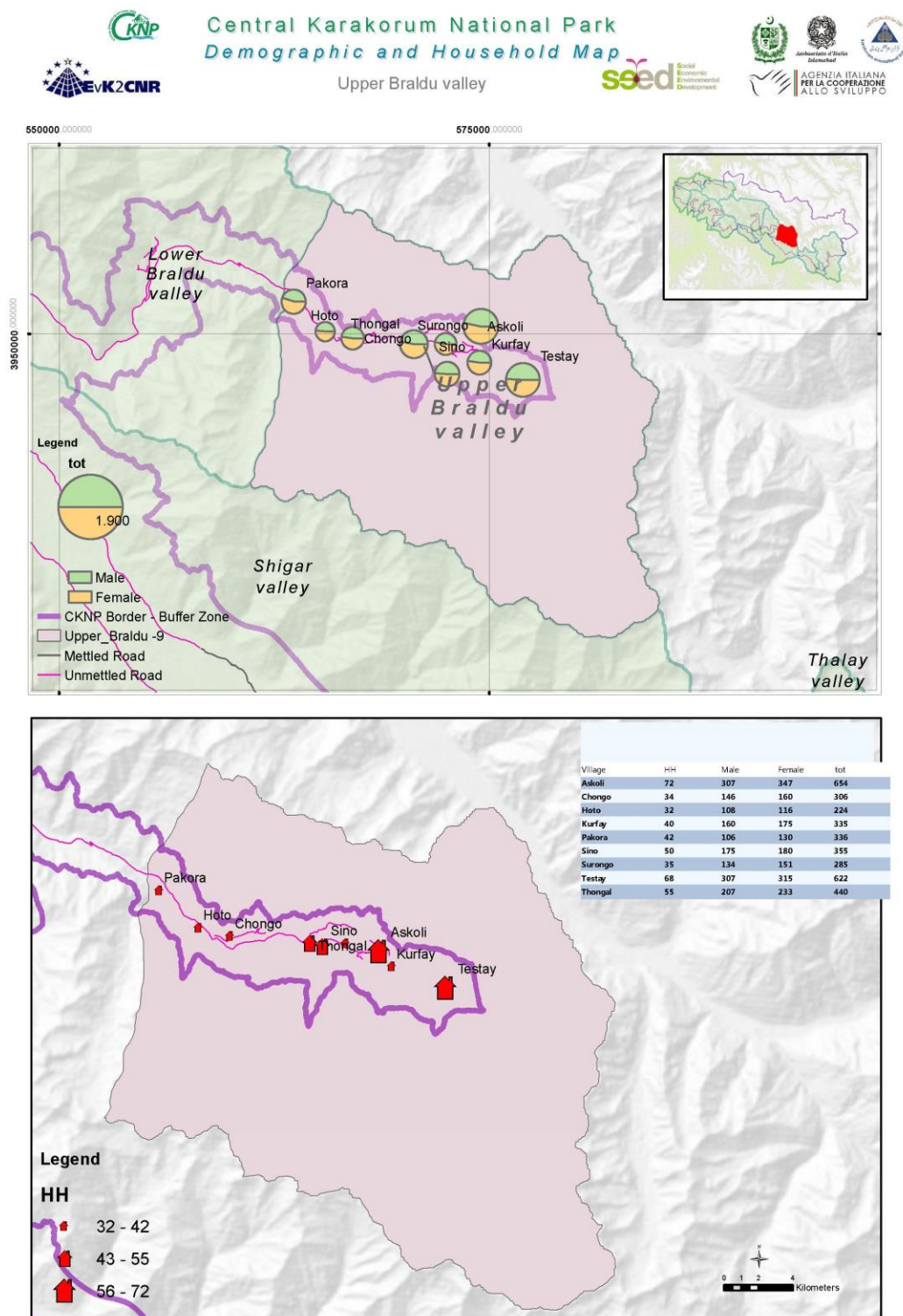
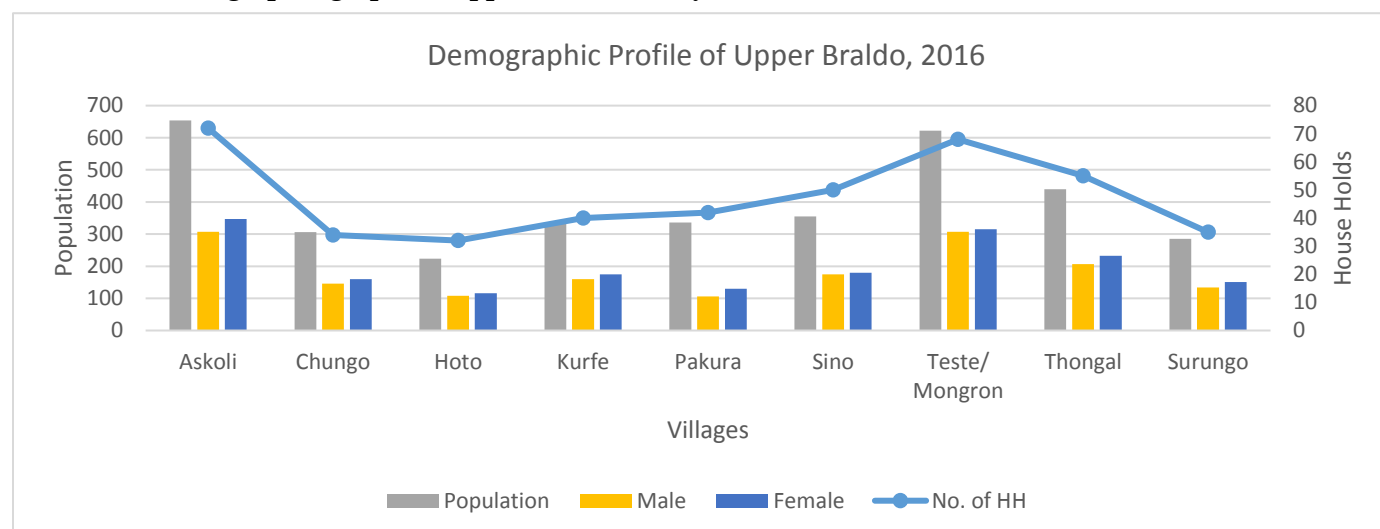


Exhibit 4: Demographic map of Upper Braldo Valley

**Exhibit 5: Demographic graph of Upper Braldo Valley, 2016**



### 1.3.2. Road Access

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 communication with the outside world. This lack can be attributed to difficult topography and low population densities in respect to lowland areas, factors that increase investment and maintenance costs. Upper Braldo valley is connected to downtown by Sakardu – Askoli road, which is a 120 km dusty, rough and jagged jeep able road. Jeep takes seven hours, so basically a whole day. Except Skardu - Askoli road, the road infrastructure is literally absent in Upper Braldo Valley.

### 1.3.3. Education facilities

Being very remote and one of the most isolated valleys of the CKNP, Askoli and Korfe villages have the education facilities up to middle schools both for boys and girls being run by both public and private sectors. There is one primary school in Sino village only for boys, rest of the villages have primary school facilities both for boys and girls. The students of higher and secondary school education move to Shigar or Skardu.

### 1.3.4. Health facilities

The public health infrastructure is really weak in Upper Braldo valley even though the population is in great need of medical assistance and health education owing to a series of endemic diseases caused by poor sanitation and unhealthy habits.

There is one government dispensary in Askoli and one NGO managed health facility (Lorenzo Mazzoleni Dispensary) as well and there is one dispensary in Hoto, and rest of villages have to visit these facilities or they have to go Dasso, Shigar or Sakardu. There is one dispensary between Testy and Mongron but that is not functional and the one in Askoli is without basic facilities, like the building is damaged and in very bad shape and there is no electricity. Lorenzo Mazzoleni Dispensary is the main health care center in the area providing medical services to people.

Amid open discussions, ladies referred an increment in the rate of respiratory illness and skin hypersensitivities. Particularly pregnant ladies and young kids are more inclined to fall prey to these ailments. An overall decline in health is reported during group discussions in both genders as compared to past. Disease appearance in community is attributable to seasonal shift, poor health facilities and several other environmental pressures.

### **1.3.5. Veterinary facilities**

Veterinary facilities like dispensary is available only in Askoli village that is also not so much functional. Non-governmental organizations like Ev-K2-CNR in their last project SEED phase I had a massive livestock vaccination campaign in the valley. People mostly take their animals to Shigar or Skardu or NGOs run vaccination campaigns. People also avail the services of private vet technicians in case of any problem or disease outbreak. The common diseases of the livestock are pneumonia, FMD, mastitis, mange and enterotoxaemia. The main causes of year-round mortality are diseases, predation, winter starvation and casualties (falls, avalanches). In predation most of the animals are infected by the wolf.

### **1.3.6. Electricity**

All the villages in Upper Braldo 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. 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.

**Exhibit 6: Socio-economic Profile of Upper Braldo Valley**

Village	Education Facilities			Health facilities		Veterinary facilities	Electricity
	Category / Level	Ownership	Gender	Geographic Location	Facility	Geographic Location	
Askoli	Middle	Govt. and private both	Both girls and boys	N 35°40'56.2" E 75°48'56.6" 3072 m asl	Dispensary	N 35°40'46.2" E 75°49'21.7" 3005 m asl	Yes Community take their livestock to Shigar vet facility
Chungo	Primary		-do-	N 35°41'22.3" E 75°44'23.1"	-	-	Yes Community take their livestock to Dasso paeen vet facility at Lower Braldo
Hoto	Primary	Public	-do-	N 35°41'14.0" E 75°43'44.4" 2959 m asl	Dispensary	N 35°41'28.3" E 75°43'41.7" 2830 m asl	Yes Community take their livestock to Skardu vet facility
Korfe	Primary and Middle	Govt.	-do-	N 35°40'32.8" E 75°48'39.1" 3017 m asl	Dispensary	36°06'19.9" 74°48'49.0" 3007 m asl	Yes Community take their livestock to Skardu vet facility
Pakura	Primary	Public	-do-	N 35°41'51.4" E 75°42'43.4" 2963 m asl	-	-	Yes No facility, community take their livestock to Skardu vet facility
Sino	Primary	Govt.	Boys	N 35°40'56.6" E 75°47'51.4" 3052 m asl	-	-	Yes No facility, community take their livestock to Dasso paeen vet facility at Lower Braldo
Testy/Mongron	Primary	Private	Both girls and boys	N 35°39'39.0" E 75°50'59.3" 3005 m asl	Dispensary	-	No No facility, community take their livestock to Shigar vet facility
Thongal	Primary	Govt. and private both	-do-	N 35°41'30.5" E 075°48'09.7" 3147 m asl	-	-	Yes No facility, community take their livestock to Askoli vet facility
Surungo	Primary	Private	-do-		-	-	Yes No facility, community take their livestock to Mongron vet facility

### 1.3.7. 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.

There is LSO working in Upper Braldo Valley named as Braldo Local Support Organization. Braldo LSO was formed by AKRSP with the support of Ev-K2-CNR in SEED project phase I and provided financial and managerial support. VCCs, VOs and WOs are also working but due to the community's internal conflict their performance is being hampered so that's why their visibility and coherence is really weak. There are also some VOs having political and religious backgrounds. In the context of natural resource management these organizations facilitate the meetings, execution of activities, monitoring and decisions related to community resources and resolve conflicts i.e. Sino and Hoto villages are in conflict over pasture use rights. The community seems not satisfied with their performance and not so much functional especially if there is no NGO driven project. Ev-K2-CNR with AKRSP as an implementing partner established LSO Upper Braldo with 33 % women's membership set as a mandatory obligation and provided with technical and financial support.

**Askoli:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Youth organization and Valley Conservation Committee

**Chungo:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Valley Conservation Committee and a religious student organization.

**Korfe:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization and Valley Conservation Committee. The VO is facing serious financial crisis.

**Pakura:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization and Valley Conservation Committee.

**Sino:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Youth organization and Valley Conservation Committee.

**Mongron/Testy:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Youth organization and Valley Conservation Committee

**Surungo:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Youth organization and Valley Conservation Committee.

**Thongal:** Along with LSO Braldo other social organizations working in the village are: Village organization, Women organization, Youth organization and Valley Conservation Committee





# 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 integral component of a cultural complex that incorporates language, nomenclature, resource use practice, cultural and worldview. 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 it 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

Inhabitants of Upper Braldo valley has established complex irrigation mechanism or water system frameworks and agricultural fields in a long process of water channel development, land leveling and improvement. The glacial melt water is extracted from nearby stream or Nullah following gravitational force and brought to agriculture fields through open water channels. The water related systems and frameworks contrast from one valley to other but water distribution mainly depends upon its availability. In case of water shortage, the usage rights rotate between different agriculture fields and household areas or villages while the usage right within the community is restricted; households get water for a particular time span irrespective of their land holdings. Mostly due to extreme winter season or due to natural hazard, irrigation channels need continuous maintenance. Customary rules say that every farmer has to take the responsibility of water channel maintenance and its discharge point in order to avoid any

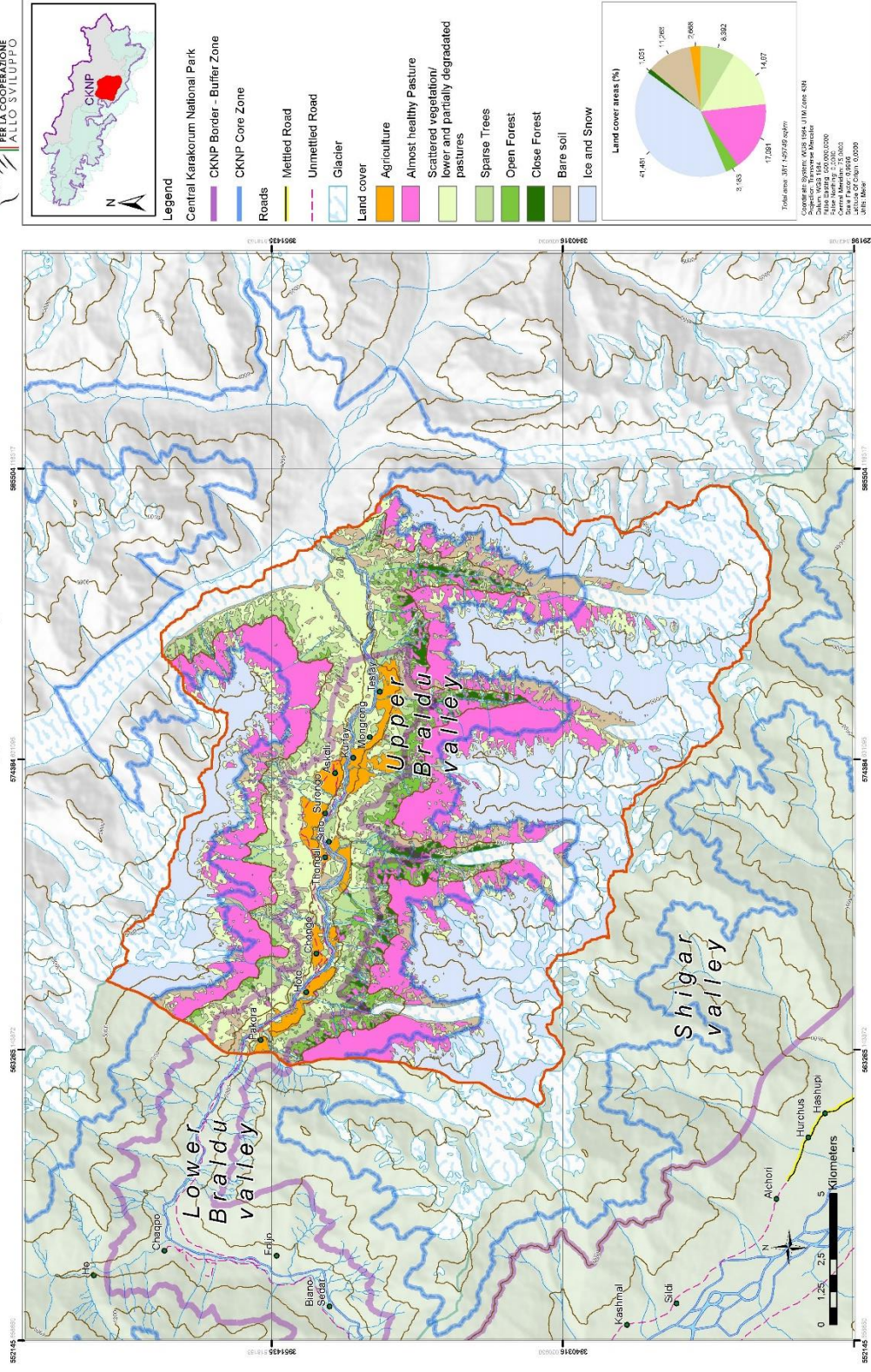


Exhibit 7: Land Cover Map of Upper Braldu Valley

potential harm to affiliated fields. Repair work of the main channel is an obligation for water utilizer group. Each household need to assign one male worker for this task and in case of noncompliance they are fined. Up keeping of channel includes removal of rocks, sediments, silt, anthropogenic matter and repair of side walls.

### 2.3. Agriculture

There is subsistence agriculture in Upper Braldo valley, the most important crops are wheat, buckwheat, barley, millet, vegetables (peas) and fruits (apricots) are grown in several different local and adopted varieties. The Upper Braldo is a single cropping zone because of the short growing season due to harsh climate which does not allow another cropping cycle. Agriculture in Upper Braldo is both irrigated and rain fed. Indigenous cultivars and even the wild relatives of numerous crops are grown with the possibility of “Food for own” but the yield is very low. In average each house hold has 10 Kanals of cultivated land. In the cultivated land most of the people grow wheat and vegetables.

In Upper Braldo valley local farmers have developed terraced patches of agriculture fields through land reclamation at different altitudes around their settlements which is often highly fragmented landscapes. Besides protecting and improving the existing cropping system, terraces provide new planting niches with favorable conditions for specialty crops or for establishing valuable trees. For example, farmers plant fruit and nut trees along the edges of terrace rises and thereby allow the successful establishment of tree crops to manage scarce plain area. The size for the agriculture fields decides the limits for mechanization such as manual tilling or mechanized tilling. To maximize agriculture production conservation tillage in addition to animal manure has also been practiced by local farmers in Upper Braldo valley to avoid erosion and increase in fertility.

The existing status of agriculture in Upper Braldo is miserable and requires quick consideration. Primitive local cultivars, absence of good soil management techniques and post-harvest losses are reasons of poor crop production. Small land holding, quality seed, conventional agricultural frameworks, and untrained manpower are the major obstructions in venture to dynamic cultivation. Outdated practices, indigenous seed varieties and post-harvest losses are very common and thus bringing on the decrease in quality and perishing the items before marketed.

**Exhibit 8: Economic benefits of agriculture production**

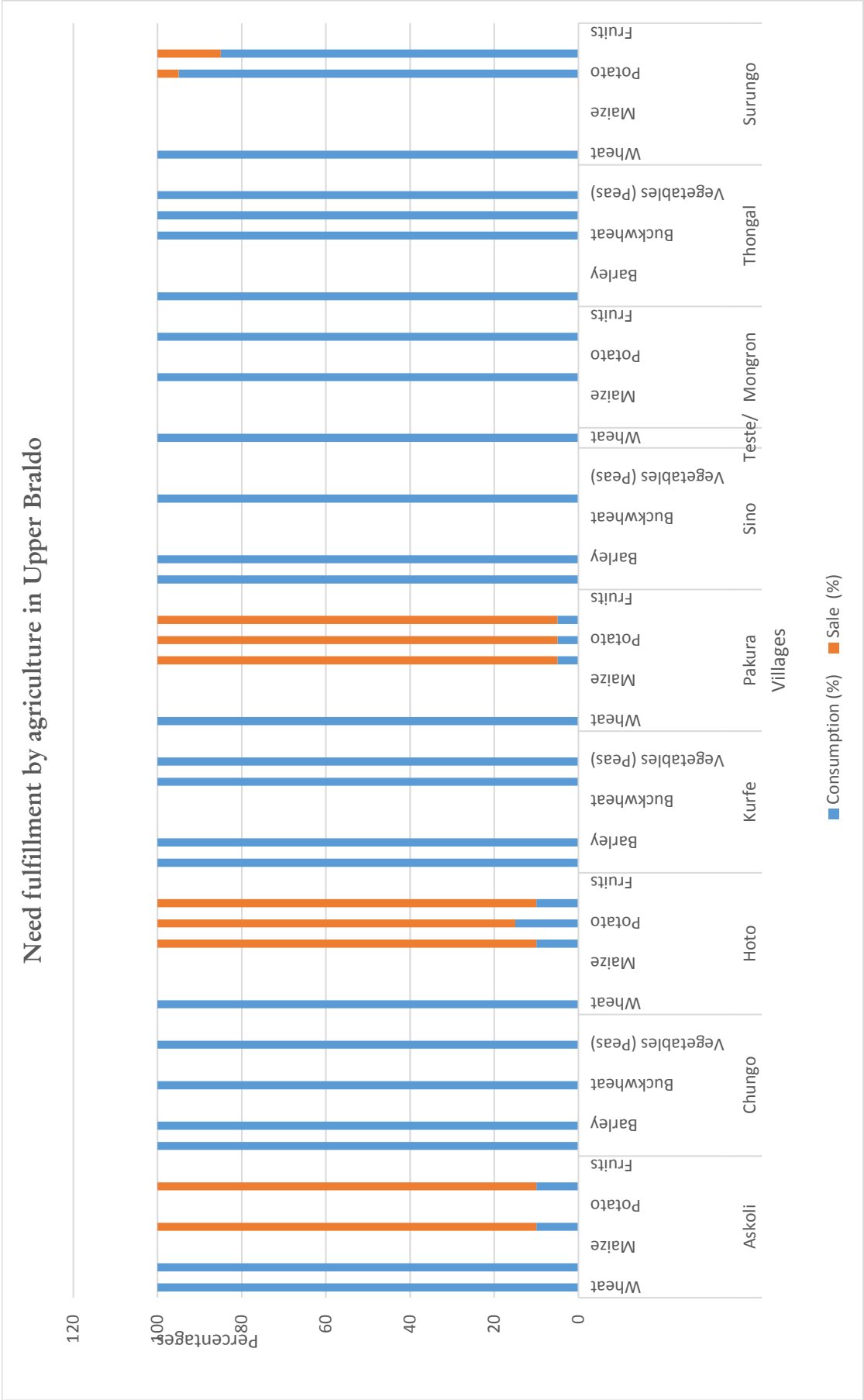
Village	Crop	Consumption (%)	Sale (%)	Av. Income/HH	Av. Value/HH
Askoli	Wheat	100	-	7000	504000
	Barley	100	-		
	Maize	-	-		
	Buckwheat	10	90		
	Potato	-	-		
	Vegetables (Peas)	10	90		
	Fruits			60000	2040000



Chungo	Wheat	100	-	10000	3200000
	Barley	100	-		
	Maize	-	-		
	Buckwheat	100	-		
	Potato	-	-		
	Vegetables (Peas)	100	-		
	Fruits				
Hoto	Wheat	100	-	20000	800000
	Barley	-	-		
	Maize	-	-		
	Buckwheat	10	90		
	Potato	15	85		
	Vegetables (Peas)	10	90		
	Fruits				
Korfe	Wheat	100	-	25000	1050000
	Barley	100	-		
	Maize	-	-		
	Buckwheat	-	-		
	Potato	100	-		
	Vegetables (Peas)	100	-		
	Fruits				
Pakura	Wheat	100	-	6000	1470000
	Barley	-	-		
	Maize	-	-		
	Buckwheat	5	95		
	Potato	5	95		
	Vegetables (Peas)	5	95		
	Fruits	100	0		
Sino	Wheat	100	-	6000	1470000
	Barley	100	-		
	Maize	-	-		
	Buckwheat	-	-		
	Potato	100	-		
	Vegetables (Peas)	-	-		
	Fruits	-	-		
Testy/ Mongron	Wheat	100	-	6000	1470000
	Barley	-	-		
	Maize	-	-		
	Buckwheat	100	-		
	Potato	-	-		
	Vegetables (Peas)	100	-		
	Fruits	-	-		

Thongal	Wheat	100	-	8000	825000
	Barley	-	-		
	Maize	-	-		
	Buckwheat	100	-		
	Potato	100	-		
	Vegetables (Peas)	100	-		
	Fruits	-	-		
Surungo	Wheat	100	-	40000	1754000
	Barley	-	-		
	Maize	-	-		
	Buckwheat	-	-		
	Potato	95	5		
	Vegetables (Peas)	85	15		
	Fruits	-	-		

Exhibit 9: Need fulfillment by Agriculture in Upper Braldo Valley, 2016



## 2.4. Livestock

Livestock herding is one of the major sources of livelihood in the CKNP buffer zone. CKNP buffer zone livestock constitutes 20% of the total head of livestock in Gilgit Baltistan, which according to current VCSDP survey are 30205 animals in nine villages of Upper Braldo valley.

The general population of Braldo Valley makes their earnings from subsistence agricultural farming and animal domestication. They keep diverse sort of animals including Diverse sorts of sheep, goat, bull, zo, zomo, yak, yakmo and poultry breeds. The majority of the cattle in Upper Braldo are local the Braldo valley are, however a portion of the general population likewise raise Jersey dairy cattle and for breeding purpose yaks and bulls are being used. Artificial insemination is just an exception. Wheat straw, grasses and leaves are stored and fed to animals in winter. The regular diseases of the domesticated animals are pleura pneumonia, FMD, mastitis, mange, endo parasites and enterotoxaemia. The primary driver of year-round mortality are illnesses, predation, winter starvation and losses (falls, Avalanches). The people of Braldo Valley mainly drive their livelihoods from subsistence farming and livestock. According to survey the animals rearing trend is still increasing in Upper Braldo.

In March and April, stockholders take their herds on daily movements to the transitional pastures but not sufficient for the livestock all villages of Upper Braldo. All animals are collected and given to a few men who take them up to high elevated pastures. On daily movements the flocks are driven to high elevated meadows following the receding snowline as 4500 m. The timing of herding in different parts of the alpine pastures may vary, reflecting perceptions of the value of grass in different places.

The newly born calves, lambs and kids and as well as one or two lactating animals per household for daily milk supply are retained at villages during the whole summer. They are fed with fresh grass and weeds removed from the fields by women. The village community or in some cases the village elderly select a village guardian who protects the crops to ensure that no animal enter any field until the fields are harvested. The guarding usually serves for one year and receives 5kgs of wheat per household as payment for his duty. In addition, if he catches grazing animals in the fields, he receives fines from the owner of a specific animal.

In autumn, when the livestock are driven down from the high pastures, they are turned on to the fields to graze on the stubble. Dried apricots of lower quality are given to them in evening as kind of reward so that they return to stables. Kind of fodder to the livestock during the winter depends not only its availability but also on many beliefs about the appropriate forms and amount of fodder to be given to particular types of animals. Cattles and cross bred are fed straw, and sometimes a little grain. Pregnant cattle are given supplementary fodder, hay, some flour, apricot nuts and sometimes eggs. Generally, all livestock lose weight during the winter. Since the traction power of zo is needed for plowing, they are fed barley and sometimes even apricot oil as supplement three weeks before plowing starts in early spring. Goats and sheep are fed leaves of fruit and other trees during October and November. Women or children tear leaves off the trees or beat the branches with long stick so that the leaves fall down and can be eaten

by the stock. During the winter goats are fed hay, dried leaves, and herbs from weeding, sometimes apricot kernel of low quality and also millet straw, when available.

Non lactating goats and all sheep from village are moved to high pastures at a fix day by some villagers while cattle and zomos are driven to high pastures individually by stockholders themselves. On the bloq, however, the livestock is tended by a fix number of villagers who work there as herdsmen on a rotational basis. If animals are killed due to illness, accident, predators or other natural events the herdsmen don't have to pay any compensation to the owner. If animal has to be slaughtered due to any accident or illness, injury, herdsmen are allowed to take the heart and liver while rest of the meat is given to owner. Animals born in high pastures belongs to owner, he usually gives a small reward to the herdsmen. All animals are marked by scratches on their horns, paint spots on the hides, marks in the ear. This herdsmen arrangement on pay basis is practiced when a particular household is short of men or does not want to send a household member to tend the livestock on bloq or brokh.

For breeding purpose there is usually one bull in each village and owned by the whole village community and usually bought at the age of 2 to three years. Only bull at the age between four and eight years is suitable for cross breeding while old ones are sold, and from the profit a new younger bull is bought. During winter, bull is held within the stable of one household which receives one basket of straw from every household for the feeding of the animal. Farmers from the same village don't have to pay anything while people from other villages without a village bull must give some money for that purpose.

The different pasture settlements vary significantly in size and construction but all of them show the similar features. Such a permanent pasture settlement consists of one or more clusters of small stone built living huts with associated cattle sheds and pens for the livestock. They are just below the main grazing grounds, mostly with a permanent stream close by. The huts are relatively small, irregular in shape, windowless, and with a low roof pole, rafters and stone slabs covered with turf. Unlike other regions in Karakoram, stables and huts are not privately, but commonly owned and are used by the whole village community.

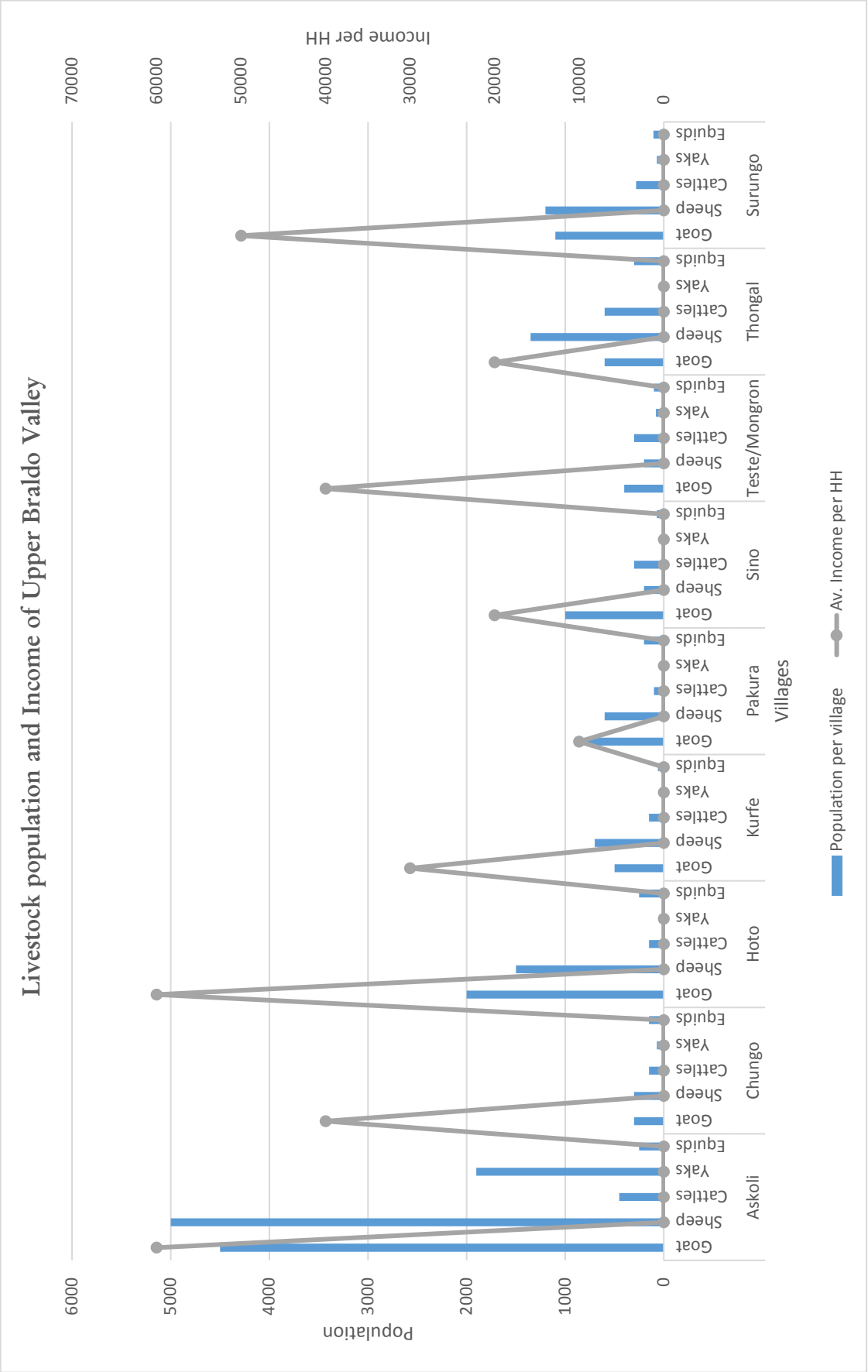
**Exhibit 10: Contribution of livestock in economics of Upper Braldo Valley**

Villages	Kind of livestock	Population per village	Population per HH	Av. Income per HH/yr	Rearing trend
Askoli	Goat	4500	63	60000	Increase
	Sheep	5000	69		
	Cattles	450	06		
	Yaks	1900	26		
	Equids	250	3.5		
Chungo	Goat	300	09	40000	Increase
	Sheep	300	09		
	Cattles	150	04		
	Yaks	70	02		
	Equids	150	04		
Hoto	Goat	2000	60	60000	Increase
	Sheep	1500	40		
	Cattles	150	05		
	Yaks	50	02		
	Equids	250	08		
Korfe	Goat	500	12	30000	Increase
	Sheep	700	18		
	Cattles	150	04		
	Yaks	40	01		
	Equids	60	01		
Pakura	Goat	800	20	10000	Increase
	Sheep	600	14		
	Cattles	100	03		
	Yaks	-	-		
	Equids	200	06		
Sino	Goat	1000	10	20000	Decrease
	Sheep	200	06		
	Cattles	300	09		
	Yaks	05	-		
	Equids	70	03		
Testy/Mongron	Goat	400	08	40000	Increase
	Sheep	200	04		
	Cattles	300	06		



	Yaks	80	08		
	Equids	100	02		
Thongal	Goat	600	10	20000	No change
	Sheep	1350	25		
	Cattles	600	10		
	Yaks	10	-		
	Equids	300	05		
Surungo	Goat	1100	31	50000	Inc.
	Sheep	1200	34		
	Cattles	280	08		
	Yaks	70	02		
	Equids	105	03		

Exhibit 11: Livestock Population and Income of Upper Braldo Valley:



## 2.5. Pastures

In Baltistan, the pastures along the Biafo and Baltoro glaciers are grazing grounds for villagers of the upper Braldo Valley who were subjects of the Raja of Shigar. However, now the Raja exerts little control over the remote Braldo Valley. The villagers of the Braldo were effectively left alone to tend their livestock in summer pastures along the glaciers. Transhumance of local livestock population to this high-altitude area is a common practice all over the study area during the summer months.

Animal rearing dominates land use with pastures and water management being guided by customary rules in Upper Braldo Valley. This kind of common pool resources often prompts conflicts, for instance the communities of Sino and Hoto villages are in conflict over pasture use rights. Communities depend upon pastures for livestock herding, fuel wood collection, medicinal plants harvest and other consumable products.

Alpine Meadows and extended grasslands (high pastures) above or near tree line are accessible only for short time period which is peak summer season. Traditional rights of communities in these pastures are usually well defined, and they establish seasonal summer pastures in these areas and some of them are shared between two or more bordering villages. Rights to the utilization of pastures are collectively conferred on entire villages and are not confined to kinship groups. Nomadic economy and labor activities are predominantly based on animal husbandry. Mixed herds are composed of sheep and goats, cattle/yaks for livestock production and camels, horses and donkeys mainly for transport of tents, household goods and utensils. Nomads utilize pastures to which they claim rights of access based on customary law.

Local pastorals at Upper Braldo valley exhibit vertical transhumance patterns with seasonal movements from top mountain pastures to downside. The pasture settlements have sheds for the animals as well and they are fenced as well to avoid attacks of snow leopard and wolves. The FGD interview indicates that only 19% pastures of Upper Braldo valley are healthy while other 81% are degrading gradually.

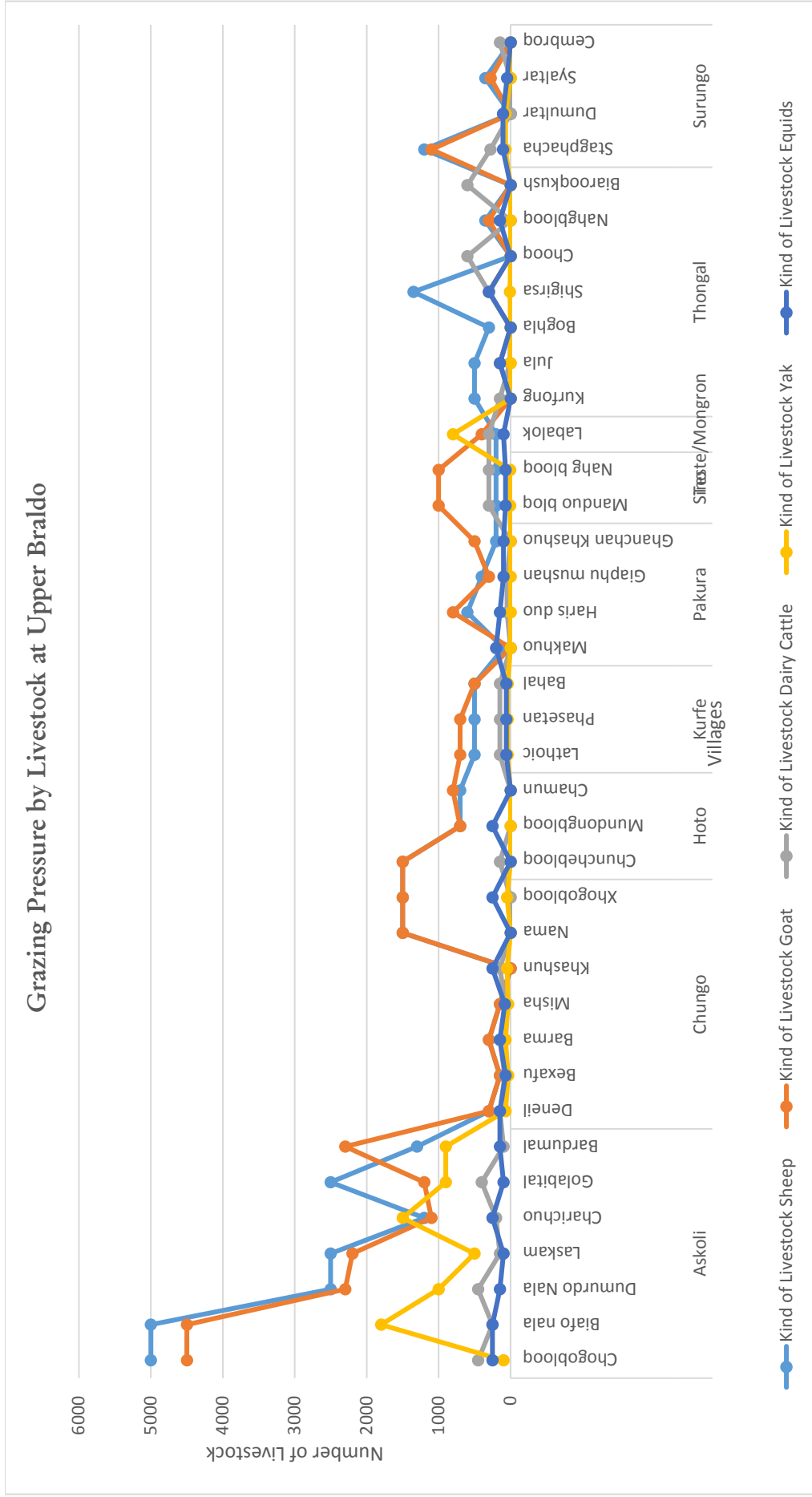
Decline in health of pastures is direct indicator of unsustainable harvesting practices due to increasing local population fueled by climate change. Uncontrolled grazing and other consumable products irrespective of decreasing productivity allows them to earn handsome amount for subsistence. Indirectly it also indicates 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.

**Exhibit 12: Assessment of grazing pressure from each livestock classes on pastures of Upper Braldo Valley**

Pastures	Village	Other Uses	Status	Grazing Period	Livestock classes					
					Sheep	Goat	Dairy Cattle	Yak	Equids	Total
Chogoblooq	Askoli	Fuel wood and medicinal herbs	D	All year	5000	4500	450	100	250	10300
Biafo nala					5000	4500	250	1800	250	11800
Dumurdo Nala					2500	2300	450	1000	150	6400
Laskam					2500	2200	150	500	100	5450
Charichuo					1200	1100	200	1500	250	4250
Golabital					2500	1200	400	900	100	5100
Bardumal	Chungo	Fuel wood and medicinal herbs	PD	May-Oct	1300	2300	100	900	150	4750
Deneil					300	300	150	70	150	970
Bexafu					150	150	80	35	70	485
Barma					300	300	150	70	150	970
Misha					150	150	70	35	80	485
Khashun					-	-	150	50	250	450
Nama	Hoto	Fuel wood and medicinal herbs	PD	Round the year	1500	1500	-	-	-	3000
Xhogoblooq				May-June	1500	1500	-	50	250	3300
Chuncheblooq				May-Oct	1500	1500	150	-	-	3150
Mundongblooq					700	700	-	-	250	1650
Chamun					700	800	-	-	-	1500
Lathoic	Korfe	Fuel wood and Medicinal herbs	PD	May-July	500	700	150	40	60	1450
Phasetan				Aug-Oct	500	700	150	40	60	1450
Bahal				Marc-Apr	500	500	150	40	60	1450
Makhuo				Jun-Jul	100	-	-	-	200	300
Haris duo	Pakura	Fuel wood and Medicinal herbs	D	Jun-Jul	600	800	50	-	150	1600
Giaphu mushan				All the year	400	300	50	-	100	850



Exhibit 13: Grazing Pressure by livestock on pastures of Upper Braldo





## 2.6. Fuel Wood Collection/ Timber Harvesting

Upper Braldo valley which lies at dry north eastern side of CKNP has comparatively fragmented and sparse forest with approximately 160.9 km<sup>2</sup> vegetation cover and its average ABG is 1428.6 MgKm<sup>-2</sup> and CAI of 1616.5 Mg/year (Ferrari, 2014). Vegetation cover is 9.01 % (16.8% grasslands, 3.5% close forest, 1.5% open forests, 24.8 % for both scattered and sparse vegetation). High density of timber trees is found in south-western valleys of CKNP than North eastern valleys.

As a consequence of increasing population; expansion of villages is common phenomenon in Upper Braldo like other valleys and thus construction of settlements/houses is also on rise. The timber for construction purposes is either purchased from Sakardu timber market or from natural/artificial plantations (Exhibit No. 16). In Upper Braldo 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 Astak valley. From a large tree, locals usually obtain around 50 logs. The trees harvested for timber in each village of Astak valley are listed in Exhibit No. 12. The value of a large tree harvested, divided into logs and transported to the nearest city (Sakardu), can vary between 100,000 Rupees (Picea) and 125,000 (Pinus) depending upon type and quality of wood.

Household fuel sources in Upper Braldo are Artemisia, Sea buckthorn, Dung, pruning from plantations and wood from forests. Area under vegetation in whole Braldo valley is only 160.9 km<sup>2</sup> comprises of 83.5 % Junipers, 5.3% coniferous and 11.2% broad leaves and also the artificial plantation sites of *Populus* spp. along with Artemisia shrub-land, and sea buckthorn. Poplar varieties are common plantations aided significantly to alleviate stress on natural forests. They are preferred due to high annual biomass, higher pest resistance, site adaptability, and easy vegetative propagation. Due to Artemisia's regular presence, this valley is also called as Artemisia Shrub land. Apart from being component of the fuel sources, it is also used by livestock during winter. Juniper trees are found in isolation at inaccessible locations on steep mountain slopes and grows well where water availability is up to the requirement of the tree. Junipers are preferred species for fuel because of its dryness and aroma. Our data collected during the survey reports that approximately 428 households living in Upper Braldo valley harvests about 3'577.65 Mg/year/valley of the natural resources and 116.2 Mg/year/ valley from natural forests as fuel. Natural plantation contributes to 32% of the basic fuel needs.

Among the alternative fuel wood resources electricity, gas cylinders and kerosene oil are usually employed. Plantations by local community on private lands have help alleviate strains on natural flora considerably. Even sustainable and productive forest systems may experience pervasive and severe levels of small-scale chronic disturbance by harvesting then the consumption of 32% natural flora annually will soon turns the forest areas into barren lands.

Majority of the fuel sources are common to the community and within community; there is no restriction on fuel wood collection but selling of wood is not encouraged socially. These regulations do not apply to private resources and plantations. Community restricts over exploitation from common resources. Bushes, mainly Artemisia which is quite common in CKNP is frequently used as fuel for ignition purpose in Upper Braldo.

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. In Upper Braldo which has scarce forest reserves, timber and fuel harvest is usually unchecked and unmonitored, evidently contributes significant share in total household livelihood revenues. Customary laws although allow the use up to need basis and don't allow sale of wood extracted from natural forests but this is hardly practiced and locals decide by themselves where and how much to cut (FGD interview, 2016). Although these practices do not allow sale of timber neither address the maximum amount of wood harvest from the buffer area. There are several other gaps in customary laws which provoke the need of revitalization of customary practices/laws in addition to reinforcement of statutory laws essential for natural resources conservation and restoration. There is 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 14: Timber harvesting and use at Upper Braldo valley**

Village	Houses constructed in last 5 years (2010-2015)	Number of trees used	Tree species used
Askoli	20	400	Poplars, Willow
Chungo	25	20	Poplars, Willow
Hoto	05	375	Poplars, Willow
Korfe	10	30	Poplars, Willow
Pakura	25	1000	Poplars, Willow
Sino	25	1000	Poplars, Willow
Testy/Mongron	25	70	Poplars, Willow
Thongal	25	800	Poplars, Willow
Surungo	05	15	Poplar, Willow

**Exhibit 15: Summary of Fuel Wood harvest and Consumption in Astak Valley**

Village	HH	Average household Consumption (Mg yr <sup>-1</sup> )			Average Village Consumption (Mg yr <sup>-1</sup> )		
		W	S	Tot	W	S	Tot
Askoli	72	4.0	2.0	6.0	288	144	432
Chungo	34	6.8	2.38	9.18	231.2	80.92	312.12
Hoto	32	6.6	3.2	9.8	211.2	102.4	313.6
Korfe	40	3.85	1.8	5.65	154	72	226
Pakura	42	9.0	4.0	13	378	168	546
Sino	50	5.0	2.4	7.4	250	120	370
Testy/Mongron	68	8.0	4.0	12	544	272	816
Thongal	55	5.2	2.5	7.7	286	137.5	423.5
Surungo	35	2.55	1.4	3.955	89.425	49	138.42

Exhibit 16: Annual fuel wood harvest, Upper Braldo

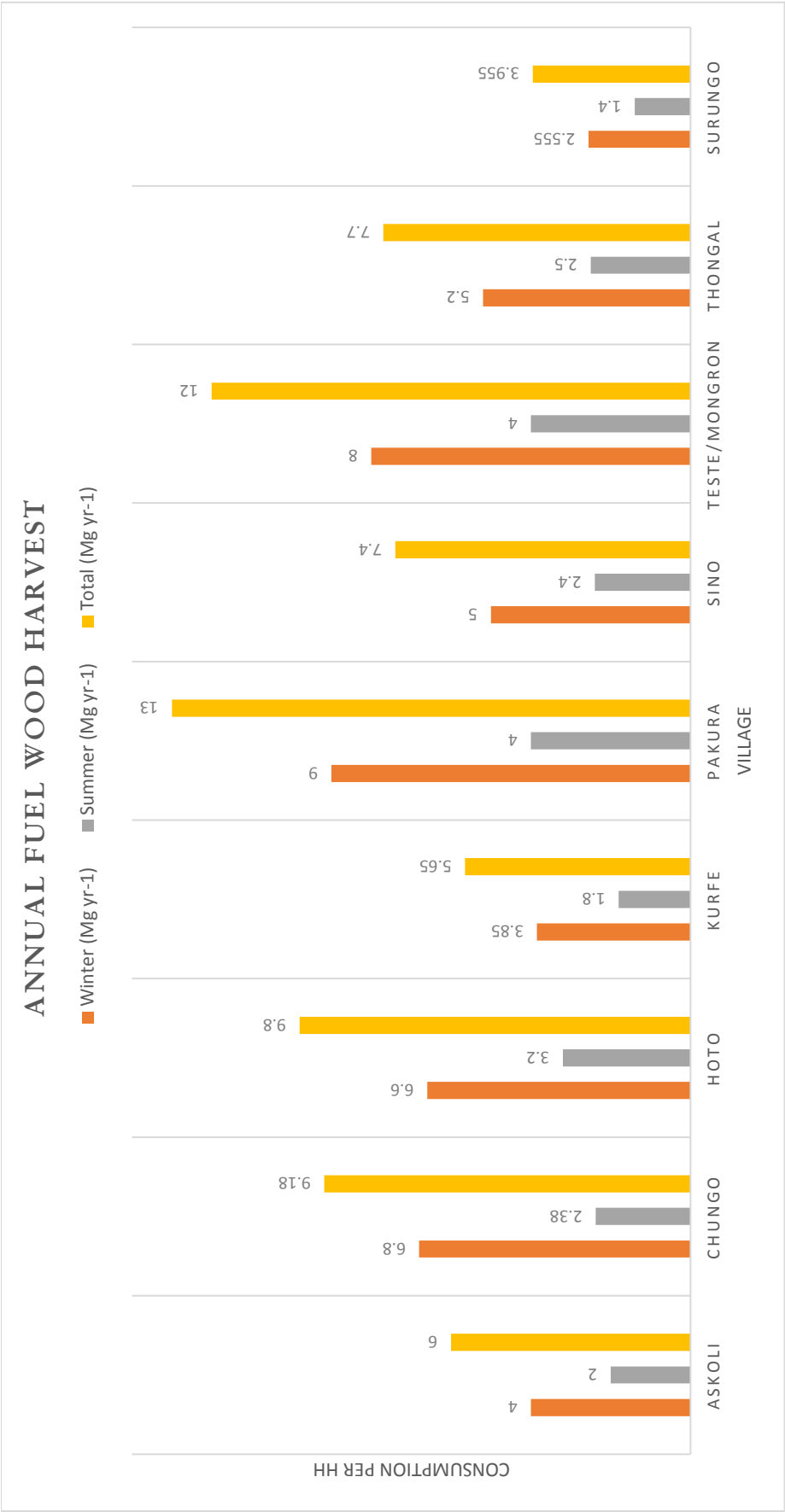


Exhibit 17: Details of fuel wood harvested per household from several sources (Mg/HH/Year)

Sources /Villages	Askoli		Chungo		Hoto		Korfe		Testy/Mongron		Pakura		Sino		Thongal		Surungo	
	W*	S <sup>^</sup>	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
Artemisia	1.32	0.66	1	0.67	0.73	0.35	0.6	0.2	0.23	0.11	1	0.4	0.5	0.22	0.257	0.13	0.60	0.31
Sea buckthorn	0.35	0.18	0.7	0.3	1.06	0.53	0.39	0.2	0	0	0.26	0.12	0.7	0.4	0.34	0.2	0	0
Junipers	0.6	0.32	0.6	0.32	0	0	0.5	0.2	0.36	0.19	1.2	0.65	0.4	0.18	0.68	0.4	0.3	0.19
Shrubs/Grasses	0	0	0.7	0.3	1.33	0.66	0.26	0.15	1.88	0.89	1.5	0.6	0	0	0	0	0	0
Dung	0.4	0.14	0.8	0.3	1.4	0.61	1	0.6	1.08	0.56	1.33	0.65	0	0	0.6	0.23	0.6	0.29
Natural forest	0.6	0.31	0.7	0.19	1	0.5	0.25	0.1	1.96	0.97	1.5	0.47	2	1	1.75	0.7	0.3	0.2
Fruit trees	0	0	0	0	0	0	0.15	0.05	0.22	0.09	0	0	0	0	0.3	0.1	0.3	0.2
Other riparian vegetation	0.5	0.23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantation	0.23	0.13	0.7	0.3	1.06	0.53	0.7	0.3	2.25	1.17	0	0	0	0	0	0	0	0
Market	0	0	1.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

W\* = winter, S<sup>^</sup> = summer

Exhibit 18: Assessment of required reforestation to compensate fuel needs in Upper Braldo Valley

Valley	Average Fuel consumption from Natural Forest (Mg/yr/valley)	Annual CAI (Mg/yr)*	Required credit to sustain fuel needs	Harvest Pressure
Upper Braldo	18570.24	1616.5	-16953.7	Unsustainable

## 2.7. Tourism

Upper Braldo is famous for its historical and adventure tourist sites. Askoli Museum, historical religious buildings are another type of the offer from Braldo to tourist and scholars from history and archaeology. The museum contains a stunning collection of wooden and metal kitchenware, animal trophies, yak skins and jewelry. This museum is an initiative of an INGO known as Ev-K2-CNR funded by SEED project and now maintained by CKNP directorate with nominal income from visitor's ticket. The visitors' diary has comments from foreign travelers, who are in awe of the local culture and the natural magnificence.

Upper Braldo (Askoli) is one of the key starting points of mountaineering expeditions to world's famous peaks including K2, Biafo Glacier, Baltoro Glacier, and the highest cliffs in the world the Great Trango Towers. Three most famous treks namely, Sosbun, Skroro La and the 42km long Panmah Glacier trek Dumurdo area are ideal for adventure tourism. Most mountaineering expeditions and trekking teams stay at campsites in Upper Braldo prior to leaving for wilderness.

Available tourist facilities are CKNP Visitor information and Registration center at Askoli Maidan, camping sites, porters, guides, cooks and some climbing equipment for rent. Attraction of tourist for this landscape provides the local people an opportunity to earn handsome income. Some villages of Upper Braldo hold usufruct rights over camping sites and provision of goods and services to these sites. Jhula (Askoli), Payu (Testay) and Urdukas (Kurfay) holds the revenue rights for the earning from camping sites and route to Baltoro. Each campsite earns around PKR 40,000/- profit after paying salaries and consumable procurements. Non-localized services include provision of "*Sardars*" to organize and manage porters, porters to carry loads, guides and cooks. Porter charges PKR500 per day and cook PKR600.



# 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 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 Upper Braldo valley was well aware of changes that are happening in their climate and responded all the questions effectively. 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 show that 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. 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 mountains and affect people and ecosystems in the surrounding lowlands.

#### 3.2. Temperature variability and seasonal shifts

Gradual decrease in temperature has been reported by local community during last 30 years and even decrease in summer days though the scientific evidences don't agree.

#### 3.3. Precipitation

In addition, changes in climate, such as reduced snowfall and rainfall, are reported across the area by local community, but solid evidence of the impact is difficult to ascertain. According to local community the dry cold season is on increase. 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 most profound effect since last ten years. According to local community snow season has also showed significant delay and is getting more delayed year by year in different valleys.

### 3.4. Drought

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.

As a consequences of climate shift drought is at continuous increase from regional climate scenario as reported by local community. Due to warmer temperature the snow deposits are melting before time and increased 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 regeneration of forest and pastures. It is difficult to mitigate the issue by water uplifting from rivers due to the required capital.

The local community so-far is unable to assess the intensity of drought and to adapt it accordingly. Therefore, to enhance the resilience of 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 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 by 36% since last 30 years. However, the flood frequency is also reported to be increased by the local community by 28% since last 30 years.

### 3.6. Landslides

Floods are the regulating factors of the land slides. With increase in the temperature, glacier recession and GLOF events 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 Indus basin. Sometimes the upper Braldo valley gets blocked because of landslides.

According to the survey conducted to gather information about the driving factors of climate events by local community, it is assessed that landslides have increased considerably (24%) since last 30 years. These landslides wither soil from 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. It has significant impact on tourist flow as well.

## Exhibit 19: Impact of Climate Change at Upper Braldo 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	17.5	Increase	More rains as compared to present	Decrease
Snow	Decrease	51	Decrease	More snow as compared to present	Decrease
Temperature	Decrease	12	Decrease	Less as compared to present	Decrease
Summer season duration	Decrease	13	Decrease	Summer starts late and ends early. Temperature is comparatively high in summer now a day	Increase
Winter season duration	Increase	30	Increase	Winter starts early and ends late. Winter is much colder as it was before.	Decrease
Glacier recession	Increase	28		Glaciers are decreasing	Decrease
Land slides	Increase	24	Increase	They were not frequent as now	Increase
Flood frequency	Increase	28	Increase	Less flood as compared to present	Increase
Flood magnitude	Increase	36	Increase	Less magnitude as compared to present	Increase
Drought	Increase	19	Decrease	Less drought as compared to present due to less snow	Increase
GLOF Frequency	Increase	30	Increase	GLOF events were less frequent as compared to present	Increase
GLOF Magnitude	Increase	25	Increase	Magnitude was less as compared to present	Increase

### 3.7. Pastures

Range lands that serve as pastures and grazing lands are degrading annually. Pasture In the alpine and sub alpine areas 29% degradation has been observed. However mid and low land grazing areas have declined 33%.

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 20: Impact of Climate change on the pastures

Pastures	Status	Change (days/%age)	Trend			Adaptation Measures by local community
			10 y ago	30 y ago	Future prediction	
Alpine and sub-alpine pastures	Degrading	29	Degrading	Less degraded as compared to present	More degradation	NIL
Mid and low land grazing	Degrading	33	Degrading	Less degraded as compared to present	More degradation	

### 3.8. Biodiversity

#### 3.8.1. Agriculture and Fruits

Upper Braldo is an ecologically fragile region and characterized by extremes of altitudes. Valley falls in single cropping zone with main crops being wheat and barley. Minor crops include wheat, buckwheat and millet, and peas but they ripe fully. Numerous fruit trees especially apricots in great variety are grown in gardens or along irrigation channels. The impacts of climate change are becoming evident as low productivity of crops, increase in disease and unavailability of water at sowing and irrigating time.

#### 3.8.2. Forest

Natural forest stand of Upper Braldo valley represents a mix of woody and non woody vegetation. Major floral species are Pine, Junipers, Poplar, willow, Fraxinus, Olea, Berberis, Wild Rose, Cotoneaster, Sea buckthorn, Artemisia, Stipa.

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

- Rising temperature and CO<sub>2</sub> as a consequence of climate change has impacted the local forest ecosystem of Upper Braldo by providing 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 CO<sub>2</sub> 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 Nullah 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 in Upper Braldo valley.
- c) Along with this, climate change 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 local community knows about the impact of climate change on the forest but don't know about the mitigation strategies. These strategies are needed to be designed by thorough research and impact. Long term impact of the small-scale forest disturbances which cannot be observed via satellite systems must be assessed and counter measures should be adopted. 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 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 answer and capacity building of the community accordingly to ensure the ecosystem viability.

### 3.8.3. Wildlife and associated biodiversity

Impacts of anthropogenic stress along with climate change on wildlife are significant in Upper Braldo valley. According to this current VCDSP survey 70% decrease in ibex population in last 30 years and the shift towards higher altitude. In view of the decreasing ibex population, the prime factors are poaching, habitat destruction, loss of vegetation and climate change.

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 decline. The apparent reasons are the absence of favorable climate for 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 the Upper Braldo 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.

### 3.9. 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 51% according to the perception of local community and rain fall has decreased as well. The altered precipitation pattern has caused the differential availability of water during different seasons. During end summer and winter season water become scarce and leads to unsustainable water management. The water management in view of precipitation shortage needs holistic approach.



### 3.10. Tourism

Askole, which is the starting point for many mountaineering expeditions in the Karakoram Mountains, including K2. Upper Braldo is accessed by tourists through a jeep able road from Sakardu to Askoli. This road often knocked out due to the extreme weather events like landslides and floods, especially between Thongal and Askoli.

There is urgent need for the tourism sector, national governments and international organizations to develop and implement strategies to face the changing climate conditions and to take preventive actions for future effects, as well as to mitigate tourism's environmental impacts contributing to climate change coupled with poverty alleviation strategies for the local inhabitants.

**Exhibit 21: Impact of climate change on Biodiversity of Upper Braldo Valley**

Biodiversity	Status	Altitudinal Shift	Trend			Adaptation Measures by local community
			10 y ago	30 y ago	Future prediction	
Agriculture crops and fruit trees	Degrading	N/A	New pest varieties have been reported	Pests and crop infections were not frequent Artificial fertilizers were not required	Weeds will become common Irregular precipitation patterns will lead to productivity decline	Increase in cropping area by leveling to enhance productivity Use of fertilizers has been increased
Natural Forest	Degrading	Reported for some non woody vegetation	Degrading	Forest patches were dense and healthy	More degradation	No adaptation yet
<b>Wildlife</b>						
Ibex	Decreasing	Increasing	Less population due to hunting and habitat shrinkage	Population was good in number	Population will increase due to the conservation efforts	Poaching and Illegal hunting is controlled due to trophy hunting initiatives but it is not the part of customary laws
Urial	N/A	--	--	--	--	--
Markhor	Decreasing	Increasing	Population was good and is increasing continuously	Population was so less that it was rarely seen	Population is increasing but at low rates than it should be	Illegal hunting and poaching have been controlled to ensure the population increase
Birds	Decreasing	--	Bird population and diversity was less	Population and diversity were good	Bird population can either decrease due to removal of natural vegetation or it can be expected to increase due to increase in their prey	No adaptations
Butterflies	Decreasing	--	Due to absence of flowering plants butterflies are no more common	Butterflies of several types were common	They will decrease because of land erosion and shrinking of natural vegetation areas	Not adaptation has been done yet
Fishery	N/A					





# CONSERVATION MANAGEMENT ISSUES & PROBLEM OF UPPER BRALDO VALLEY







## 4. MANAGEMENT ISSUES AND PROBLEMS

Present scenario of Upper Braldo 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 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 Upper Braldo 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.

### 4.1. Agriculture

Marginal arable land is available in Upper Braldo valley which is cultivated by traditional varieties of grains, fodder, fruit trees and commercial trees. 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:** This shrinking is being aided by the division of available land of forefathers divide among the generations and declines the agriculture productivity.
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. Situation become worse during the winter season which foster low availability of water in streams. Moreover, division of water quantity between old and new villages is also an issue. Newly established villages don't get the water up to the demand and agriculture along with other water dependent sectors get worse effects.
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 holding, primitive seed varieties, traditional agriculture practices, 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 use of traditional methods and seeds for cultivation.
4. **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 Upper Braldo 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 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.

5. **Climate Change:** Climate change is exacerbating the challenges faced by the agriculture sector, negatively affecting both crop and livestock systems in Upper Braldo 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. Farmers are really feeling helpless against the inconsistent weather even they are thinking to abandon growing maize and wheat, and cultivate cash crops like tomato and potato because that are short-duration.

#### 4.2. Pasture

Majority of the pastures of Upper Braldo valley are declining at rapid rates. The pasture sustainability is also facing lot of pressures from livestock more than carrying capacity, medicinal plants extraction, landslides and floods.

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. 70% pastures of valley 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 also 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 of Upper Braldo valley 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. Recent kills in Upper Braldo valley are not reported recently but due to currently non-functional 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:** According to WHO, 80% of the human population of Africa still use medicinal plants in their primary health care. The popularity of herbal drugs is on the constant rise in many developed countries of the world, while in developing countries like Pakistan; medicinal plants contribute significantly to the income sources of people living in the Gilgit-Baltistan. Upper Braldo 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 local community for collection, drying and usage is important.

#### 4.3. Water

Water is the key ingredient and symbol of life. All the changes in climate pattern are directly and indirectly playing with water quantity. Altered precipitation patterns, warm temperatures and frequent air currents actually disturbed the water quality and quantity both. The local community at Upper Braldo 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 for irrigation. 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 hotels and increasing tourist pressures. 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 unanimously reported about the water quantity as "Either lot of water or no water". As an adaptation to this issue they exploit the water points which are often far flung and also take their livestock to such areas. But irrigation becomes an unsolved issue because it demands the on-site availability of water.

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.

#### 4.4. Forest and NTFP Issues

These sectors are as vulnerable from climate change as any other 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 and resulted degradation and reduced distribution of entire forest ecosystem. It increased the wood harvesting opportunity for the local community from Upper Braldo Valley 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 continuously increasing population dependence of local community is also increasing on these natural resources. Majority of Upper Braldo Valley 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 CO<sub>2</sub> increased the rate of photosynthesis and thus growth but increased the pest attack is seriously stressing the forest regeneration.

#### 4.5. Eco-tourism

Upper Braldo Valley is the hub of adventure tourism which incorporates a maximum number of foreign tourists every year to generate the huge amount of revenues and alternative livelihood opportunities.

Following issues are being reported by the local community.

1. **Road infrastructure:** Upper Braldo lies en-route to world's famous peaks and glaciers including Baltoro. Upper Braldo is connected with Shigar and Sakardu only through a jeep able road and this road often get blocked because of floods and landslides. Keeping in view the livelihood dependency of the community on tourism, it is utmost necessary to keep this road well maintained through the touristic season.

2. **Camping sites and accommodation:** Upper Braldo also provided three camping sites at different locations: Jhula, Payu and Urdukas. Despite of the hard work done by CKNP directorate, the camping sites are still struggling regarding economic and environmental sustainability. The camping sites facilities need further improvement like water supply, washrooms and garbage. Upper Braldo can host tourists in a much better way if couple of reasonable clean restaurant and hotels can be opened in Askoli.
3. **Climate Change:** The months of June, July and August are the peak touristic months for Upper Braldo Valley and the same time water level and flooding in streams, incidents of landslides and debris flow increase due to high temperature coupled with heavy rains unprecedented rains, these factor hamper tourist flow in the valley.

#### 4.6. Wildlife and Protected areas

Institutional structures to manage wildlife and protected areas experience lot of issues due to habitat loss, 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. **Habitat degradation and Isolation:** Valley community claims decline in overall population of ungulates especially ibex and Urrial but CKNP Directorate reports otherwise. According to CKNP's seasonal wildlife surveys there is overall increase in wild life population because of awareness and conservation endeavors. It is obvious that habitat degradation has also pushed the species to more isolated habitats that caused additive stress on the wildlife health, reproductive potential and genetic health and so on. Still there is no assessment for the impact of habitat degradation on genetic health of wildlife species.
2. **Illegal Poaching/Hunting:** Illegal hunting is one of the major threats to the wildlife of CKNP. The watch and ward system reported weak though CKNP directorate registered complaints and reports to police against illegal hunters. The community of Upper Braldo emphasized to induct game watchers from community for improvement in watch and ward.
3. **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 UPPER BRALDO VALLEY







## 5. PROPOSED MANAGEMENT INTERVENTIONS

### 5.1. Agriculture

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

1. **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.
2. **Integrated farming and agriculture products:** Farmers are traditionally inclined to monocropping systems and earn the revenues from raw products only. The little economic innovation lies in the sale of dry fruits and crops such as maize during which million rupees' products waste annually. Many end-users require specifically processed products such as Marmalades, Jams and Vinegar. Farmers need guidance on the value addition of products in order to be economically stable.
3. **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.
4. **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.
5. **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.

6. **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.
7. **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.
8. **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.
9. **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

1. **Upgradation of customary laws:** Customary practices should be amended in such a way that ensure 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 cultivars:** 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.

6. **Local botanical garden to store seed line of pasture 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.
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 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 Data base:** 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 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.
11. **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.

### 5.3. 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 the Upper Braldo 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:** 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:** 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 CO<sub>2</sub> 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 seems 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 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.

### 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. **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 has 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.

## 6. STATUARY VS CUSTOMARY PRACTICES IN UPPER BRALDOVALLEY

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 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.	-
	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	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 UPPER BRALDO 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	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 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 originations	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  2.2.2. Capacity building of Social organizations to ensure conservation of park resources and sustainable resource used  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 access community health facilities	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 dispensaries	Suggested for inclusion in relevant community management plan  Suggested for inclusion in revised MP/OP activities	Askoli  Testy/Mongron	Urgent	Long term



			Unhygienic practices by locals			3.1.5. Awareness conferences about hygienic practices	Suggested for inclusion in revised MP/OP activities	All	Urgent	Short term
						3.1.6. Dissemination of brochures and pamphlets to educate community about prevention from sporadic diseases and promotion of healthy and hygienic practices by women and children through workshops, campaign and social organizations	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	4.1.1. Promotion of fuel-efficient stoves at high altitudes  4.1.2. Develop and Motivate usage of alternative sources	Activity No. 14.2.1 -do-	All	Urgent	Short term
5.	Education	5.1. Curb illiteracy	Prevalence of unsustainable practices	Lack of needful development infrastructure and human resource	5.1.1. Increase the capacity of existing schools  5.1.2. Creation of new educational facilities	Suggested for inclusion in revised MP/OP activities  Suggested for inclusion in revised MP/OP activities	All  Surungo	Medium  Medium	Long term  Long term
6.	Agriculture	6.1. Lack of sufficient	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
				Lack of financial and	6.1.1. Introduction of Improved seed	Suggested for inclusion	All	Medium	Medium term



7.	Livestock	7.1. To enhance income opportunities for locals from livestock		Lack of jobs and economic opportunities in agriculture and related crops	6.1.5. Improvement of existing economic opportunities	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
					6.1.6. Creation of new job to enhance economic capacity of the local community	Suggested for inclusion in revised MP/OP activities	All	Urgent	Long term
7.	Livestock	7.1. To enhance income opportunities for locals from livestock	Livestock mortality due to diseases	Less arable land per household	6.1.7. Development of barren land patches	Suggested for inclusion in revised MP/OP activities	All	Medium	Medium Term
				Disease spread	7.1.1. Improvement of existing vet facilities	Suggested for inclusion of irrelevant community development plans	Askoli, Testy/Mongron	Urgent	Long Term
				Poor breeds with lesser dairy productivity	7.1.2. Establishment of new vet facilities		Thongal	Medium	Medium Term
			Depredation of livestock by wildlife	Lack of proper grazing	7.1.3. Livestock insurance scheme	Activity No. 9.4.2	All	Medium	Medium Term

8.	Pastures and Rangelands	8.1. To maintain ecologically healthy ecosystem	Poor breeds with lesser productivity	management regeneration 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
			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	Suggested for inclusion in revised MP/OP activities  -do-  -do-	All  All  All	Urgent  Moderate  Urgent	Medium  Medium term  Short term

					8.1.4. Awareness of herders/professional shepherd about sustainable herding practices Revive the use of indigenous grazing system						
	Unknown Carrying capacity	Lack of Research studies	8.1.5. Research studies about the carrying capacity and adaptability of Pasture to climate change	8.1.6. Establishment of enclosure to measure productivity with surrounding pastures	Activity No. 9.2.  Suggested for inclusion in revised MP/OP activities	All  One healthy/least degraded pasture in whole valley	Urgent  Urgent	Long Term  Long Term			
9.	Forest	Run-off and landslides Less biodiversity Less fuel wood availability for local community	9.1. To maintain appropriate forest cover	Lack of alternative fuel resources  Lack of capacity to use fuel resources  Lack of awareness on	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	Suggested for inclusion in revised MP/OP activities  All  All	Sino, Hoto, Askoli  All  All	Urgent	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 Shigar, 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 Shigar and CKNP Directorate. The DFO Shigar 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 Shigar and endorsed by the chairman of DCC with recommendations from CKNP Director and DFO Shigar. The DCC Shigar 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 Shigar, 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 Shigar, 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 Shigar 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

## Bagrot Valley

### Central Karakorum National Park

#### Gilgit Baltistan





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[www.wwfpak.org](http://www.wwfpak.org)

[www.cknp.org.pk](http://www.cknp.org.pk)

## PLAN EDORSEMENT

Signed by President CBCSDO/LSO Basha .....

Endorsed Director CKNP .....

Approved by Deputy Commissioner/ .....  
Chairman District Conservation Committee  
for Skardu in ..... meeting of DCC Skardu  
held .....

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
<b>1. Socio-economic and Ecological Profile of BashaValley .....</b>	<b>6</b>
1.1. Geographic location of villages .....	6
1.2. Demographic profile of villages .....	8
1.3. Education .....	9
1.4. Health .....	11
1.5. Agriculture .....	11
1.6. Water resources and irrigation infrastructure .....	13
1.7. Livestock herding.....	16
1.7.1. Livestock holding and herd composition.....	16
1.7.2. Seasonality, feeding and grazing pattern.....	19
1.7.3. Status of livestock vaccination in Basha valley.....	24
1.8. Pastures of the Valley .....	24
1.8.1. Name, location, surface area, facilities and use of pastures .....	25
1.8.2. Pastures Grazing Fee.....	27
1.8.3. Grazing Cycle in Basha valley of CKNP .....	28
1.9. Wildlife .....	30
1.9.1. Numbers and status .....	30
1.10. Forests and forestry .....	30
1.10.1. Forest cover and composition .....	30
1.10.2. Use of forests for timber and fuelwood .....	31
1.10.3. Social forestry interventions under SEED Project.....	34
1.11. Mining Sector .....	36
1.12. Tourism.....	37
1.13. Local Management Institutions (LMIs) in the Valley .....	37



1.14.	Role of LMIs in managing natural resources.....	42
1.15.	Use rights of natural resources and associated customary laws .....	43
1.16.	Local NGOs and CBOs in the target villages .....	46
<b>2.</b>	<b>Management issues and problems .....</b>	<b>48</b>
2.1.	Traditional low yielding agro-practices.....	48
2.2.	Pastures degradation .....	48
2.3.	Traditional animal husbandry and associated problems .....	50
2.3.1.	<i>Livestock mortality (diseases and depredation).....</i>	<i>50</i>
2.3.2.	<i>Lack of Veterinary Facilities.....</i>	<i>51</i>
2.3.3.	<i>Lack of a permanent vaccination Programme for livestock .....</i>	<i>52</i>
2.3.4.	<i>Traditional cattle sheds with poor sanitary measures .....</i>	<i>52</i>
2.3.5.	<i>Lack of milk processing facilities.....</i>	<i>52</i>
2.4.	Forests and forestry related issues .....	52
2.4.1.	<i>Depletion of plant biomass due to timber and firewood extraction.....</i>	<i>52</i>
2.4.2.	<i>Free grazing, a challenge for afforestation and social forestry.....</i>	<i>55</i>
2.4.3.	<i>Lack of alternatives of domestic energy .....</i>	<i>55</i>
2.4.4.	<i>Extraction of bark of birch.....</i>	<i>56</i>
2.5.	Challenges for wildlife conservation.....	56
2.5.1.	<i>Illegal hunting and poaching.....</i>	<i>56</i>
2.5.2.	<i>Retaliatory killing of mammalian predators.....</i>	<i>56</i>
2.5.3.	<i>Chance of disease transmission between livestock and wildlife.....</i>	<i>56</i>
2.5.4.	<i>Challenges in notification of Basha valley as CMCA.....</i>	<i>57</i>
2.5.5.	<i>Challenges in running livestock Insurance scheme .....</i>	<i>57</i>
2.6.	Problems associated with irrigation water supply .....	58
2.7.	Conventional less efficient mining activities.....	58
2.8.	Problems associated with Human and Institutional Development.....	59
2.8.1.	<i>Lack of participation of Arandu people in co-management of natural resources.....</i>	<i>59</i>
2.8.2.	<i>Alienation from traditional governance systems .....</i>	<i>59</i>
2.8.3.	<i>Community mobilization and management issues.....</i>	<i>59</i>
<b>3.</b>	<b>Proposed management interventions .....</b>	<b>61</b>
3.1.	Sustainable mountain agriculture.....	61
3.2.	Pasture management and improvement measures .....	61

3.2.1. <i>Creation of Sustainably Managed Pasture Area (SMPA)</i> .....	61
3.2.2. <i>Grazing management</i> .....	62
3.2.3. <i>Pasture Improvement Measures</i> .....	63
3.3.   Livestock management.....	67
3.3.1.   Improvement of veterinary services in the valley.....	67
3.3.2.   Livestock Vaccination Programme.....	68
3.3.3.   Improvement of cattle sheds for improved sanitation and predator avoidance .....	68
3.3.4.   Livestock breed improvement .....	70
3.3.5. <i>Capacity building of selected herders in innovative dairy production measures</i> .....	71
3.4.   Afforestation and forest conservation .....	71
3.4.1. <i>Regulate timber extraction from natural forests</i> .....	71
3.4.2. <i>Regulate use of firewood from natural forests</i> .....	72
3.4.3. <i>Firwood plantation</i> .....	73
3.4.4. <i>Promotion of energy efficient technologies and alternative energy options</i> .....	75
3.4.5. <i>Minimize extraction of birch bark</i> .....	76
3.5.   Wildlife Conservation .....	76
3.5.1. <i>Community-based watch and wardand monitoring of wildlife populations</i> .....	76
3.5.2. <i>Facilitate Notification of Basha valley as CMCA</i> .....	77
3.5.3. <i>Strengthen Livestock Insurance Schemes in Basha valley to promote positive human-carnivore interaction</i> .....	78
3.6.   Improvement of water courses.....	79
3.7.   Ecotourism promotion with community-participation .....	81
3.8.   Promote cautious mining practices .....	81
The local community, especially the owner of mines and local workers must be sensitized about the impacts of current mining activities on environmental and human health and safety. Where possible the local people should cover the abandoned mining areas with earth to allow fast generation of vegetation. ....	
3.9.   Institutional Strengthening of Community Organizations.....	82
3.9.1. <i>Integration of LMIs and other CBOs</i> .....	82
3.9.2. <i>Capacity-building of CBCSDOs</i> .....	83
3.9.3. <i>Financial Management and Sustainability of CBCSDOs</i> .....	83
<b>4.   Management actions</b> .....	<b>84</b>
4.1.   Sustainable mountain agriculture .....	84

4.2. Pasture management .....	84
4.3. Livestock management .....	84
4.4. Afforestation and sustainable forest management.....	85
4.5. Wildlife Conservation.....	86
4.6. Improvement for water courses .....	86
4.7. Community-based ecotourism.....	86
4.8. Mining .....	86
4.9. Institutional Strengthening of Community Organizations .....	87
<b>5. Indicators of process and progress .....</b>	<b>88</b>
<b>6. Implementation mechanisms .....</b>	<b>93</b>
6.1. Implementation Mechanism .....	93
6.2. Available Capacities.....	94
<b>7. Expected outputs .....</b>	<b>95</b>
7.1. Sustainable mountain agriculture.....	95
7.2. Pasture Management .....	95
7.3. Improved Livestock management.....	95
7.4. Sustainable forest management .....	95
7.5. Wildlife Conservation and management.....	95
7.6. Efficient uses of water resources .....	95
7.7. Sustainable mountain ecotourism .....	95
7.8. Safe mining .....	95
7.9. Institutional Strengthening of Community Organizations .....	95
<b>8. Visible bottlenecks in realizing the expected outputs, and arrangements (available and potential both) to overcome the bottlenecks .....</b>	<b>96</b>
<b>9. Monitoring mechanism .....</b>	<b>98</b>
9.1. CKNP Directorate.....	98
9.2. District Conservation Committee Meetings.....	98
9.3. Community Agreements .....	98
9.4. CBCSDOs Audit and Record Keeping.....	98
9.5. CBCSDO Visitors Diary .....	98
<b>10. Proposed budget for implementation.....</b>	<b>100</b>

<b>11. Appendices .....</b>	<b>105</b>
<i>Appendix-A Sampling plan for household surveys.....</i>	<i>105</i>
<i>Appendix-BParticipants of FGDs in Basha Valley .....</i>	<i>107</i>
<i>Appendix-cTemplate for Monthly Report by VWGs .....</i>	<i>108</i>
<i>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 .....</i>	<i>109</i>
<i>Appendix E. Wildlife Survey/Monitoring Protocols in CKNP.....</i>	<i>110</i>
<i>Appendix F. Pictures of field activities.....</i>	<i>112</i>

## LIST OF FIGURES

Figure I: Location map of CKNP (Source: WWF-Pakistan) .....	1
Figure 2: Map of Basha valley (location and territory use).....	7
Figure 3 Territory use map of Arandu.....	7
Figure 4 Territory use map of Bisil .....	7
Figure 5 Territory use map of Doghoro .....	8
Figure 6: Average Crop Yield (kg/ha) in Basha valley of CKNP .....	12
Figure 7: Average annual production per household in Basha Valley of CKNP .....	13
Figure 8 Water resources and facilities in Arandu Village.....	14
Figure 9 Water resources and facilities in Bisil village.....	15
Figure 10 Water resources and facilities in Doghoro village .....	16
Figure 11 Grazing cycle in Arandu village .....	28
Figure 12 Grazing cycle Bisil village .....	29
Figure 13: Grazing cyle Doghoro village .....	29
Figure 14 Fuelwood collection areas in Arandu village .....	33
Figure 15 Areas of fuelwood collection in Bisil village .....	33
Figure 16 Areas of fuelwood collection in Doghoro village.....	34
Figure 17: An example of fodder cultivation on slopes in village Zil.....	64
Figure 18 : An example of fodder cultivation in areas less suitable for cereal crops in village Zil .....	64
Figure 17A view of traditional (rounded) and improved/predator proof (rectangular with roofing) corral in Saisko village is given in the following photograph.....	70
Figure 20: A pictorial view of suitable lands for firewood plantation in Doghoro village.....	75
Figure 21 A view of FGD in Arandu village.....	112

## Abbreviations

AKPBS	Aga Khan Planning & Building Services
AKRSP	Aga Khan Rural Support Programme
BLSO	Basha LSO
BWCDO	Balistan Wildlife Conservation and Development Organization
CBCSDO	Community-based Conservation and Sustainable Development Organization
CCHA	Community-controlled Hunting Area
CFT	Cubic feet
CI	Confidence Interval
CKNP	Central Karakoram National Park
CL	Confidence Level
CMCA	Community-managed Conservation Areas
CO	Community Organization
CSDF	Conservation and Sustainable Development Fund
CSDP	Conservation and Sustainable Development Plan
DCC	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	Micrco-hydel



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 gazetted 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 km<sup>2</sup>, altitudinally ranging from 2000 m asl to 8,000 m asl and partly covering four of the seven districts of Gilgit-Baltistan<sup>1</sup>. 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

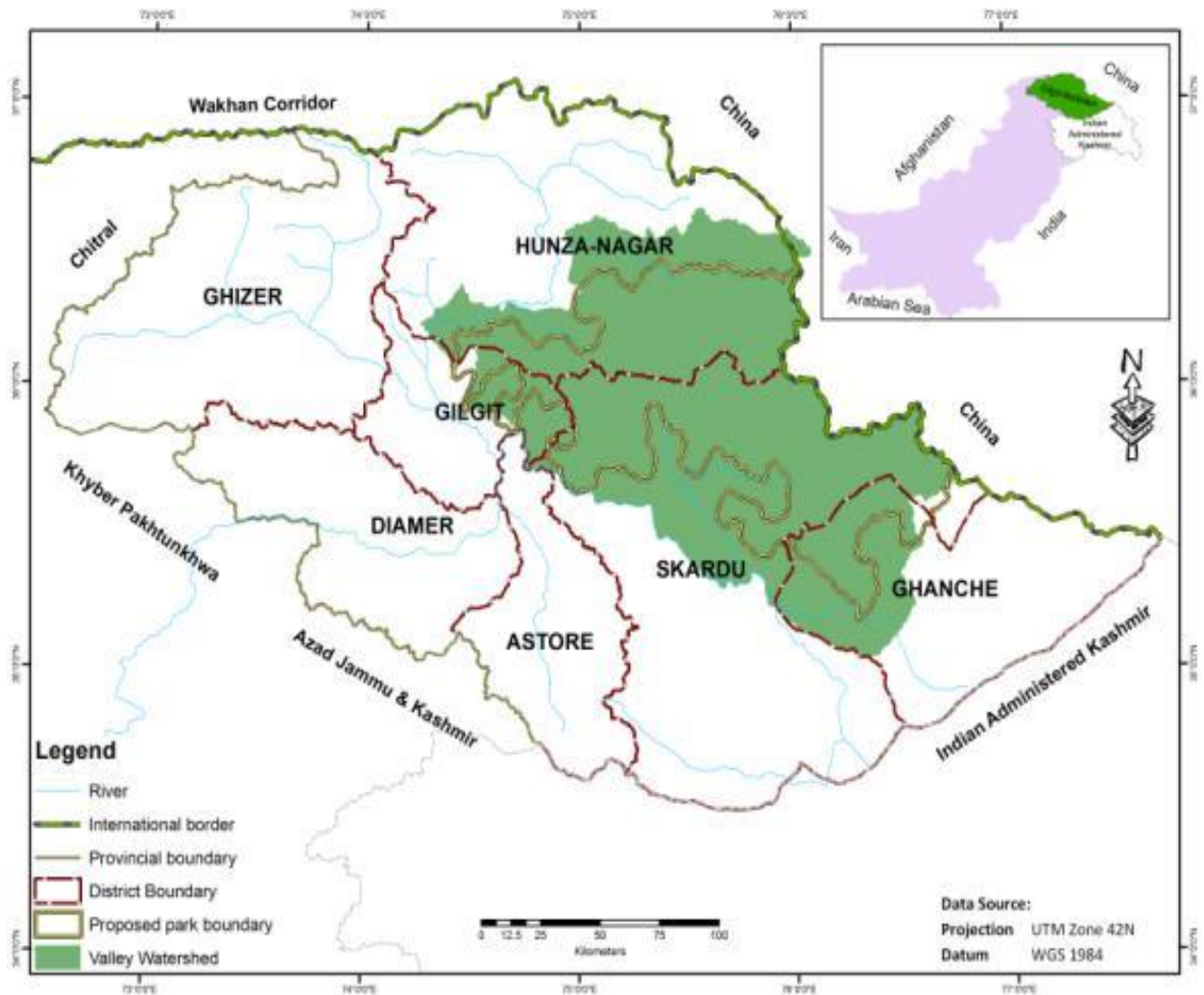


Figure I: Location map of CKNP (Source: WWF-Pakistan)

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

portion of Karakoram Mountains<sup>2</sup>. 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 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 Karakoram<sup>3</sup>.

Most of the CKNP areas are characterized by the dry alpine vegetation, comprising the 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<sup>4,5</sup>. 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 wolf<sup>6</sup>.

CKNP is surrounded by 230 villages, inhabited by over 115,000 people living in about 13,000 households. 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 CKNP<sup>7</sup> 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 widely distributed in the valley adjoined CKNP;

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<sup>2</sup> 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.

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

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

<sup>5</sup> 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.

<sup>6</sup> 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.

<sup>7</sup> Integrated Park Management Plan (IPMP) for Central Karakoram National Park. 2014. Developed by Ev-K2-CNR, Islamabad, Pakistan.

- 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 at committing community-based organizations to collaboration for management of the park<sup>8</sup>;
- iii. However, difficult 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 practices<sup>9</sup>. Also, other activities not directly related with resource use could affect the Park integrity; and
- iv. 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 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 Hushey<sup>10</sup>. 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.

Integrated Park Management Plan (IPMP) for CKNP (2014)<sup>11</sup> emphasizes to strengthen the community-based organizations (VCCs and LSOs) around CKNP to make them integrated conservation and development bodies, with a view to:

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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, Bergamo, Italy

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

- 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, 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

Basha valley forms the central part of the Park. Basha CSDP deals with the integrated conservation and sustainable development matters of eight villages of Basha valley including (from upstream to downstream) Arandu, Bisil, Saisko, Zil, Bein, Doko, Niasolo and Doghoro that partly fall within CKNP boundaries and utilize Park resources through grazing, fuelwood collection, tourism and mountaineering. The upper reaches of the Arandu villages falling within the Park are characterized by famous peaks like Spantik (7,027 m). The area below snowline is home to the endangered snow leopard sharing habitat with grey wolf and ungulates species including Himalayan ibex and musk deer.

### Structure and Composition of the Plan

The plan comprises of the following ten segments:

- i) Socio-economic and ecological profile of Basha 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 eight Focused Group Discussion (FGDs); one in each village and interviews with household heads, covering 252 household out of 730 (34.5% 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*. List of participant of FGDs 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 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) was also consulted for relevant recommendations. Lessons learned by CKNP partners under SEED Project were reviewed from various documents available with WWF-Pakistan. Previous VCP of Basha was also reviewed to obtain useful information.



## 1. Socio-economic and Ecological Profile of Basha Valley

Basha valley is part of UC Basha, sub division Shigar District Skardu, situated at 93 km north of Skardu town. The valley comprises of eight villages situated on both sides of River Basha including: Arandu, Bisil, Saisko, Zil, Doko, Sibiri, Bein and Doghoro.

### 1.1. Geographic location of villages

Location of the eight villages of Basha valley which fall in the buffer zone of CKNP including Arandu, Bisil, Saisko, Zil, Bein, Doko, Niasolo and Doghoro is given in the following table:

Villages	Settlements	Coordinates		Elevation (m)
		E	N	
Arandu	Gonkhor, Krongkhor, Arandu Gone	75°20'05.46"	35°51'56.52"	2770
Bisil	Chamanabad, Gulshanabad	75°24'02.10"	35°52'11.56"	2737
Saisko	Saisko	75°25'05.29"	35°48'59.57"	2673
Zil	Zil& Zil Gon	75°24'22.53"	35°48'18.54"	2617
Bein	Bein	75°23'52.92"	35°46'53.16"	2527
Doko	Doko gon	75°23'48.20"	35°47'45.32"	2614
Sibiri	Sibiri gon	75°23'48.89	35°47'27.76"	2579
Doghoro	Monrong, Hangopikhor, Kifurpikhor, Payupikhor, Watopikhor, Gamagon, Doghoro yul (centre)	75°24'00.13"	35°44'56.42"	2504

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

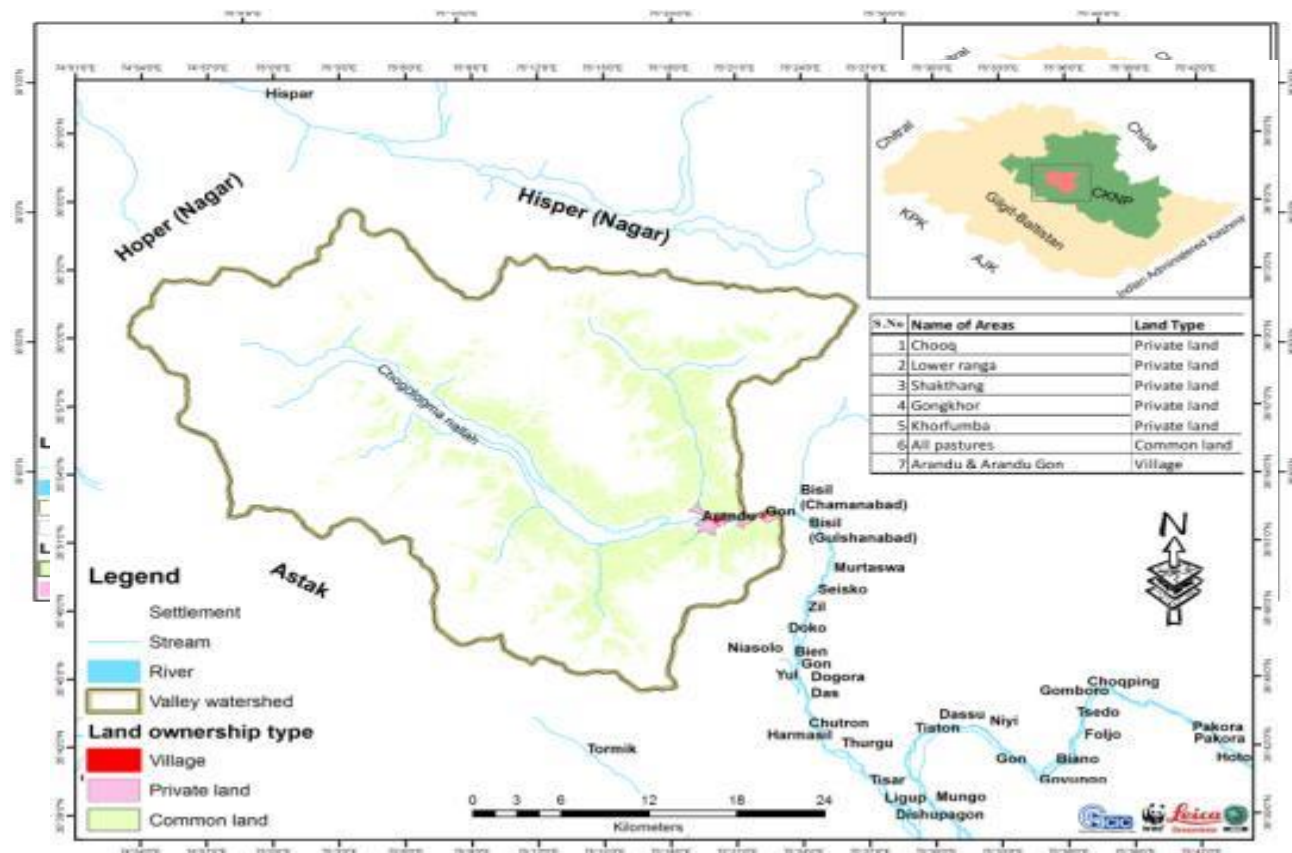


Figure 4 Territory use map of Arandu

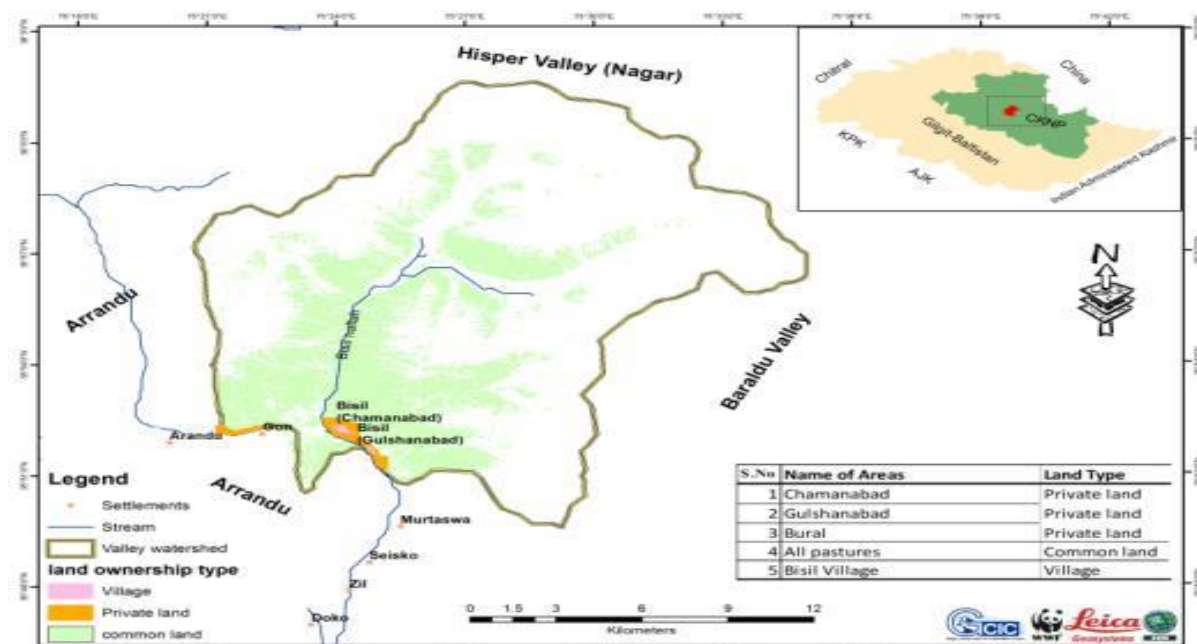


Figure 2 Territory use map of Bisil

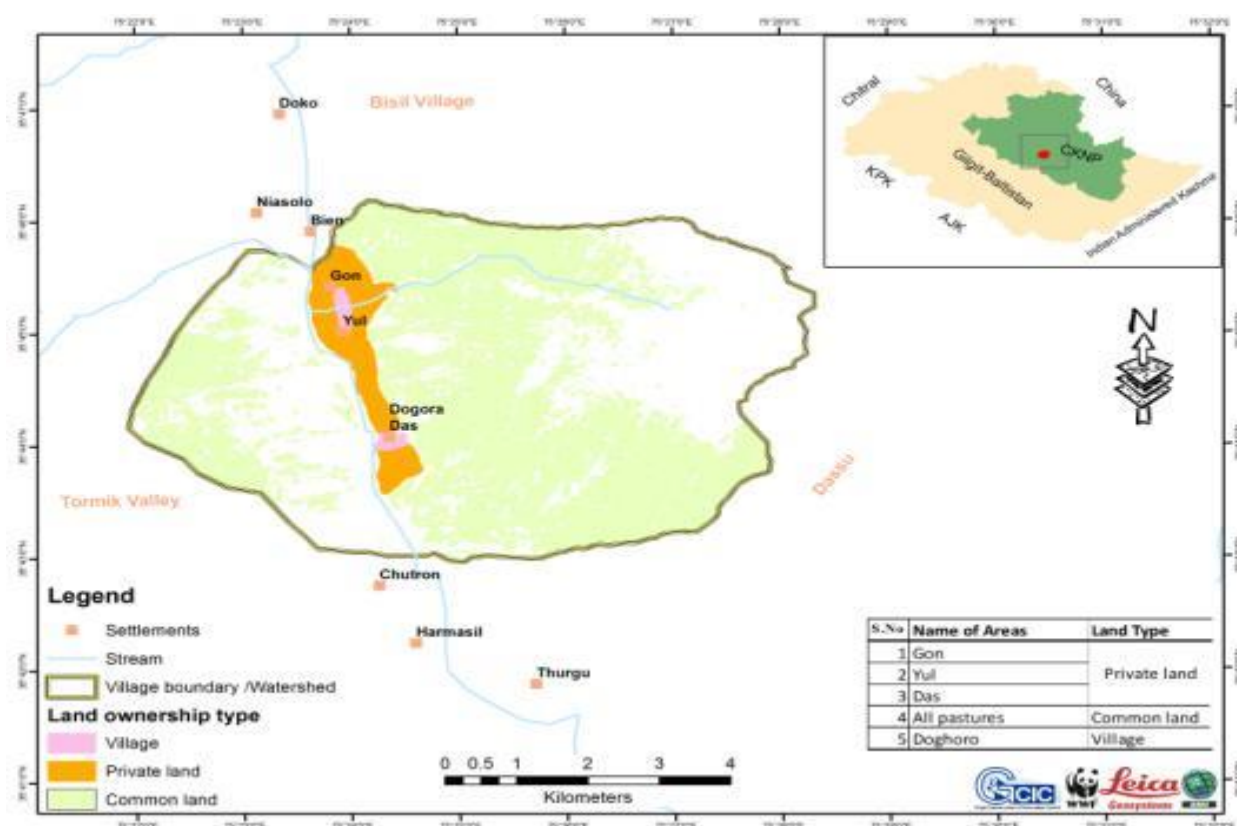


Figure 5 Territory use map of Doghoro

## 1.2. Demographic profile of villages

Village	No of Households	Population	Average household size	Agricultural land per household (Ha)	Yearly Cash Income/household (PKR)
Arandu	135	1725	13		
Bisil	137	1684	12	0.32	73,718
Saisko	140	1630	11	0.36	69,742
Zil	89	1200	13	0.54	128,125
Doko	64	896	14	0.18	77,933
Sibiri	55	770	14	0.18	115,588
Bein	64	832	13	0.37	89,632
Niasolo	90	900	10	0.11	88,182
Doghoro	117	1578	13	0.41	91,553
Total					
Source: BLSO and Household interviews			Source: Household interviews		

**Bisil:** The major sources of income include Agriculture (contributing 74%, n=39 of the total annual cash income), labor (20%) and others (2.5%, n=39).

**Doghoror:** On average, each household has about 8.2 kanals (0.802ha) of arable land and Rs. 91, 553 annual cash income from various sources.

#	Village	Name of school	Level/ Grade	Target group	Government/ Private	If private, name of supporting Institution/ individual
1.	Arandu	Government Primary School run through NEF	5 <sup>th</sup>	Mix	Government	-
2.		Public School Arandu (with 40 students and 3 teachers)	5 <sup>th</sup>	Mix	Private	Sibling mountaineers from Shimshal (Mirza Ali and Samina Baig) and two climbers of Czech Republic (Dina and Vita)
3.	Bisil	Government Primary School Chamanabad	5 <sup>th</sup>	Mix	Government	-
4.		Community School Gulshanabad	5 <sup>th</sup>	Mix	Private	Community of the village
5.	Saisko	Government Primary School	5 <sup>th</sup>	Mix	Government	
6.	Doko	Community Middle School	8 <sup>th</sup>	Mix	Government	
7.	Sibiri	Iqra Public School	5 <sup>th</sup>	Girls	Private	Iqra Fund
8.	Zil	Primary School	5 <sup>th</sup>	Mix	Government	Also supported by Community through various organizations such as SEED and Iqra Fund
9.		Community Primary School	5 <sup>th</sup>	Mix	Private	Iqra Fund
10.	Bein	Primary School (NEF)	5 <sup>th</sup>	Mix	Government	Iqra Fund is also supporting
11.		Primary School	5 <sup>th</sup>	Mix	Government/Private	Building and teachers salary by CAI, one teacher from Government
12.	Niasolo	Primary school	5 <sup>th</sup>	Mix	Private	Marfie Foundation, Iqra Fund
13.	Doghoror	FG Middle School	8 <sup>th</sup>	Mix	Government	
14.		Community Primary School	5 <sup>th</sup>	Mix	Private	Iqra Fund

### 1.3. Education

After primary school (5<sup>th</sup> grade) student of the Arandu have to reallocate to schools in other areas like Tissar and Gulapur, very few go to schools in various villages of Basha valley but

majority move to Skardu, where they have to seek refuge with their relatives or hostels or boarding to pursue their education.

In Bisil after primary school (5<sup>th</sup> grade) students of the area have to reallocate to schools in other areas like Doko, Doghoro, Tissar, Gulapur, Shigar and Skardu, where they have to seek refuge with their relatives or hostels or boarding to pursue their education. Majority of the population (74%) is illiterate. A very small proportion of the total population (2.5%, n=39) is graduate. Figures obtained for number of people with primary, secondary, higher secondary education were 2.5%, 10% and 5.1% (n=39) respectively.

In Doghoro majority of the population (72.34%) is illiterate while rest of the 27.66 % is literate to varying levels. 4.26 percent of the total population appeared having primary education while, 6.38 % has acquired middle level, 4.26 % secondary level, 6.38 % higher secondary level, 2.13 % has Bachelors education and 4.26 % has masters level education respectively in the village. As a general perception, male populace is more literate than their female counterparts.

### Education facilities in the Valley

A summary of educated people (among adult population) in Basha valley is given in the following table:

Village	Primary	Matric	Intermediate	BA/BSc	MA/MSc	M.Phil	PhD.	Total
Chotron	70	30	16	15	10	0	0	141
Haimasil	45	12	6	4	0	0	0	67
Thorgo	21	5	4	1	0	0	0	31
Daimal	18	12	8	4	0	0	0	42
Doghoro	51	10	8	6	2	1	0	78
Niasolo	17	11	4	5	1	0	0	38
Sibiri	30	9	4	4	0	0	0	47
Doko	35	11	4	5	3	0	0	58
Bein	30	8	6	3	0	0	0	47
Zil	10	4	3	1	0	0	0	18
Saisko	49	12	11	9	6	0	0	87
Bein (Ghulshaabad)	53	5	4	3	0	0	0	65
Bein (Chamanabad)	61	21	8	6	3	1	0	100
Arandu	18	10	4	2	1	0	0	35
<b>Total</b>	<b>508</b>	<b>160</b>	<b>90</b>	<b>68</b>	<b>26</b>	<b>2</b>	<b>0</b>	<b>854</b>
Source: LSO Basha, 2014 (a chart prepared by Pasha Shigri, Manager LSO Basha)								

## 1.4. Health

There are some health facilities in Arandu, Bisil, Saisko and Doghoro while in rest of the village there is no health facility and people have to visit nearest villages or in case of serious ailments they seek treatment in Skardu in government, military or private hospitals, depending upon their financial situation.

**Arandu:** There is a Civil Dispensary managed by Health Directorate of Baltistan with staff comprising of a Dispenser. Another health facility is known as Czech Hospital established in the village in 2006-2007 by Czech climbers namely Dina Sterbova and Vita Bokoupil.

**Bisil:** The only health facility in the village is a First Aid Post managed by Health Directorate of Baltistan with staff comprising of a Dispenser.

**Saisko:** There is a Civil Dispensary managed by Health Directorate of Baltistan with staff comprising of a Dispenser.

**Doghoro:** The only health facility in the village is a First Aid Post managed by Health Directorate of Baltistan. A lady health visitor (LHV) also serves in the village.

## 1.5. Agriculture

Agriculture comprises of single crop a year, dominated by wheat, barley, buckwheat, potatoes and peas. Due to extreme cold weather and short growing season vegetable production is very minor and fruits are very limited except some trees of apricots.

Village	Major crops	Yield (kg/ha)	Average production per household (Kg/year)	Consumption (%)	
				Domestic	Sale
Doghoro	Wheat	554	227	100	0
	Barley	712	292	100	0
	Buckwheat	354	145	100	0
	Potatoes	1680	689	60	40
	Vegetables (Peas turnip etc.)	102	42	70	30
	Fruits	524	215	74	26
Bisil	Wheat	703	225	100	0
	Barley	822	263	100	0
	Buckwheat	700	224	100	0
	Potatoes	419	134	100	0
	Peas (Black and white)	269	86	50	50



Village	Major crops	Yield (kg/ha)	Average production per household (Kg/year)	Consumption (%)	
				Domestic	Sale
Saisko	Wheat	903	325	100	0
	Balrey	822	296	100	0
	Buckwheat	433	156	100	0
	Potatoes	953	343	84	16
	Vegetables (Peas turnip etc.)	0	0	0	0

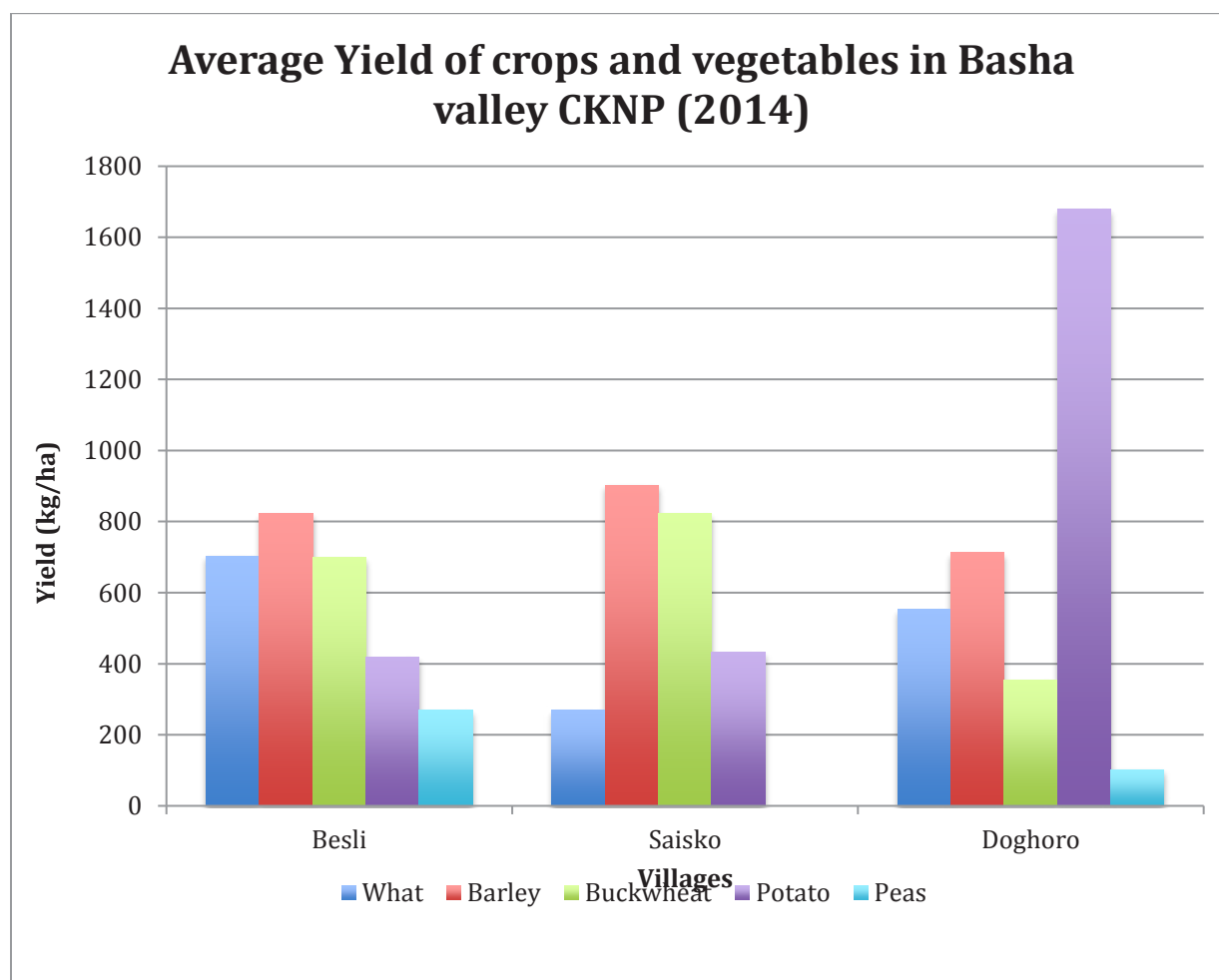


Figure 6: Average Crop Yield (kg/ha) in Basha valley of CKNP

Per household annual production of various crops in three villages of Basha is given as under:

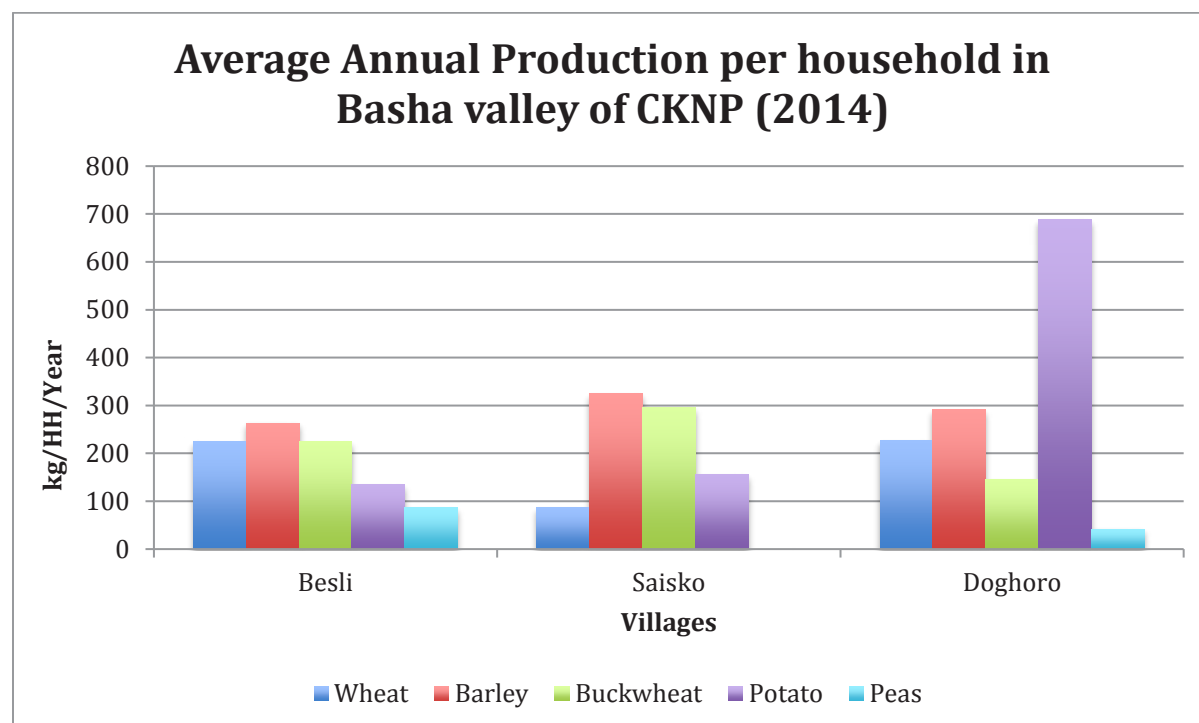


Figure 7: Average annual production per household in Basha Valley of CKNP

### 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 resources in the various villages of the valley are indicated in the following table:

#### Arandu

Source/Facilities	Name of Location	GPS Coordinate	Elevation (m a.s.l.)	Used by No households	Source type	Physical condition of water
Spring	Gura	75°19'56.63"E, 35°51'31.15"N	2882		spring	Clear
Pipe line	Gura	75°19'56.78"E, 35°51'31.59"N	2865		spring	Clear
Water tape	Gonkhor Arandu	75°20'7.29"E 35°51'58.90"N	2773		spring	Clear
Reservoir (250 gallon small fibre tank)	Gura	75°19'56.78"E, 35°51'31.59"N	2865		spring	Clear

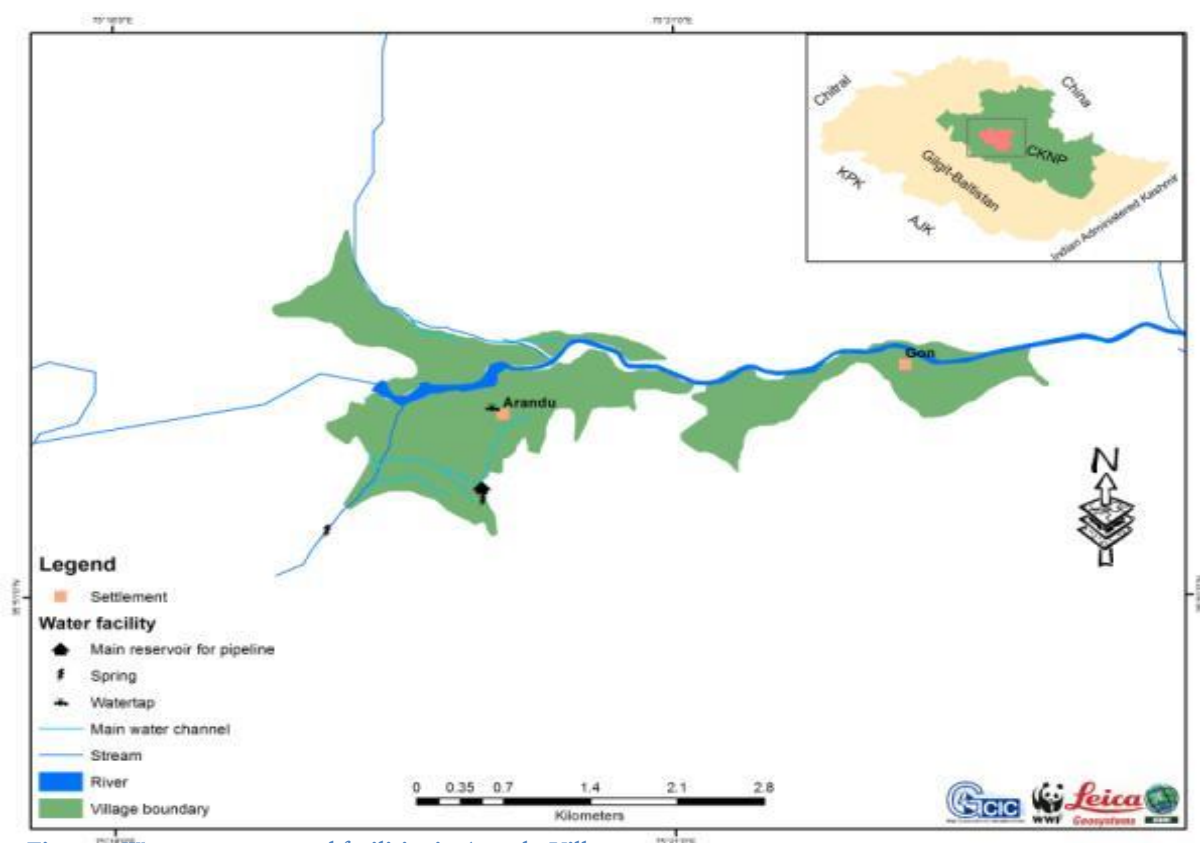


Figure 8 Water resources and facilities in Arandu Village

## Bisil

Source/Facilities	Name of Location	GPS Coordinate	Elevation (m a.s.l.)	Used by No households	Source type	Conditions of water
Spring	Aratay	75°24'41.29"E, 35°52'46.72"N	3350	70+50=120	Spring	Clear
Pipe line	Hudas Gulshanabad	75°24'15.62"E, 35°52'22.28"N (75°24'24.49"E, 35°52'19.99"N)	2733 2770	70 50	Spring	Clear
Water tap	Chamanabad	75°23'54.76"E, 35°52'25.06"N	2704	70	Spring	Clear
	Gulshanabad	75°24'21.08"E, 35°52'10.16"N	2717	50	Spring	Clear
Reservoir	Hudas	75°24'15.62"E, 35°52'22.28"N	2733	70 + 50=120	Spring	Clear

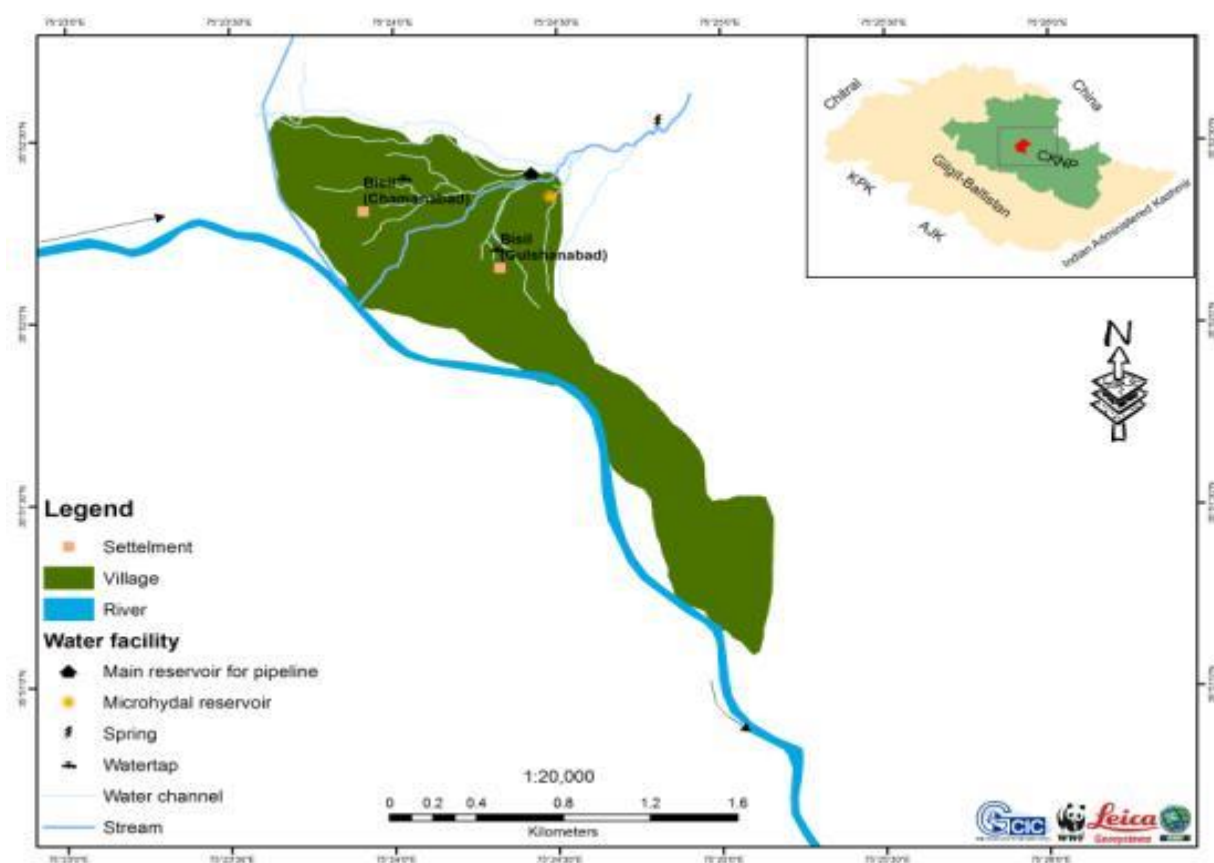


Figure 9 Water resources and facilities in Bisil village

## Doghoru

Source/Facilities	Name of Location	GPS Coordinate (UTM WGS84)	Elevation (m a.s.l.)	Used by No households	Source type	Physical condition of water
Spring	Lungma	75°24'8.33"E, 35°45'12.15"N	2598		Spring	Clear
Pipe line	Gone	75°23'59.77"E, 35°45'20.55"N	2538		Glacier	Muddy
Water tap	Gone	75°23'46.16"E, 35°45'22.98"N	2490		Spring	Clear
Pipe line	Yul	75°24'4.04"E, 35°45'9.57"N	2580	100 Yul	Glacier	Muddy
Water tap	Yul	75°23'56.60"E, 35°45'0.62"N	2514		Spring	Clear
Reservoir	Yul Gone	75°24'4.04"E, 35°45'9.57"N 75°23'59.77"E, 35°45'20.55"N	2580 2538	100 Yul 40 Gon	Glacier	Muddy

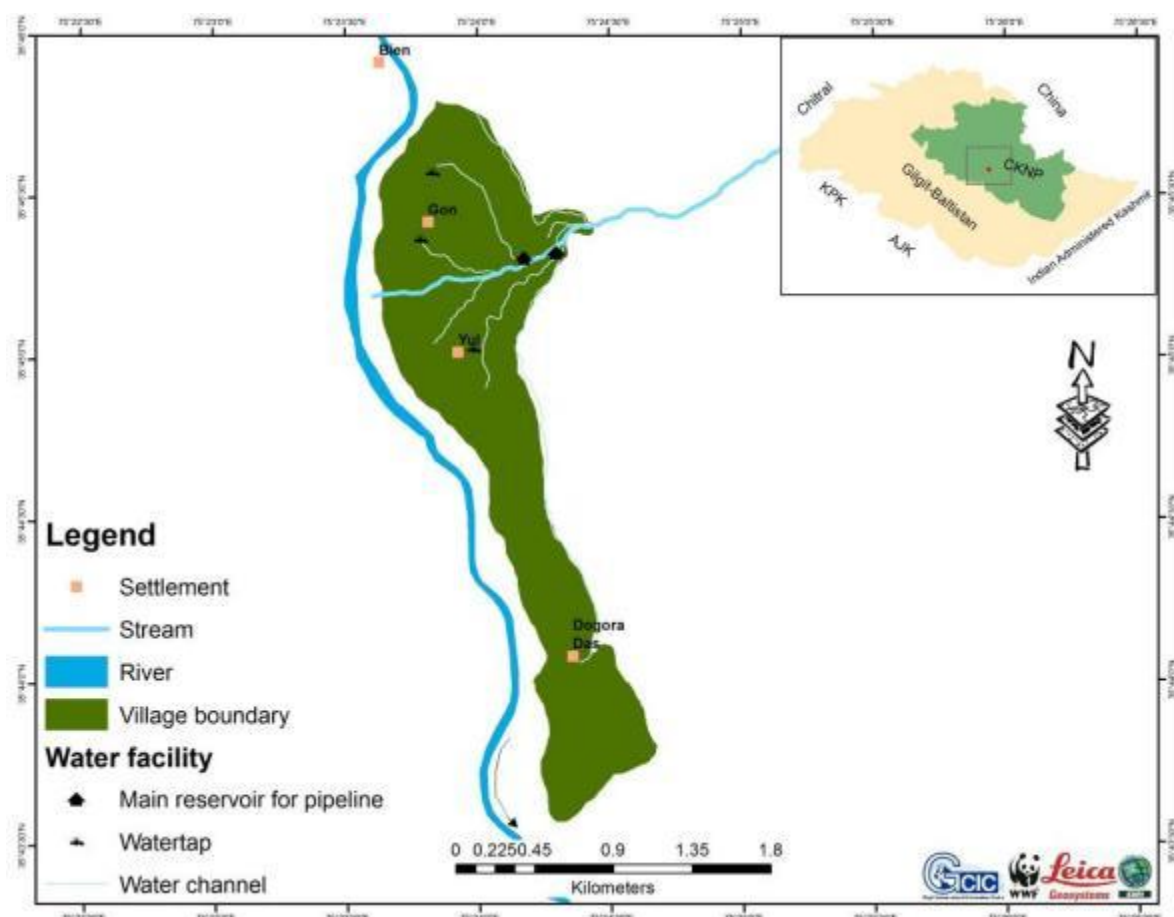


Figure 10 Water resources and facilities in Doghoro village

## 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 progeny but there are about seven generations each having a specific name in the local context). Equines donkeys and horses were reported to be none during 2014.

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	% of milking cattle
Arandu	3900	2700	453 (3 bulls)	2400	1380	0	10830	1800	17
Bisil	212	253	145	619	13	0	1241	297	24
Saisko	425	463	228	585	20	0	1721	388	23
Zil	445	378	167	679	6	0	1674	350	21
Bein	216	77	94	266	27	0	680	205	30
Sibiri	188	192	124	162	4	0	670	117	17
Doko	239	115	85	320	38	0	798	141	18
Doghorro	346	344	189	326	55	0	1260	204	16

Average livestock per household in Basha valley is 20, which has decreased by 35% over the last five years, as it was 30 animals per household five year back (2009). Percentage of milking cattles (cow and zomo) in the herd is 34% only. The reasons of decrease in livestock numbers per household are:

- Lack of household labour 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 table:

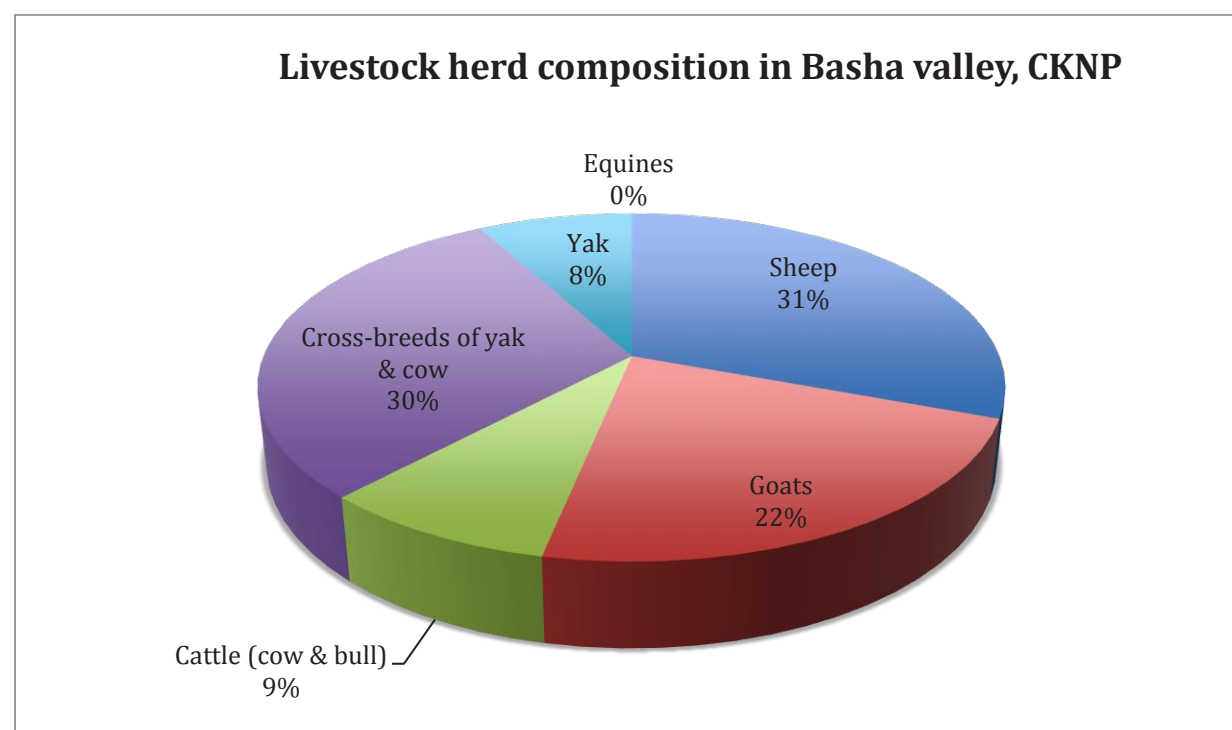
Villages	Sheep	Goats	Cattle (cow, bull)	Crossbreed of yak and cow	Yak	Equines (donkeys and horses)	Total	Milking cattle
Arandu	26	18	3	16	9	0	72	12
Bisil	2	2	1	5	1	0		3
Saisko	3	3	2	4	0.1	0	12	3
Zil	5	4	2	8	0.1	0	19	4



Bein	3	1	1	4	0.4	0	11	3
Sibiri	3	3	2	3	0.1	0	10	2
Doko	4	2	1	5	1	0	12	2
Doghorro	3	3	2	3	1	0	11	2

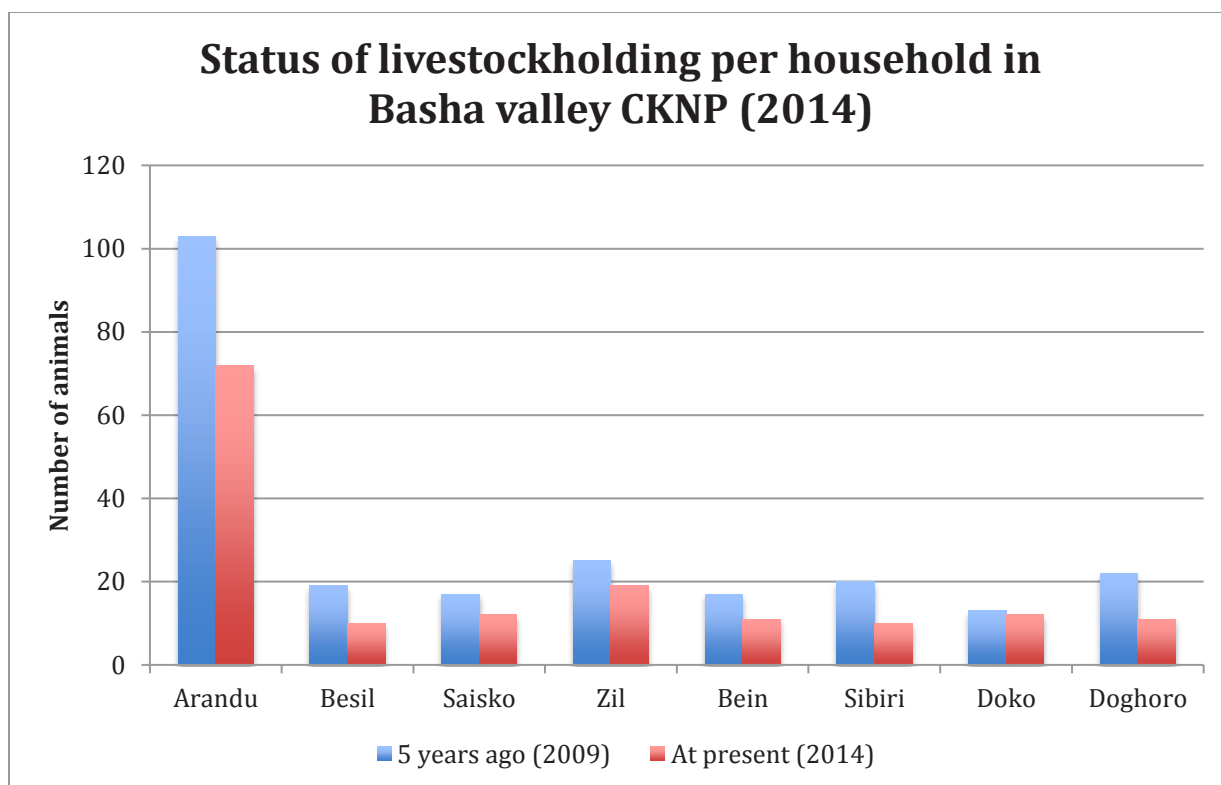
Herd composition in Basha valley shows that sheep are the dominant animal type followed by cross-breeds of cow, goats, cattle and yak. Equines are absent in Basha valley.

Trend in livestock populations and numbers over the past five years



Status of livestock holding in Basha valley is also given in the following table and figure:

Villages	Average herd size 5 year ago	Average Herd size (at present)	Difference (%)
Arandu	103	72	30
Bisil	19	10	47
Saisko	17	12	29
Zil	25	19	24
Bein	17	11	35
Sibiri	20	10	50
Doko	13	12	8
Doghorro	22	11	50
Average	30	20	34



### 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 valleys, only the herds travel with the people necessary to tend them. There are defined customary laws for seasonal movement of livestock to 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 pasture 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 April-May some stockholders take their animals on daily movement to transitional pastures. When the field are ploughed zo are driven to high elevation pasture where they 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 after crops have been harvested. Almost from mid-September some of the stocks e.g. cow goat and sheep driven down to spring seasoned pastures (Yul Bloq) at the end of September in most of the valleys. Cattle 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 take the responsibility of these livestock at the pasture during the season turn

by turn from each household. In some particular cases herdsman 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 valleys where Yak and non-lactating cow graze together more or less unattended. The crossing of animals is thus made easier and desired. 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. They 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.

A summary of feeding, grazing pattern and seasonality is given in the following tables:

#### Arandu

Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring (April-May), depending upon snowfall	Sheep	✓	✓	✗	Controlled grazing in pastures near to village by owners turn by turn at daily basis
	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
Summer (June to Mid-October)	Sheep	✓	✗	✗	Controlled grazing in high pastures by group of 10-20 owners/shepherds including young boys
	Goats	✓	✗	✗	Controlled grazing in high pastures by group of 10-20 owners/shepherds including young boys
	Lactating cattle including cow and zomo	✓	✗	✗	Controlled grazing in high pastures by group of 10-20 owners/shepherds including young boys
	Non- lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures

Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Autumn (Mid October- Early December) depending upon snowfall	Sheep	✓	✗	✗	Controlled grazing in pastures near to village by owners turn by turn at daily basis
	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	✗	✗	✓	Mostly remain in cattle shed during heavy snowfall, except for taking out for drinking water
	Goats	✗	✗	✓	Mostly remain in cattle shed during heavy snowfall, except for taking out for drinking water
	Lactating cattle including cow and zomo	✗	✗	✓	Mostly remain in cattle shed during heavy snowfall, except for taking out for drinking water
	Non- lactating cattle and yak	✗	✗	✓	Sometime let outside the cattle shed

#### Bisil:

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 Arandu (Bural, Chimalcho) tended by owners turn by turn at daily basis

Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
	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 and early Autumn (June to End October)	Sheep and goats	✓	✗	✗	Rotational grazing by 60 male shepherds in high pastures
	Lactating cattle including cow and zomo	✓	✗	✗	Rotational grazing by 60 male shepherds in high pastures
	Non- lactating cattle and yak	✓	✗	✗	Free ranging/grazing in high pastures namely Piyung (Chamanabad cattle) and Dangalter Nullah (Gulshanabad cattle)
Late autumn and Winter (Nov-Dec to March) depending upon snowfall	Sheep and goats	✓	✓	✗	Grazing in pastures near to village and across the river. Or in case of heavy snowfall stay inside corrals
	Lactating cattle including cow and zomo	✗	✗	✓	Mostly remain in the village or in cattle shed during heavy snowfall, except for taking out for drinking water
	Non- lactating cattle and yak	✗	✗	✓	Sometime let outside the cattle sheds

#### Doghor:

Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
Spring (April-May)	Sheep and goats	✓	✓	✗	Controlled grazing in pastures adjacent to village by owner himself individually

Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
	Lactating cattle including cow and zomo	✓	✓	✗	Moved to Hobodas area for guarded grazing by 11 paid herders who are also livestock owners themselves
	Non- lactating cattle and yak	✓	✗	✗	Moved to Goorikha area for free grazing
Summer (June to Aug)	Sheep and goats	✓	✗	✗	Guarded grazing in high pastures by 11 paid grazers who are livestock owners themselves
	Lactating cattle including cow and zomo	✓	✗	✗	Guarded grazing in high pastures by 11 paid grazers who are livestock owners themselves
	Non- lactating cattle and yak	✓	✗	✗	Free grazing in high pastures (Goorikha) but zo are brought back to village in Aug
Autumn (Sep-October)	Sheep and goats	✓	✗	✗	Guarded grazing in intermediate pastures by 11 paid grazers who are livestock owners themselves
	Lactating cattle including cow and zomo	✓	✗	✗	Guarded grazing in intermediate pastures by 11 paid grazers who are livestock owners themselves
	Non- lactating cattle and yak	✓	✗	✗	Zo remain in the village and taken care by owners themselves
Winter (Nov-Dec and Jan-March)	Sheep and goats	✗	✓	✗	Grazing in pastures near to village by owners themselves individually or remain inside cattle sheds during heavy snowfall
	Lactating cattle including cow and zomo	✗	✗	✓	Free grazing in village and taken care by owners themselves individually or



Season	Livestock types	Grazing in pastures	Partly stall feeding	Fully stall feeding	Grazing pattern
					remain inside cattle sheds during heavy snowfall
	Non- lactating cattle and yak	X	X	✓	Free grazing in village and taken care by owners themselves individually or remain inside cattle sheds during heavy snowfall

### 1.7.3 Status of livestock vaccination in Basha 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	
Arandu	3089 sheep, goats and cattle collectively			(dysentery, pleuropneumonia, food & mouth)			WWF/Ev-K2-CNR
Bisil	17	17	23	Lungs & Skin Disease, thyroid, Stomach and Dysentery, Pox & PPR	PPR, Pox, Lungs Disease, Diarrhoea, Dysentery	Dysentery, Lungs disease, Pox and PPR	BWCDO, AKRSP, WWF/Ev-K2-CNR,
Doghoru	57	57	62	Lungs & Skin Disease, Stomach and Dysentery, Pox & PPR	PPR, Pox, Lungs Disease, Diarrheic, Dysentery	Dysentery, Lungs disease, Pox and PPR	BWCDO, WWF/Ev-K2-CNR

BWCDO organized vaccination campaigns in almost all the villages of Basha except Arandu, which was later covered by WWF under SEED Project for vaccination/ treatment campaigns.

AKRSP under the framework of SEED Project has established a Village Input Store in Zil village, aimed at providing basic treatment and extension services to the local people in the whole Basha valley.

### 1.7. 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– 3500m). 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 cattle sheds and stall fed in case of heavy snowfall.

### 1.8.1 Name, location, surface area, facilities and use of pastures

#### Arandu village

ID	Name	Coordinate (at pasture center)		Altitude (m)	Estimated surface (hac)
		E	N		
1.	Lumkha	75.328605	35.865083	2768	651.69
2.	Stangkha	75.252450	35.843518	3680	2745.81
3.	Khwarltoq	75.258915	35.784828	4059	
4.	Urdoding	75.257297	35.776327	4065	
5.	Bakun	75.195103	35.928540	4035	4413.87
6.	Manpikhora	75.162237	35.943033	4082	
7.	Ghorobrasa	75.317044	35.925459	3281	1727.82
8.	Chemendoq	75.085481	35.943239	4301	
9.	Aliyarbrangsa	75.319329	35.875679	2823	6585.03
10.	Ghorebrangsa	75.133044	35.951898	4105	
11.	Shukthangkhu	75.320580	35.932293	3354	
12.	Haremalcho	75.310485	35.936335	3373	
13.	Domoq	75.303831	35.954261	3514	
14.	Sangchu	75.290815	35.971947	3629	
15.	Chuwangledaq	75.324299	35.944169	4231	
16.	Khaldor	75.319191	35.967336	4415	
17.	Chonda	75.326781	35.974868	3997	
18.	Around village	75.3326	35.864829	2780	1530

#### Bisil Village

Id	Name	Coordinate (at pasture center)		Altitude (m)	Estimated surface	Facilities <sup>1</sup>
		E	N			
1.	Booral	75.372178	35.873471	2848	1056.42	7 small accommodations, 30 small cattle sheds, 3 open corrals
2.	Birehlter	75.402687	35.882174	3019	1576.98	
3.	Arehlter	75.422550	35.871347	3697		32 small accommodations, 32 small cattle sheds, 1 open corral
4.	Chumik	75.410118	35.878800	3317		32 small accommodations, 32 small cattle sheds, 1 open corral
5.	Niatica	75.438933	35.886621	3813	630.30	32 small accommodations, 32 small cattle sheds, 1 open corral
6.	Tsukha	75.409085	35.916268	3419	1414.80	45 small accommodations, 1 small cattle shed, 9 open corral
7.	Pakora	75.402481	35.929526	3399	332.45	9 small accommodations, 9 small cattle sheds, 1 open corral
8.	Sughlo	75.387717	35.925557	4346	362.43	12 small accommodations, 12 small cattle sheds, 10 open corrals
9.	Piyung	75.380519	35.916629	4480	320.50	4 small accommodations, 7 small cattle sheds, 2 open corral
10.	Dangalter				396.10	--
11.	Sthangshing broq (in front of the village across the river)	75.391759	35.867898	2657	430.23	---

## Doghor

<b>Id</b>	<b>Name</b>	<b>Coordinate (at pasture center)</b>	<b>Altitude (m)</b>	<b>Estimated surface (hac)</b>	<b>Facilities<sup>1</sup></b>	<b>Other use<sup>2</sup></b>
1.	Hobodas	75° 22' 56.71" E 35° 43' 45.57" N	3558	57.10	5 small accommodations, 10 closed cattle sheds, 1 open corral for livestock	Dung
2.	Massik	75° 21' 58.25" E 35° 44' 13.26" N	4312	36.94	7 huts	-
3.	Goorikha	75° 22' 27.72" E 35° 44' 48.68" N	3731	39.23	4 small accommodations, 1 close cattle shed, 1 open corral for livestock	-
4.	Bas pang	75° 25' 27.00" E 35° 45' 59.22" N	4096	103.43	1 small accommodation and 1 corral improved by BWCDO	-
5.	Lungma	75° 27' 22.42" E 35° 45' 30.21" N	5021	48.20	5 small accommodations, 6 close cattle sheds, 1 open corral for livestock	Herbal tea leaves
6.	Ghorobroq	75° 27' 12.68" E 35° 44' 43.58" N	4646	83.06	6 small accommodations, 1 open corral for livestock	-

### 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 charged for grazing animals from outside the village in the valley is given in the following table:

<b>Village</b>	<b>Pasture Name</b>	<b>Period</b>	<b>Animal types</b>	<b>Number</b>	<b>Grazing fee value</b>	<b>Name of villages from where animals are brought</b>
Arandu	For the last 10 years no animals from other villages are brought to Arandu for grazing					
Bisil	Arehlter, Birehlter, Dabadas, Khargos	May-Oct	Zomo and few cows	+100 (2013)	The grazer gets the excess butter (ghee) after providing 3kg/month/animal to teh owner.	Tissar, Gulapur, Thorgo, Diamal
Doghorro	Arehlter, Birehlter,	May-Oct	Zomo and cow)	+100 (2013)	The grazer gets the excess butter (ghee) after providing	Tissar, Gulapur, Thorgo, Diamal





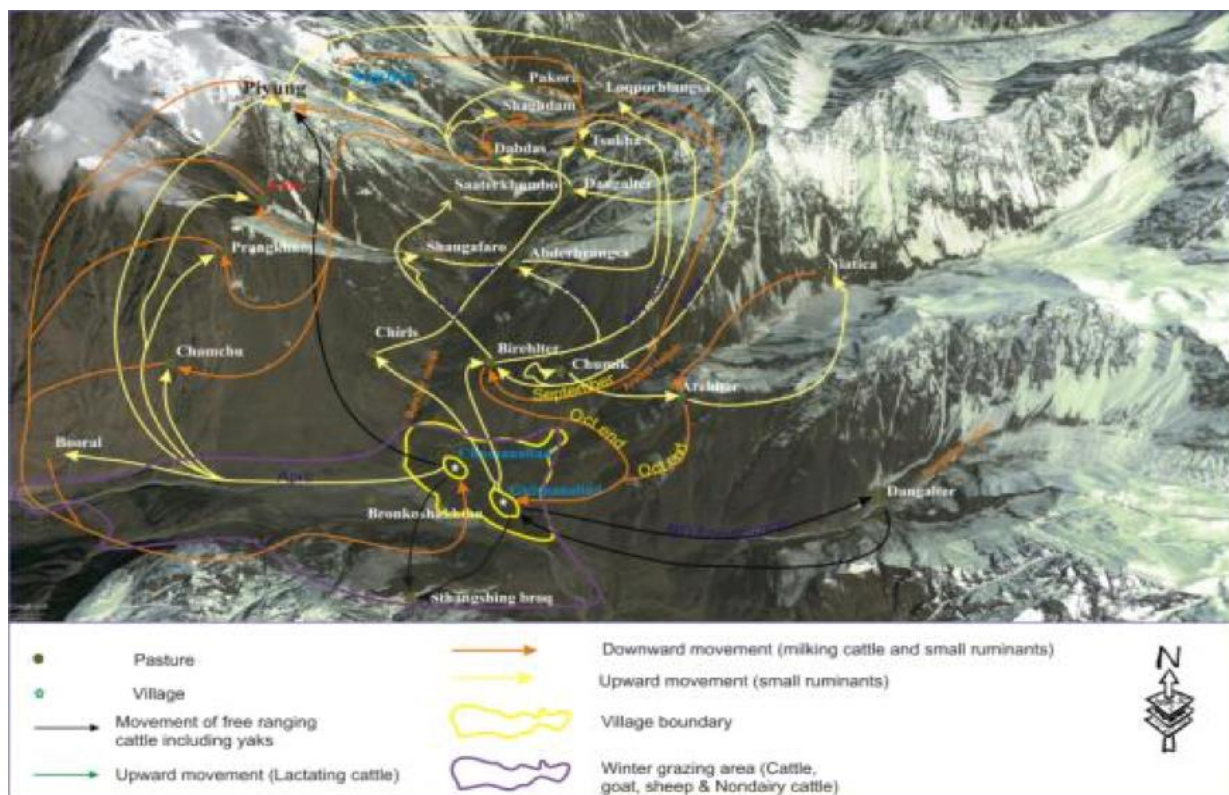


Figure 13 Grazing cycle Bisil village

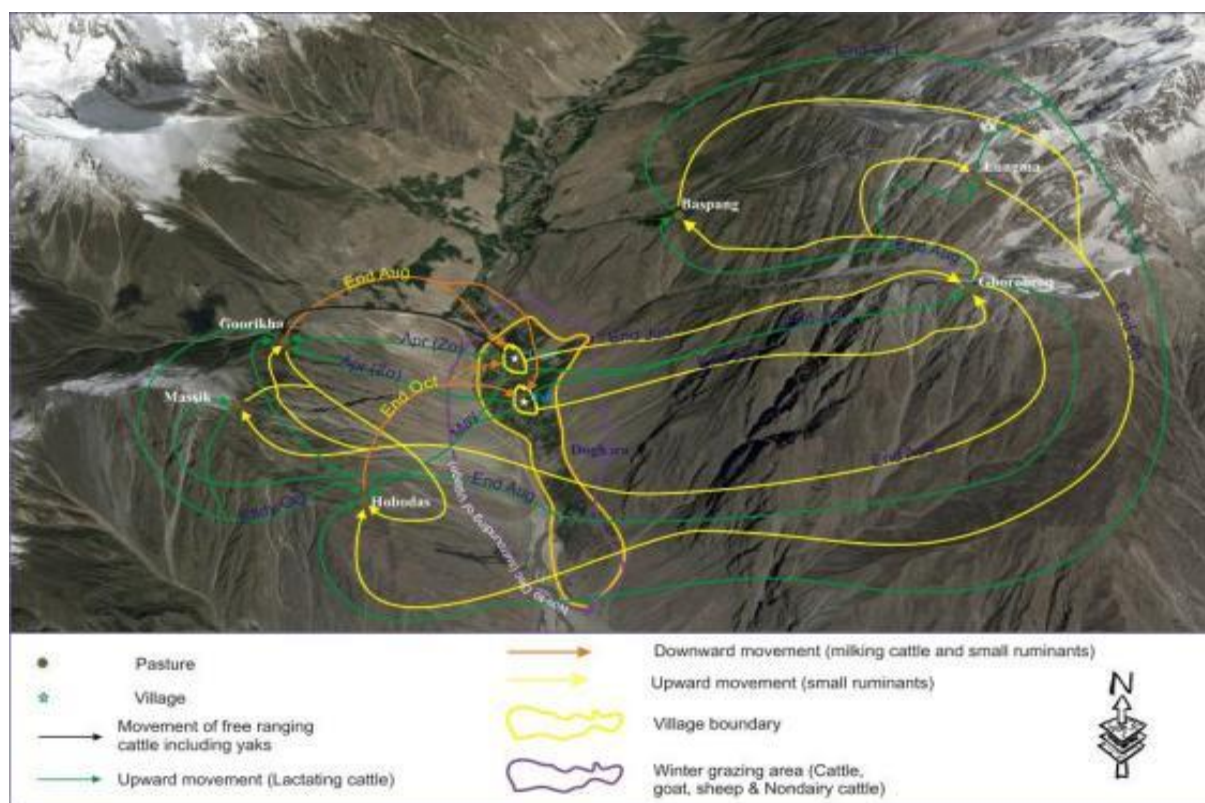


Figure 12: Grazing cyle Doghoro village



## 1.8. Wildlife

### 1.9.1 Numbers and status

Village	Species	Estimated Numbers	Source of Information
Arandu	Ibex	200-300	(FGD participants)
	Musk deer	Not known	Animals seen quite often (FGD participants)
	Snow leopard	Not known	Sign are seen quite often (FGD participants)
	Grey Wolf	Not known	Animals seen quite often (FGD participants)
	Brown bear	Not known	Animals are seen in Wakhut area
Bisil	Ibex <i>Capra ibex sibirica</i>	50-70	FGD Participants
	Snow leopard <i>Panthera unica</i>	Not known	Signs have been frequently seen in the village
	Grey Wolf <i>Canis lupus</i>	Not known	Wolf predations have also been observed
Doghorro	Ibex	130-150	WWF/CKNP seasonal survey 2014, Lungma and Banspang pastures are best grazing grounds for Himalayan ibex. Except Arandu ibex from most of other villages of Basha use to these pastures. Participants of FGD.
	Snow leopard	Not known	People of Doghorro (FGD participants)
	Grey Wolf	Not known	-

## 1.9. Forests and forestry

### 1.10.1 Forest cover and composition

Basha valley like other areas of District Skardu comprises mainly of rugged and barren lands, dominated by Artemisia covered slopes and devoid of natural forests. However, Arandu is the only village in the valley, one of the uniquely forested areas in central part of CKNP. Basha valley is third in terms of vegetation cover in Baltistan after Tormik and Stak and comparatively more vegetated than other villages of Shigar. Vegetation cover in Basha area (1668 km<sup>2</sup>) comprises of only 58.34 km<sup>2</sup> of closed forests, which is 3.5% of the total surface area of the valley. Open forests are spread on 98.04 km<sup>2</sup> (5.9% of the surface area) while sparse vegetation

on 242.49 km<sup>2</sup> (14.5% of the surface area)<sup>12</sup>. Average biomass and increment calculated for each of the vegetation class is given below<sup>13</sup>:

Vegetation class	Increment (Mg ha <sup>-1</sup> yr <sup>-1</sup> )	Biomass (Mg ha <sup>-1</sup> )
Sparse trees	0.910	29.37
Open forests	1.528	50.93
Closed forests	2.714	104.39

In Basha valley Arandu village has the highest forest cover mainly consisting of sub-alpine broad leaved forests, comprising of Birch (*Betula utilis*), Juniper (*Juniperus* sp.) and or willows (*Salix* sp.), scattered at 3300-3800 m on north exposed valley sides. These forest patches heavily rely on snow accumulation and avalanches for water availability. 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*.

### 1.10.2 Use of forests for timber and fuelwood

An assessment of timber use by 204 households in Basha valley showed that 30% of the households had some sort of timber use for construction (houses and cattle shed) during the last five years (2010-2014). Use of timber for construction (houses and cattle shed) in Basha valley is on average 6 logs or 22 CFT/household/year (n=207 households). This is equivalent to 4770 logs or a total volume of about 16,697 CFT per year extracted by 30% of the total 756 HH (excluding Arandu). Except Arandu village, 97% of the total timber is obtained from plantations while 3% from natural forests. 57% of the timber is extracted from a household's own plantation while 43% is purchased locally or from nearby valleys like Tissar or Shigar, comprising of poplar and willows. The 3% of the timber from natural forests is equivalent to 599 CFT and majority of which is extracted in Bisil.

In Arandu village the total timber requirement for construction is about 900 CFT/year by 30% of the 135 households. 40% is bought from other villages of Basha valley. The rest of 60% comprising of about 541 CFT is arranged locally of which 70% timber (equivalent to about 379 CFT/year) is extracted from natural forests while only 30% (162 CFT) from farm forestry. Locally the timber is acquired from trees species including Juniper followed by willows, poplar

<sup>12</sup>IPMP for CKNP (2014). Developed by Ev-K2-CNR, Islamabad, Pakistan

<sup>13</sup> 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, Islamabad, Pakistan

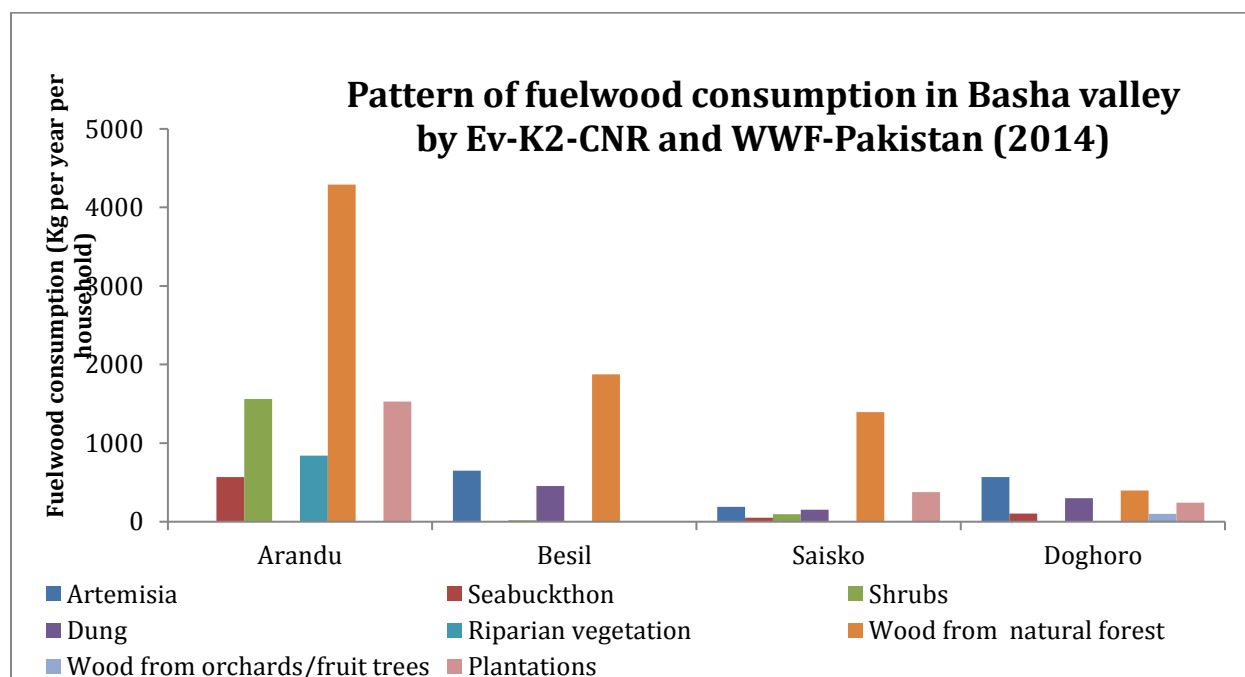
and Birch. Birch wood is usually used for cattle sheds. Customary laws regarding use of timber from natural forests is given in section 1.15.

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

Village	Timber consumed on construction of houses in the last five years	
	Number of logs	Volume (CFT)
Arandu	1230	4305
Bisil	1450	5075
Doghorro	1070	3745

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 Arandu and Bisil. Average quantity of fuelwood consumption in Basha valley is 11 kg/HH/year with highest in Arandu (24 kg/HH/year) and lowest in Doghorro (5 kg/HH/year). Consumption of fuelwood increases with increasing elevations, seasonal severity and magnitude of snowfall.

An analysis of various sources of fuelwood in Basha valley is given in the following figure:



## Areas of Fuelwood collection from natural forests

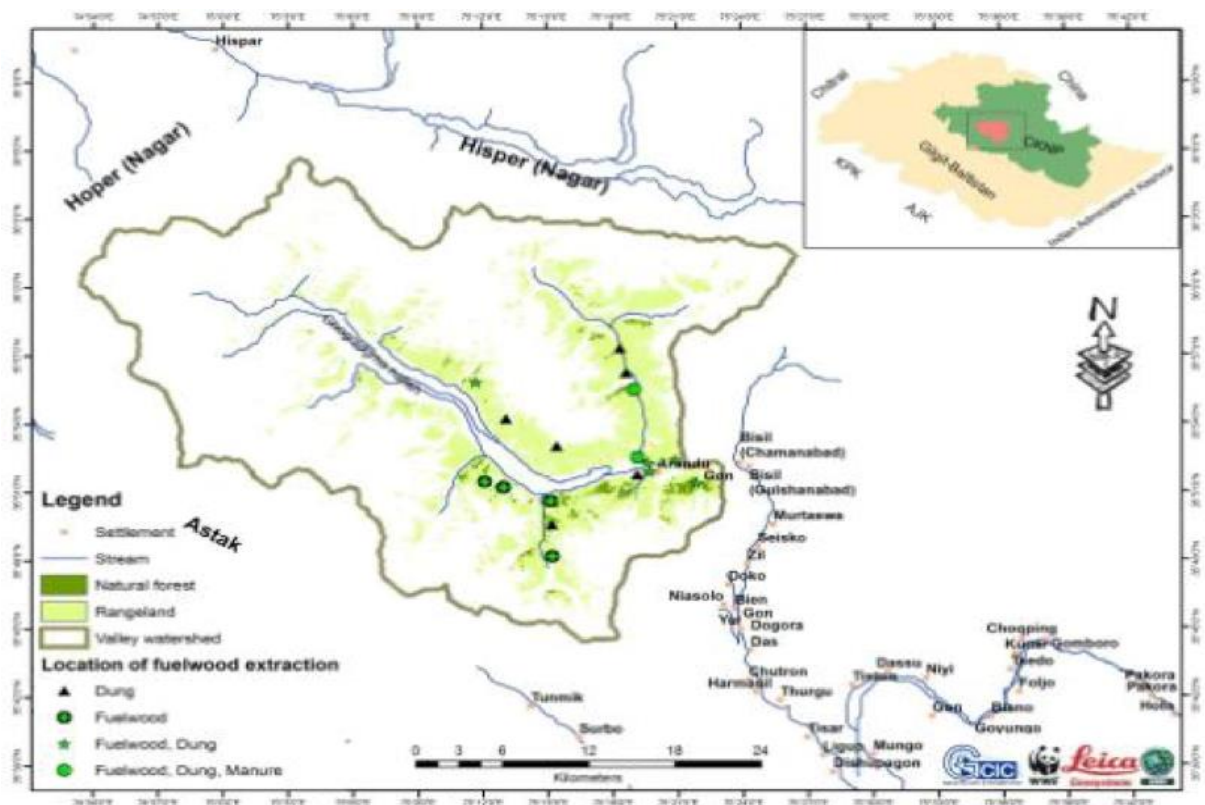


Figure 15 Fuelwood collection areas in Arandu village

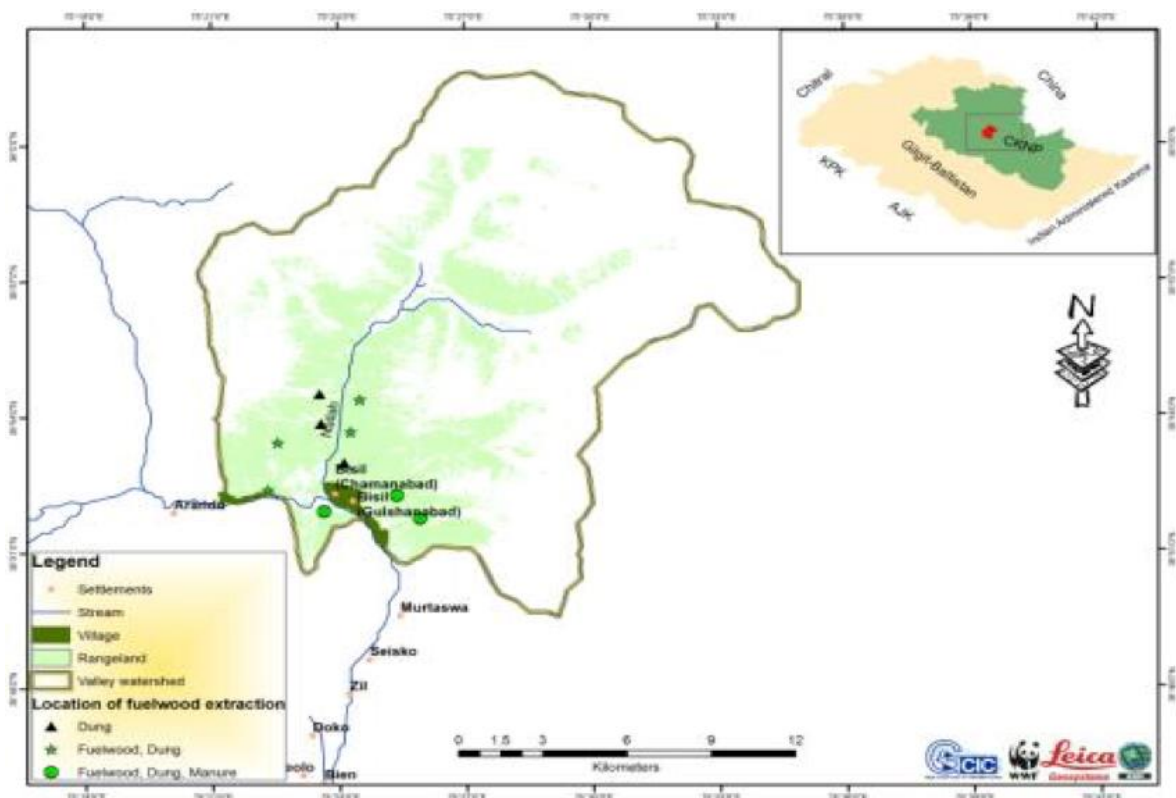


Figure 14 Areas of fuelwood collection in Bisil village

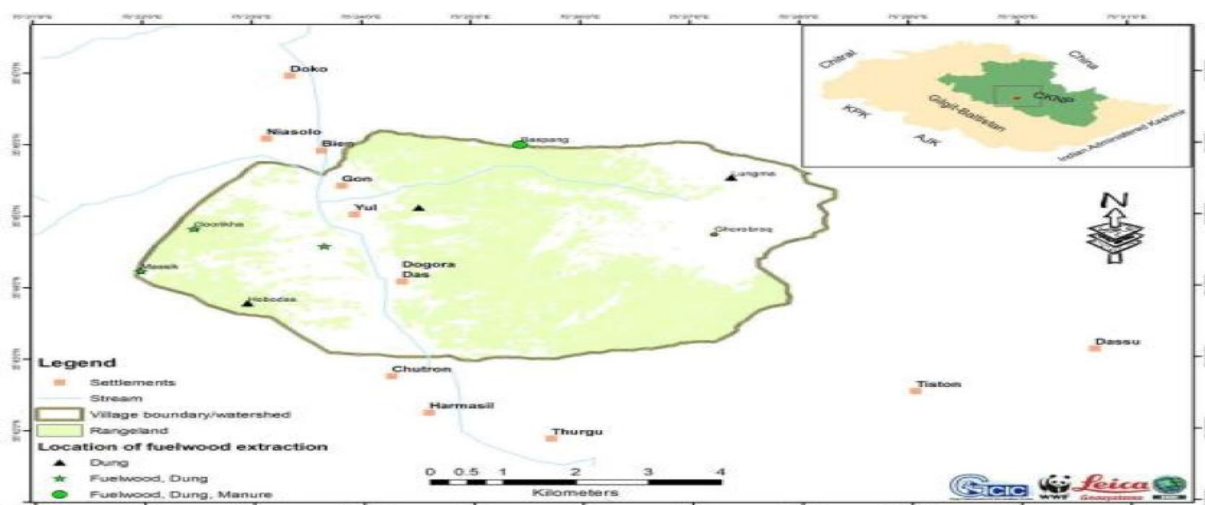


Figure 16 Areas of fuelwood collection in Doghoro village

### Social forestry interventions under SEED Project

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:

Villages	Site Name	Coordinates	Alt. (m)	# of trees	Area (Kanal s)	Spacing <i>distance between trees</i>  Average diameter (cm at person shoulder) and high (m) <i>estimated</i>			Concern CBO	Planting year
						Species	Dia m (inch )	Hig h (ft.)		
Arandu	Panjar difoq (Arandu Gon)	75°22'15.89" E, 35°52'7.80" N	2740	300 Popula r 100%		popula r	6	7	Mr. Fida (tourist guide) through Basha LSO	2014
	Khorfumba	75°20'21.67" E, 35°52'12.68" N	2745	Popula r 100%		Popula r	4.5	6	Mr. Fida (tourist guide) through Basha LSO	2014

Villages	Site Name	Coordinates	Alt. (m)	# of trees	Area (Kanal s)	Spacing <i>distance between trees</i>  Average diameter (cm at person shoulder) and high (m) <i>estimated</i>			Concern CBO	Planting year
						Species	Dia m (inch )	Hig h (ft.)		
Bisil	Chutak	75°24'29.46" E, 35°51'59.02" N	2697	60090 % willows 10% poplar	3	willow	4.5	5	Village conservation Committee Bisil, Basha	2014
	Chutak	75°24'29.46" E, 35°51'59.02" N	2697	50090% poplar 10% willows	3	popula r	4	6	Village conservation Committee Bisil, Basha	2014
	Arbabsa	75°24'34.02" E, 35°51'57.51" N	2708	700100% poplar	1.5	popula r	4.3	6.2	Village conservation Committee Bisil, Basha	2014
	Mozgo hisa	75°24'34.02" E, 35°51'57.51" N	2708	700100% willows	2	willow	7	8	Village conservation Committee Bisil, Basha	2014
Doghor	Hungo Pikhori	75°23'49.48" E, 35°45'33.21" N	2495	80% willow & 20 % popula r	2	Willo w	4.7 inch	9 feet	Village Conservati on Committee Doghor	2012
	Hungo Pikhori	75°23'49.48" E, 35°45'33.21" N	2495	Popula r 20% Willo ws 80%	2	Popula r	5 inch	11 feet	Village Conservati on Committee Doghor	2012



Villages	Site Name	Coordinates	Alt. (m)	# of trees	Area (Kanal s)	Spacing <i>distance between trees</i>  Average diameter (cm at person shoulder) and high (m) <i>estimated</i>			Concern CBO	Planting year
						Species	Dia m (inch )	Hig h (ft.)		
	Shalma	75°24'4.84"E , 35°45'32.16" N	2645	55 % willow 45 % popula r	1	willow	4 inch	5 feet	Village Conservati on Committee Basha	2014
	Shalma	75°24'4.84"E , 35°45'32.16" N	2645	45% popula r	1	popula r	5 inch	7 feet	Village Conservati on Committee Doghoro	2014

## 1.10. Mining Sector

### Arandu

- Since 1993, but more rigorously since 1998
- Number of mining groups: 40-50
- Total components for groups: 3-4 persons per group including one cook and rest labourers.
- Average revenue per group in rupees: In the initial years it used to be 100,000-200,000 but now 80,000 to 100,000

Type and quantity of mines and minerals extracted

Type and quantity per year: Quartz (1000 kg), Saveen (60-300 pieces), Diapsite (100-200 kg), Rotile (50-100 kg), Apetitle (50-100 kg), Tanzanite (40-50 kg)

### Bisil

- Since: 1999-2000
- Number of mining groups: 7-10 both from Chamanabad and Gulshanabad
- Total components for groups: Machine owner, dynamite provider, labourers (4 persons per group)
- Total revenue in rupees (since its beginning): 6,5000,000-13,000,000
- Average revenue per group in rupees: 500,000-1,000,000

Type and quantity of mines and minerals extracted: Garnet, Aquamarine, Quartz, and Rotite

Quantity: Unknown

### Doghorro:

- a) Since 2002-3
- b) Number of mining groups: 14 (4-6/group)
- c) Total components for groups: Machine owner, dynamite provider, labourers
- d) Total revenue in rupees (since its beginning): 80,000,000-100,000,000
- e) Average revenue per group in rupees: 1,000,000-1,300,000/year

Name of mining areas are Hobodas, Lungma, Bangspang, Goorikha. Women are also involved in mining, primarily in transportation of copper from Bangspang area. They carry the mineral in baskets on their back.

Types of mineral extracted are Copper, Quartz, Aquamarine, Booraj and Tourmaline. There is not a fair idea about quantity extracted each year.

Quantity: unknown

### 1.11. Tourism

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

Facilities	Arandu	Bisil	Doghorro
Accommodation	Nil	LG & RD Rest House, 2 bed and bath	No proper Accommodation
Campsites	Nil	Umcharat (but without any facility)	Nil
Services	Guides: 1 (Fida Ali) Porters: 200 Cooks: 2 Cooks Assistant: 5	Guides: 0 Porters: 150 Cooks: 4 Cooks Assistant: 6	Guides: 0 Porters: 50 Cooks: 2 Cooks Assistant: 3

### 1.12. Local Management Institutions (LMIs) in the Valley

Local Management Institutions responsible for traditional governance system in the Bashavalley is called *Tsarma* (or *Jirga*), run through *Tsarma* (notables or representatives) selected collectively by the village people or on hamlet level by inhabitants of a particular hamlet. The *Tsarma* are mostly selected through mutual consensus for a period of one-three 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.

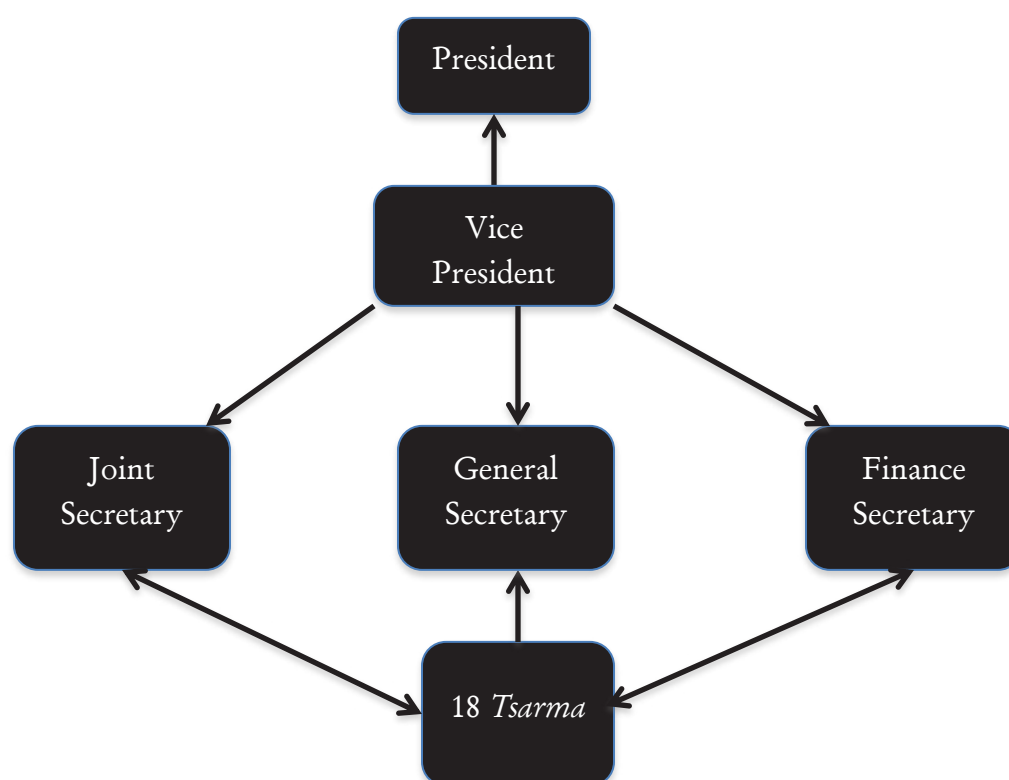
Structure of local governance system in the valley is given in the following table:

Village	Number of Stranso	Number of Tsarma	Other members	Total members	Headed by
Arandu	Not specified	18 including a vice president, a general secretary, a joint secretary and a finance secretary,	-	18	President
Bisil	Not specified	5-6	1 Namberdar (Trangpa), 1 UC member, 4 teachers, 1 representative of VCC, 4 religious leaders	17	Collective decision under Elm-o-Amal Organization, however most of the decision regarding natural resource are taken by Tsarma unanimously
Saisko	5	At village level 5 At hamlet level 9 (Centre 3, Sajjadabad 2, Hassanabad 2, Ombochoq 1, Monoco 1)	UC member 1, Sheikh 1	At village level 8	Decision are taken unanimously by the body at village level
Zil	-	2	-	2	Unanimous decision
Bein	-	3	Mirwaiz/Sheikh	4	Mirwaiz/Sheikh
Doko	-	10	Trangpa	11	Trangpa
Sibiri	-	12	-	12	Collective decision. (But since last four year the LMI has not been effective)
Niasolo	-	6	-	6	Collective/unanimous decision
Doghoru	Not specified	4 at village level and 7 at hamlet level	-	11	Sheikh/Mirwaiz (Religious leader)

Some details of the LMIs in selected villages is given as under

### Arandu

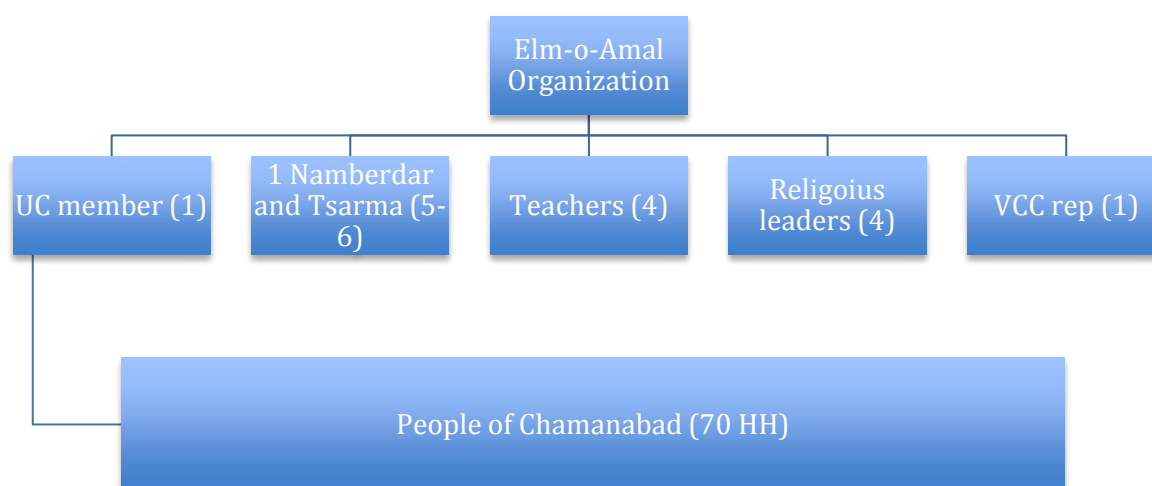
Traditionally the local governance system in the village is run through the *Tsarma* (notables), nominated by the local community through mutual consensus. *Tsarma* in Arandu village comprises of 18-member committee of which they select a president, a vice president, a general secretary, a joint secretary and a finance secretary, while the remaining work as members. Women are not represented in *Tsarma*. At the same time there is also a parallel organization called *Tanzeem*, comprising of 35 members including 3-4 women. Their ToRs are clearly spelt out and the *Tsarma* and *Tanzeem* do not interfere in each other's matters. Religious leaders, though not represented in the *Tsarma* or a *Tanzeem*, but have a major role to influence decisions at village level.



## Bisil

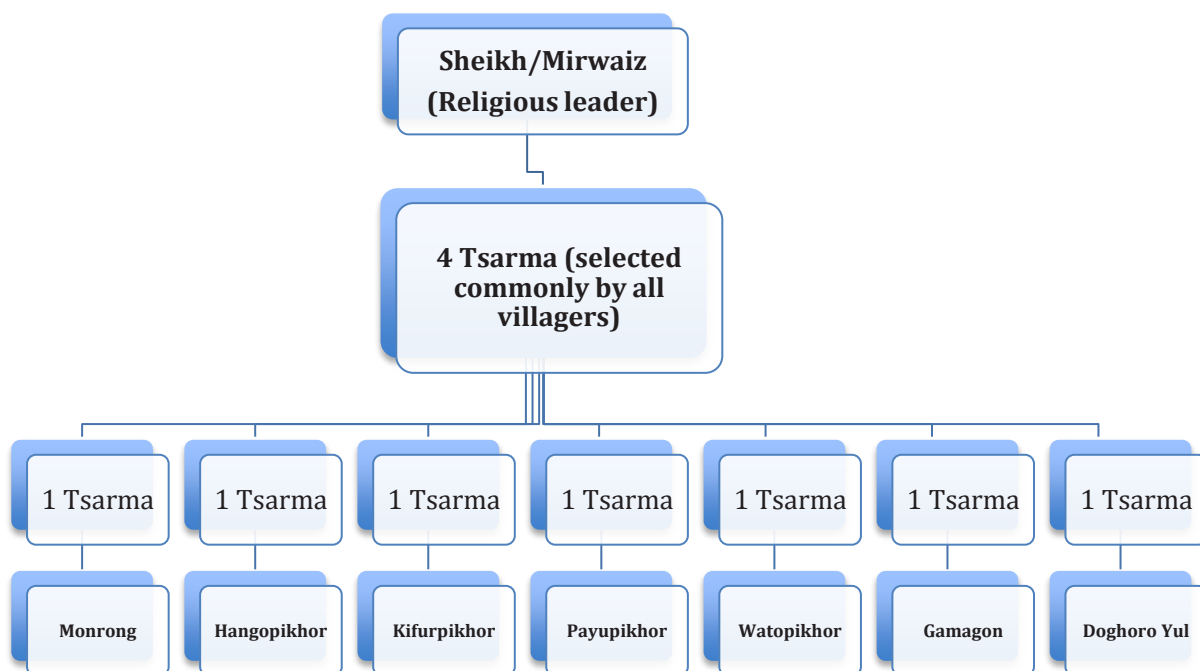
Traditionally the local governance system in the village was run through *Tsarma* (notables), nominated by the local community through mutual consensus. Now the traditional governance system is run under an organization, known as Elm-o-Amal Organization, which in addition to 5-6 *Tsarma* also contains one member of UC, four Religious leaders, four teachers and one VCC representative. Decisions are taken collectively with mutual consensus. Most of the decisions regarding natural resources are taken by *Tsarma* through customary laws, however, other members like religious leaders or teachers are involved when a matter of serious nature needs to be deliberated. A schematic diagram of the local governance in Chamanabad village of Bisil is given as under:

Opinion of religious leaders is highly valued and thus in all major decisions religious leaders are taken onboard. For any organization that wants to initiate some interventions in the village, the first point of contact should be Namberdar (*Trangpa*).



## Doghoroo

Traditionally the local governance system in the village was run through *Tsarma* (notables), nominated by the local community through mutual consensus. The *Tsarma* are at hamlet level as well as at the entire village level. At village level they are selected by consensus of the whole community of the village and work under the overall guidance of Sheikh/Mirwaiz (religious leader). At village level there are four *Tsarma* to deal with common matters while at the hamlet level the *Tsarma* is responsible to run the matters of a particular hamlet. A schematic diagram of the local governance in Doghoroo village 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*
<b>Arandu</b>		
Pasture	Grazing cycle management	10
Forests	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	Fix dates/duration of irrigation water flow in certain channels	10
<b>Bisil</b>		
Pasture and livestock	Grazing cycle management	9
Forests	Regulating duration/location of harvest and quantity	10
Land resources	Division of new lands brought under cultivation among village people, conflict resolution on individual and communal lands	10
Water resources	Maintenance of hot spring, equitable distribution of irrigation water through various channels	10
Mining	To make sure that no any outsiders works in the area without permission of the Tsarma and payment of the specified fee	8
<b>Doghoru</b>		
Pasture	Grazing cycle management	9
Forests	Ban on green wood cutting	10
Land resources	Division of new lands brought under cultivation among village people, conflict resolution on individual and communal lands	10
Water resources	Maintenance of hot spring, equitable distribution of irrigation water through various channels	10
Mining	To make sure that no any outsiders works in the area without permission of the Tsarma and payment of the specified fee	8

\*('1'- not effective, '10'- extremely effective)

### 1.14. Use rights of natural resources and associated customary laws

Theme/Area	Customary laws/restrictions	Enforced by
<b>Arandu</b>		
Grazing areas/pasture use/livestock migration, guarding	<p>Grazing cycle management.</p> <p>Ban on free grazing in the village during cultivation season by deputing a person called <i>Brapa</i> (like a watcher). Brapa, paid by all households of the village @ 1kg ghee (butter) per household, is responsible to keep an eye on freely grazing animals in the village that is harmful to agricultural fields or plantations. If found such an animal or even a chicken fine is imposed @ Rs. 50/cattle, Rs. 20/goat and Rs. 10/chicken.</p> <p>For the last 15 years livestock from other villages have been completely banned to graze in Arandu pastures and locals have been warned not to bring animals from other villages for grazing. If a local is caught bringing such animals from another village a fine of Rs. 1000 is imposed.</p>	Tranma
Fuelwood harvesting from natural forests	Collection of fuelwood is allowed only in spring (April-May) and autumn (Oct-Nov).	Tsarma
Timber harvesting from natural forests and use	Timber is allowed to be cut from natural forests if someone genuinely needs it for construction of a house or cattle shed. Without such a genuine need if someone cuts a tree for timber, fine is imposed @ Rs. 1500/large tree and Rs. 500 per small tree	Tsarma
Use of water resources	Regulate flow of water in channels through a proper timetable	Tsarma
Mining	Ban on outside miners. Resolution of conflict caused during uses of a specific mining area or during marketing	Tsarma
NWFPs including MAPs collection	Black cumin and Mashroom ( <i>Asparagus</i> ) are collected from the village pastures but not properly regulated.	Tsarma
<b>Bisil</b>		
Grazing areas/pasture use/livestock migration, guarding	Grazing cycle management, ban on free grazing during cultivation	Tsarma
Fuelwood harvesting from natural forests	Duration in a year is fixed to collect firewood, i.e. one month in autumn (Oct-Nov) and one month in spring (May). In case of non-availability of dry wood, standing trees/bushes/shrubs are cut in spring (May) and left there to be dried, which are brought to the village in autumn (Oct-Nov). Quantity is not fixed;	Tsarma

Theme/Area	Customary laws/restrictions	Enforced by
	it depends upon household consumption and household labour to fetch as much in quantity as possible. If someone does not have manpower in the family/household to fetch wood, they hire labour for firewood collection. Sale of firewood is banned.	
Timber harvesting from natural forests and use	<p>Specified time period for harvesting of timber is one month in autumn (October-November) and one month in spring (May). A person who attempts to harvest timber other than the specified duration, a fine of Rs. 100-5000 is charged keeping in view magnitude of the violation.</p> <p>For construction of houses the specified trees are Junipers (Shuqpa) and Pines (Sthangshing) while for cattle shed Birch (Staqa) and Salix are allowed.</p> <p>A village person in want of timber to construct a house or a cattle-shed gets verbal permission from Tsarma. A poor person is considered most deserving to avail timber from natural forests free of cost, whereas those who can afford to buy timber from market are discouraged to apply for timber of natural forests or such a person is charged Rs. 2500-4000 per tree.</p> <p>This amount is deposited in Tsarma's account and used for any welfare activity such as education of a poor student, treatment of a needy person or any common cause such as repair of water channel, repair and maintenance of hot spring and repair of pavements, etc.</p>	Tsarma
Use of water resources	<p>All irrigation water channels in the village are repaired and maintained by all villagers collectively. Drinking water tank and pipe line is maintained by three households of the village turn by turn who are paid by the village people collectively.</p> <p>The hot springs in the village are said to have medicinal value for various ailments like skin problems and pain in joints. Locals as well as people from outside areas, even from Skardu, visit the village to take a bath in the springs for the desired treatment. Therefore, the springs have to be maintained and this responsibility also lies with the locals.</p> <p>There are three different springs in the village, one pond is dedicated to local ladies and two (regarded medicinally more effective) are dedicated for men. One of the men's ponds is opened up from 8-11 am for ladies outside of the village. One pipe carries water to Gulshanabad for two ponds there; one is for men and another one for ladies.</p>	Tsarma
Mining	Outsiders' (people other than Bisil village) entry without permission is not allowed. If an outsider comes to extract minerals, he has to pay Rs. 10,000/year to the local Tsarma.	Tsarma
NWFPs including MAPs collection	<p>Black cumin is collected from pastures of the village @ 5-40 kg per household and sold in markets of Skardu @ Rs. 200-3000 per kg. Or a buyer from Skardu comes to the village and gets the product.</p> <p>Collection before ripening is banned, until the Tsarma announces a date for collection. Quantity is not fixed; those who stay longer in pastures with livestock collect more.</p>	Tsarma

Theme/Area	Customary laws/restrictions	Enforced by
<b>Doghoru</b>		
Grazing areas/pasture use/livestock migration, guarding	<p><i>Grazing cycle management:</i> Each year during May-October 11 persons are deputed to graze/tend livestock in high pastures. The grazers get excess butter (ghee) after delivering 3 kgs/dairy cattle/season to the owner. Thus a grazer earns 4-5 kg of ghee/dairy cattle and 80-120 kg in total during a season for 12-15 dairy cattle. One kg of ghee is Rs. 800 in Skardu market, and thus a grazer can earn 64,000-96,000 per year.</p> <p>If sometimes the season is not favorable, instead of 3 kgs a bit less like 2kg/animals is given to the owner.</p> <p>During Nov-December and March-April it is everyone's responsibility to graze and take care of their own livestock, whereas in January and February they remain mostly inside sheds due to heavy snowfall.</p>	Tsarma
Fuelwood harvesting from natural forests	No strict rules except ban on cutting of green wood. Fuelwood is not readily available; most of the village people fulfill this requirement from farm forestry.	Tsarma
Timber harvesting from natural forests and use	Timber is not available in the village, and hence no rules have been there in this regards.	Tsarma
Use of water resources	Timber is not available in the village, and hence no rules have been in this regards.	Tsarma
Mining	Regulatory restrictions	Tsarma
NWFPs including MAPs collection	No specific rules as yet.	Tsarma

### 1.15. Local NGOs and CBOs in the target villages

As per the Basha LSO Record, there are 16 VO and 16 WO in Basha valley. 95% (765 out of the total of 801) households of the valley have membership in these VOs and WOs.

Village	Total HH	Total Pop	VO	WO	VO formation Date	WO formation Date	HH having membership in VOs and WOs
Arandu	120	1560	1	1	29.07.1988	12.03.2011	120
Arandu Gond	15	165	1	1	25.05.1996	14.03.2011	15
Bisil (Chamanabad)	72	864	1	1	04.07.1996	18.04.2011	72
Bisil (Gulshanabad)	55	715	1	1	04.07.1996	21.05.2011	50
Dahang	10	105	1	1	18.06.2011	19.04.2011	10
Ombosoq	15	180	1	1	30.07.1989	30.03.2011	14
Saisko Centre	65	910	1	1	14.10.1987	27.03.2011	60
Monoko	10	110	1	1	10.10.1987	29.03.2011	10
Sajjadabad	50	430	1	1	20.07.1986	16.03.2011	50
Zil	80	1120	1	1	27.09.1994	21.03.2011	70
Zil gond	09	80	1	1	14.06.2011	30.03.2011	09
Doko	64	896	1	1	25.11.1995	28.03.2011	64
Sibiri	55	770	1	1	15.10.1992	26.03.2011	50
Bein	64	832	1	1	15.10.1989	18.05.2011	60
Doghoru Centre	57	798	1	1	30.11.1990	19.03.2011	51
Doghoru Gond	60	780	1	1	22.03.2011	22.03.2011	60
Total	801	10315	16	16			765
Source: BLSO, 2014							

### Basha Local Support Organization (BLSO)

BLSO was established on January 01, 2011 with facilitation of AKRSP under SEED Project for CKNP. It comprises of 16 VOs and 16 WOs. It is headed by a chairman (Sheikh Mohammad Ali Faizi since its establishment till today). The BoD comprises of 9 members, one each representing 9 villages (Arandu, Bisil (Chamanabad), Bisil (Gulshanabad), Saisko, Zil, Bein, Doko, Sibiri, Doghoru). Similarly the General Body comprises of 18 members, two each from the 9 villages. Two paid employees part of management of BLSO are a Manager and a Social Organizer.

Objective of BLSO is to facilitate community organizations at grassroots level for integrated and sustainable development through poverty reduction, natural resources management, women empowerment and environmental conservation, based on the principles of self-help, savings, human and institutional development.

Since its establishment the BLSO has developed meaningful partnership with numerous national and international organizations which are active in conservation and development activities in Basha valley including AKRSP, AKPBS, BWCDO, Ev-K2-CNR, Iqra Fund, LSO Network Baltistan, SARABASTAL, UNICEF and WWF.



## 2. Management issues and problems

### 2.1. Traditional low yielding agro-practices

Yield of wheat in Basha valley is 509 kg/ha, which is far less than the national average of 2833 kg/ha (Government of Pakistan, 2010-11)<sup>14</sup>. In addition, due to limited agriculture land holdings (on average 0.37 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 26-50% of total production of potatoes, 30-40 peas and only 26% of fruits (mostly walnut and apricots). Whereas, there was no record of selling highly valued products such as buckwheat. Due to limited landholding there is little option for crop rotation, leading to declined productivity.

Moreover, the valley has considerable quantities of wool and hair obtained from domestic livestock. Despite having a high demand of woollen products to keep warm during harsh and long winters and good prices of woollen products and rugs in local and outside markets, there is no domestic or cottage industry to utilize raw material for making products. By developing cottage industry the wool and hair raw material can be utilized and this can be a source of self-employment for local women and youth. One of the reasons of marginality among local women is lack of income generating opportunities, for which women stay idle in their homes for almost six month due to no agricultural activity in harsh winters.

### 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 produced is still not sufficient to feed animals during long winters, spanning over five-six months.

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<sup>14</sup>Government of Pakistan.2010-11. Agriculture Statistics of Pakistan. Statistical Division, Bureau of Statistics, Islamabad.

Secondly, as a result of conservation initiatives the number of wild ungulates has also been increased, exerting pressure on the shared grazing ground.

Moreover, due to poor accessibility or lack of drinking water in certain pastures, more accessible areas with availability of drinking water are excessively grazed. One pasture in both villages namely Chumik in Bisil and Ghorobroq in Doghoro were thought to be heavily degraded due to extensive grazing. In Bisil the local people think that only one pasture (namely Bakun) out of 11 is healthy, whereas the rest are partly degraded. Similarly in Doghoro only one pasture namely Lungma is thought to be healthy out of total six key pastures.

A summary of pastures status in the valley indicating degraded and partly degraded valleys is given as under:

ID	Arandu		Bisil		Doghoro	
	Pasture Name	Status*	Pasture Name	Status*	Pasture Name	Status*
1.	Lumkha	Information not provided by locals	Booral	PD	Hobodas	PD
2.	Khwarltoq		Birehlter	PD	Massik	PD
3.	Stangkha		Arehlter	PD	Goorikha	PD
4.	Urdoding		Chumik	D	Baspang	PD
5.	Bakun		Niatica	H	Lungma	H
6.	Manpikhora		Tsukha	PD	Ghorobroq	D
7.	Ghorobrangsa		La	PD		
8.	Chemendoq		Pakora	PD		
9.	Aliyarbrangsa		Jorti	PD		
10.	Aliyarbrangsa		Minguilo broq	PD		
11.	Aliyarbrangsa		Piyung	PD		
12.	Haremalcho		Dangalter			
13.	Domoq g		Sthangshing broq (infront of the village across the river)			
14.	Sangchu					
15.	Humbroq					
16.	Chuwangledaq					
17.	Khaldor					

\* D degraded, PD partly degraded, H healthy

A summary of most desired activities in pastures is given as under:

Village	Name of Pasture	Problems need to address	Recommendation
Bisil	Pakora	Poor accessibility, due to glacial melting	Repair of pony track
	Chumik	Lack of drinking water for animals	Water supply through a pipe from Arehlter Nullah
Saisko	Bangpikhor	No drinking water for livestock	3000 ft. pipe from Changi
Zil	Khalama	Lack of drinking water for animals	Support construction of small tank for water storage.
Doko	Dowal	Poor accessibility	Repair of pony track
Sibiri	Foshika	Shepherd huts are not properly built or mostly damaged	Repair of a shepherd hut
Bein	Bulcho	No cattle sheds for sheep and goats and in case of heavy rainfall, animals die of stress and cold weather	Support in construction of a cattle shed for small ruminants
	Thangshing lungma	Poor accessibility	Repair of pony track
Doghoru	Hobodas	Lack of drinking water for livestock and herders and lack of firewood (people carry firewood from village)	Pipe water supply from any nearest place
	Lungma	Lack of improved corral	Corral improvement work

## 2.3. Traditional animal husbandry and associated problems

### 2.3.1. Livestock mortality (diseases and depredation)

Annual livestock mortality in Basha valley is 5% of the total livestock holding. Local people attribute majority of the livestock deaths to mammalian predators (snow leopard and wolf) followed by diseases and accidents (avalanches, landslides etc.). 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.

The causes of animal mortality in high pastures during summers is less known to the livestock owners as do not stay in pastures with their livestock. However, winter stress has been reported to be one of the factors of animal mortality which, coupled with lack of food leads to weakness and sometimes death.

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

Mortality causes	Cattle		Goats		Sheep	
	Number	Percentage	Number	Percentage	Numbers	Percentage
Predation	78	33	184	54	273	76
Diseases	60	25	92	27	53	15
Accidents	47	20	35	10	19	5
Unknown	53	22	28	8	14	4
Total deaths	238		339		359	100

### Arandu

In 2013, AKRSP provided 33 livestock heads (30 goats and 3 cows) of improved breed to the people of Arandu with a view to promote high productive good quality animals. Unfortunately most of them (20-24) died of some diseases and weakness.

Exact number of predation incidences in Arandu village could not be known due to the non-cooperation of individual respondents, however, in FGD the participants informed about the following incidences:

- In 2014 five goats were killed by a wolf in Khorchumbu area entering into an open corral. Four other goats are still missing
- In 2013 a brown bear broke into a cattle shed in Warkhut and killed seven animals (sheep and goats)
- In 2002 a snow leopard attacked a yak in Shubuchan area and both the prey and predator fell down the hill and died

### 2.3.2. Lack of Veterinary Facilities

There is no veterinary facility in the whole Basha valley. The nearest vet dispensary is in Tissar, which is 12-50 km away from villages of Basha. Getting a diseased animal to Tissar is practically not possible neither affordable if transported through a jeep or tractor. Tissar being a populous valley consumes most of the vet medicine available in the dispensary, thus people of distant villages like Arandu get rare chance of getting a medicine from Tissar Dispensary. Sometimes they have to purchase veterinary medicine from Skardu.

Since early 2014 a vet assistant has been deputed to the Arandu village by Livestock & Dairy Development Department of Skardu, yet to start his duties in the village.

AKRSP has established an input store in Zil (12 km) with support of Ev-K2-CNR under SEED Project. Initially the locals could found some medicine from that store but the store is now not replenished regularly with the desired medicines.

### 2.3.3. Lack of a permanent vaccination Programme for livestock

The villages don'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 through the LS&DD Skardu, while BWCDO first trained a community member from each village and subsequently organized the campaigns with support of LS&DD Skardu. The BWCDO trained livestock vaccinators are available in most of the village.

### 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 people's houses) seriously lack sanitary measures, affecting health and productivity of animals. There are no 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. Lack of milk processing facilities

Basha valley is one of the high ghee (butter) producing areas in Gilgit-Baltistan, owing to substantial quantity of milk production, especially during summer in high pastures. There is no system or marketing facility for selling milk despite huge demand of milk in local markets in towns. Therefore, the milk is processed to produce butter which is called *desi ghee*, a cherished dairy product in local markets sold @ Rs. 1000/kg in Skardu. Milk by-product after extraction of ghee is called *lassi* (yogurt blended with water and shaken) which is again processed to produce *qurut*, a food ingredient used to add flavour in soups. Lassi can also be used to extract cheese. But huge quantities of lassi are of no use due to lack of any processing facility. In addition, there is no proper packaging facility for desi ghee, which causes substantial loss of the product.

## 2.4. Forests and forestry related issues

### 2.4.1. Depletion of plant biomass due to timber and firewood extraction

The natural forests in Basha valley are very scarce, except Arandu and Bisil, where some good stands of Juniper and birch can be found on north facing slopes. Major causes of deforestation in natural forest patches is extraction of plant biomass for timber and fuelwood in Arandu and Bisil while mainly for fuelwood in rest of the villages. Construction timber is not extracted from natural forests except Arandu, Bisil and Saisko.

The exploitation of natural forests is highest in Arandu, accounting for 400 CFT/year for construction timber and about 579,000 kgs for fuelwood. Whereas, extraction of timber from

rest of the Basha villages is about 500 CFT/year, mainly in Bisil followed by Saisko, Zil and Bein.

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 Basha valley shows that the pressure on natural forests for fuelwood consumption is fairly high in Arandu (4290 kg of wood from natural forests per household per year, respectively), whereas, it was 1876 kg in Bisil.

Average daily consumption of fuelwood per household is highest in Arandu (24 kg) followed by Bisil (8.2 kg) and Doghoro (5.02 kg).

An analysis of fuelwood consumption in selected villages of Basha valley is as under:

#### Statistics of fuelwood consumption in Arandu village

Veg type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (Kg)
Artemisia	0	0	0	0	0	0	0	0	0	0	0	0	0
Sea buckthorn	120	120	90	90	60	0	0	0	0	0	0	90	570
Shrubs	240	240	180	150	90	60	60	60	60	120	90	210	1560
Dung	0	0	0	0	0	0	0	0	0	0	0	0	0
Riparian vegetation	150	180	120	60	60	0	0	0	0	60	90	120	840
Wood from natural forest	750	780	600	390	240	120	60	60	90	90	450	660	4290
Wood from orchards/ fruit trees	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantations	180	180	240	240	180	30	30	30	30	60	90	240	1530
Buy	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1440	1500	1230	930	630	210	150	150	180	330	720	1320	8790

#### Statistics of fuelwood consumption in Bisil village

Vegetation type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (kg)
Artemisia	62	62	61	56	55	51	49	46	50	48	54	54	649
Sea buckthorn	0	2	2	2	0	0	0	0	0	0	0	0	6
Shrubs	2	4	2	2	2	2	2	2	0	0	0	0	18



Dung	67	69	20	4	4	4	10	24	46	54	71	81	456
Riparian vegetation	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood from natural forest	214	215	177	120	99	85	79	103	181	188	204	210	1876
Wood from orchards/	0	0	0	0	0	0	0	0	0	0	0	0	0
Plantations	0	0	0	0	0	0	0	0	0	0	0	0	0
Buy	0	2	2	0	2	2	2	2	2	0	0	0	14

### Statistics of fuelwood consumption in Saisko village

Vegetation type	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total (kg)
Artemisia	15	17	11	19	18	19	19	16	15	14	12	15	190
Sea buckthorn	4	3	4	4	4	4	5	6	5	4	5	3	51
Shrubs	7	8	8	9	7	7	7	7	7	8	10	9	95
Dung	37	31	8	1	1	1	1	1	5	11	21	36	154
Riparian vegetation	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood from natural forest	264	264	126	69	26	21	20	25	57	106	155	264	1397
Wood from orchards/	0	0	0	0	1	0	0	0	0	0	0	0	1
Plantations	66	60	33	25	19	13	12	13	16	24	33	62	376
Buy	0	0	0	0	0	0	0	0	0	0	0	0	0

### Statistics of fuelwood consumption in Doghoro village

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Kg
Artemisia	52	51	40	39	43	41	40	39	56	56	56	57	570
Sea buck thorn	9	10	10	10	10	11	12	9	5	5	6	5	102
Shrubs	0	0	0	0	0	0	0	0	0	0	0	0	0
Dung	47	45	17	5	2	3	2	6	24	43	52	54	300
Riparian vegetation	0	0	0	1	1	1	1	1	0	0	0	0	4

Wood from natural forest	58	56	48	18	6	4	4	7	32	53	53	56	397
Wood from orchards/ fruit trees	4	5	5	9	11	12	12	10	9	8	8	8	101
Plantations	33	34	27	20	11	8	7	8	17	24	26	27	241
Buy	13	12	11	11	7	4	4	7	6	9	16	16	116

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

During late autumn, winters and early spring livestock are left free for grazing 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 sources of fuelwood and is being heavily consumed for domestic energy.

#### 2.4.3. Lack of alternatives of domestic energy

Due to lack of alternative sources of fuelwood 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 burnt 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, except some fuel-efficient stoves provided to some 30 households of Arandu village for demonstration purpose by Ev-K2-CNR under SEED Project. The stove is being much appreciated by local people but due to their limited income most of the locals cannot buy it from Skardu market which costs around Rs.7000.

#### Arandu and Bisil

Supply of electricity to Bisil village is through a 150 KW micro-hydel project carried out by AKRSP in the village during 2008. The project provides electricity to 130 HH of Bisil and 150 HH of Arandu. Operation of the project is the responsibility of local committees, under the

leadership of Mr. Imran Nadeem- a renowned social activist of Shigar valley and former member of GB Legislative Assembly. Electricity usage by consumers is monitored through meters and on average about Rs. 150 is paid by each beneficiary household. For maintenance PWD has deputed two staff members, assisted by 10 persons from the local community, who are paid @ Rs. 3000 per month from the amount collected from the consumers. In 2013 the cost of repair was Rs. 375,000.

#### 2.4.4. Extraction of bark of birch

In Arandu village 600-800 kg of birch bark is extracted annually and is being sold in Skardu. Its major uses include: wrapping ghee (butter) and layering the roofs to prevent seepage of water in rainy days.

### 2.5. Challenges for wildlife conservation

#### 2.5.1. Illegal hunting and poaching

In most of the villages in Basha valley, illegal hunting and poaching is locally banned, monitored by VWGs and other community activists. During discussions and interviews the locals were reluctant to talk about such illegal activities, however, there were quite a few respondents who admitted about prevailing of illegal hunting activities. Most of such activities were said to occur in Arandu village. The local people also indicated some outsider peoples mostly some influential from Shigar and Skardu to be involved, directly or indirectly in such illegal hunting activities. The plenty of local hunters in Arandu also speak the excessive hunting activities.

#### 2.5.2. Retaliatory killing of mammalian predators

Local people, more dependent on livestock resources seem to be less tolerant towards large predators. Though during the interviews and FGDs the people were reluctant to talk about such incidences, but referring to past incidences people talked of retaliatory killing of large predators. For example in Doghoro, one of the participants of FGD informed that some 20 years back when a snow leopard was stranded inside a cattle shed in the village, some locals stoned it to death.

#### 2.5.3. Chances of disease transmission between livestock and wildlife

Foxes and wolves have been observed in Doghoro village to suffer from a skin disease, the symptom visible was 'lost hair on the skin'. 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, whose likely source was indicated in infected livestock<sup>15</sup>. Similarly contact with infected livestock was suspected on

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<sup>15</sup>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

occasion of a deadly Contagious Caprine Pleuropneumonia episode amongst threatened Markhor in Tajikistan<sup>16</sup>

Usually an animal died of a disease is left outside without properly being disposed off, leading to increasing chances of disease transmission to scavenging wildlife, as there are no domestic dogs in Basha valley.

#### 2.5.4. Challenges in notification of Basha valley as CMCA

Basha valley was one of the priority areas under SEED Project for CKNP to be designated as CMCA for facilitation of trophy hunting of Himalayan ibex, which are abundantly found in villages like Arandu, Bisil and Doghoro. Some of the challenges which protected the designation process include:

Lack of cooperation by the people of Arandu, as without Arandu, notification of the valley as CMCA seemed less fruitful.

Secondly, the LSO Basha is not a registered CO, which is a prerequisite for the notification process.

#### 2.5.5. Challenges in running livestock Insurance scheme

**Bisil:** A snow leopard insurance scheme is being run by Baltistan Wildlife Conservation and Development Organization (BWEDO) in almost the entire target villages of Basha valley, except Arandu. In addition WWF under SEED Project has also initiated Livestock Insurance Scheme (LIS) in Bein village.

Information of BWEDO led Snow Leopard Insurance Schemes in Doghoro village is as under:

60 HHs are members in the scheme who have insured 480 animals, so far. Members have contributed Rs. 45,000 as premium of the insured animals (Fund-1) and BWEDO has contributed Rs. 100,000 (Fund-2). Both funds have been kept in a local Bank in Skardu and the signatories to the accounts are two community representatives in Fund-1 and a representative of local community with a representative of BWEDO in Fund-2. During 2011-2014, 60 animals (20 goats and 40 sheep) have been reported to be killed by snow leopard. A sum of Rs. 60,000 has been agreed by the VCC to disburse as compensation among those who lost their livestock. The payment would be @ Rs. 1000 per animal. Biggest challenge to run this scheme is lack of funds and no coverage of animals killed by wolf. For local people it is challenging to verify a predation case with reference to a snow leopard kill because the scheme is only meant to cover snow leopard predations. Proper record of the scheme is lacking with the VCC, so it is difficult to assess success of the scheme.

More or less similar challenges are faced by every village where BWEDO scheme is in place.

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<sup>16</sup>Ostrowski, S., Thiaucourt F, Amirbekov M, Mahmadsheev 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>

## 2.6. Problems associated with irrigation water supply

Construction, repair and maintenance of irrigation water channels in the valley have 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 labour work).

A summary of water channels which need urgent repair works is given in the following table:

Village	Name of location	Coordinates	Estimated length of water channel (m)	Detail of repair works
Arandu	Khorsumba	75°20'22.15"E, 35°52'11.23"N	250-300 m	Repair of water channel head near river
Doghorro	Shalma (above Gond area)	75°24'4.84"E, 35°45'32.16"N	1500 m	Extension and expansion of the channel
Saisko	Shuwakildia gishko (main channel of Village)	75°25'46.04"E, 35°49'2.65"N	500 m	Repair of channel head in nallah
Zil	Shukhang shikha (main channel for Gon)	75°24'54.41"E 35°48'25.54"N	100-200 m	Repair of channel head in nallah
	Shikha	75°24'57.80"E 35°48'24.34"N	200-350 m	Repair of channel head in nallah

## 2.7. Conventional and less efficient mining activities

Basha valley is one of the key mining areas situated around CKNP. Like other mining areas of CKNP, the currently used mining techniques are quite primitive. The typical mining system in Basha valley consists of groups of four to six members, equipped with the basic tools (explosives, pickaxes, basic food and clothing) that dig holes of 3-4 feet wide and high in the pegmatite zone using drilling machines or small compressors. , in few situations they do blast the rocks using explosive detonators and safety fuse<sup>17</sup>.

The use of these traditional techniques causes damage to almost 50% of the mining products, significantly affecting the value of crystalline and fine specimens<sup>18</sup>. Furthermore, uncontrolled

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<sup>17</sup>IPMP for CKNP. 2014. Baseline for Management Plan-Part I. Ev-K2-CNR, Islamabad, Pakistan

<sup>18</sup>IBID

mining practices such as blasting with dynamite, impact the fragile mountain ecosystem disturbing the wildlife<sup>19</sup>.

The current mining activities have implications on health and safety of poor miners. The miners themselves are not aware of health and safety practices, neither the mine owner takes care of such matters, as evident from the fact that even a basic first aid box is completely missing in mining areas<sup>20</sup>.

## **2.8. Problems associated with Human and Institutional Development**

### **2.8.1. Lack of participation of Arandu people in co-management of natural resources**

The people of Arandu are quite apprehensive of the participatory natural resource management approach. Their apprehension is apparently due to a misunderstanding that involvement of conservation organizations in their area would result in sacking some of their use right or restrict them to use natural resources, mainly forests. Partly this attitude is due to their complete dependence on natural resources and partly exacerbated by interest groups within local communities, e.g. hunters. The religious fraternity in the village has a complete lack of trust on outsider organizations.

### **2.8.2. 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. Members of local management institutions (LMIs) who have a strong role in regulating natural resource use, when left out of the LSOs or VCCs, there seems a parallel system talking about natural resource use or conservation. And sometimes while feeling left out, these LMI members start to oppose the work of VCCS/LSOs, leading to overall failure of a community-organization

### **2.8.3. Community mobilization and management issues**

Strengthening of COs in Basha 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 COs' human and institutional capacities. A synthesis of some general factors is as under:

- Geographic spread of Basha valley, making it quite challenging for a valley level community organization to work effectively due to long distances between villages (e.g. almost 30-40 km between Doghoro and Arandu)
- Interest groups hindering community-based initiatives

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<sup>19</sup> WWF-Pakistan. 2008. Mineral resource survey in the Central Karakoram National Park (CKNP), Gilgit Conservation Information Centre, Gilgit, Directorate of CKNP, Skardu, 26pp.

<sup>20</sup>IPMP for CKNP. 2014. Baseline for Management Plan-Part I. Ev-K2-CNR, Islamabad, Pakistan



- Lack of proper election process to scrutinize and bring forward competent personnel/office bearers
- Ignorance from bylaws of the LSO
- No representation of LMIs in LSO

### 3. Proposed management interventions

#### 3.1. Sustainable mountain agriculture

There should be a greater focus on value chain development for agricultural products like vegetable seeds (potatoes and peas), buckwheat and walnuts. Basha valley is one of high walnut producing areas in Baltistan. For packaging and marketing of walnuts a farmers' association in Basha should be established and linked with Gilgit based dry fruit export agencies such as Mountain Dry Fruit Project and Hashwan Traders. 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 of wool and hair of domestic animals, despite a high value of woolen products in the market. With support of an organization like BCDF or KADO, local women need to be trained in processing of sheep wool, goat and yak hair for making of woolen 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 and heavy snowfall.

Some local community members have demonstrated some innovative initiatives to promote sustainable mountain agriculture. A summary of such interventions is given in the following table:

Initiative	Year of intervention	Supporting Agency
14 green houses in various villages	2010	AKRSP under SEED Project
20 green houses in various villages	2012	AKRSP under SEED Project
7 fruit nurseries in various villages	2010	AKRSP under SEED Project
2 fruit nurseries in various villages	2012	AKRSP under SEED Project

Source: BLSO

Progress on these green houses and fruit nurseries need to be monitored and these interventions need to be replicated based on success in specific village.

#### 3.2. Pasture management and improvement measures

##### 3.2.1. Creation of Sustainably Managed Pasture Area (SMPA)

A specific pasture area in selected villages of Basha Valley (preferably, Arandu, Saisko, Bein, Doghoro) 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 following<sup>21</sup>:

- 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.

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<sup>21</sup> 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

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.

### **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 barren 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. In Basha valley large chunk of lands, mostly situated at lower valley slopes and usually less suitable for growing cereals or vegetables are used to grow fodder crop. In the valley, land cover under fodder crop is greater than under crops.



Figure 17: An example of fodder cultivation on slopes in village Zil



Figure 18 : An example of fodder cultivation in areas less suitable for cereal crops in village Zil

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. Furthermore, 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, because farmers purchase seed from Skardu. Moreover, some farmers cannot afford to buy alfalfa seed which costs them Rs. 1500-2000/kg. 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*.

Village	Name of location	Coordinates	Irrigation water availability	If no from where water can be brought?	Estimated length of water channel (m)
Arandu	Chooq	75°19'43.99"E, 35°52'12.52"N	Yes		
	Khorsumba	75°20'22.15"E, 35°52'11.23"N	Yes	need to repair a channel.	250-300 m
	Dilkhori	75°19'38.13"E, 35°51'34.55"N	Yes		
Bisil	Umcharat	75°23'1.89"E, 35°52'37.66"N	No	Birehlter Nullah	4000 m
	Pharakhumo (area above village)	75°24'34.02"E, 35°51'57.51"N	Yes	-	-
	Ghamagon (area below the village)	75°23'58.90"E, 35°52'3.40"N	Yes	-	-
Saisko	Thumbos	75°25'16.56"E 35°49'1.11"N	Yes		
	Hundos	75°25'32.23"E 35°49'3.27"N	Yes	Siesko Nallah (channel denmage)	1000m
	Mazhik	75°25'28.21"E 35°49'1.79"N	Yes		
	Shing khama	75°25'12.53"E, 35°49'40.16"N	Yes	-	-
Zil	Choqshang	75°24'29.71"E, 35°47'56.22"N	Yes	-	-
	Osayshang	75°24'36.33"E, 35°48'14.46"N	Yes	-	-
	Shukung	75°24'31.14"E, 35°47'59.53"N	Yes	-	-



Village	Name of location	Coordinates	Irrigation water availability	If no from where water can be brought?	Estimated length of water channel (m)
	Naqpi Gon (Zil Gon)	75°24'43.04"E ,35°48'30.73"N	Yes	-	-
Doko	Above upper channel of the Doko Yul	75°23'44.39"E, 35°48'0.03"N	Yes	Need repair a channel head	150m
Bein	Bein Das	75°23'44.97"E 35°47'3.93"N	Yes	-	-
Sibiri	Sibiri Gon	75°23'41.40"E 35°47'17.68"N	Yes	Need repair of water channel	5000m
Niasolo	Lumburgoda	75°22'54.75"E, 35°46'3.58"N	Yes	-	-
Doghooro	Shalma (above Gond area)	75°24'4.84"E, 35°45'32.16"N	Yes	Extension and expansion of the channel	1500 m
	Aponalso (in Yul)	75°24'12.98"E 35°44'30.38"N	Yes	-	-

### Development of water points

The introduction of controlled grazing system requires water points in all the pasture units, in which the animals are supposed 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.

A summary of pastures where water points are needed to be developed is given as under:

Village	Name of Pasture	Problems need to address	Recommendation
Arandu	To be identified	To be identified	To be identified
Bisil	Chumik	Lack of drinking water for animals	Water supply through a pipe from Arehlter Nullah
Saisko	Bangpikhor	No drinking water for livestock	3000 ft pipe from Changi
Doghor	Hobodas	Lack of drinking water for livestock and herders and lack of firewood (people carry firewood from village)	Pipe water supply from any nearest place

### Improvement of Pavements in selected pastures

Due to poor accessibility in some pastures, more accessible 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.

The improvement of pavements or pony tracks to selected pastures has been carried out by BWCDO in Bisil (Chamanabad, Gulashanabad), Saisko and Zil. Similar initiatives are needed to be carried out in other pastures, identified by local people as under:

Village	Name of Pasture	Problems need to address	Recommendation
Arandu	To be identified	To be identified	To be identified
Bisil	Pakora	Poor accessibility, due to glacial melting	Repair of pony track
Doko	Dowal	Poor accessibility	Repair of pony track
Bein	Thangshing lungma	Poor accessibility	Repair of pony track
Doghor	Lungma	Lack of improved corral	Corral improvement work

### **3.3. Livestock management**

#### **3.3.1. Improvement of veterinary services in the valley**

Basha is the largest producer of ghee (butter) in Skardu market, containing the largest number of livestock (> 20,000 animals) as compared to other valleys in Skardu. Ironically there is no veterinary facility in the whole of Basha valley. The nearest vet dispensary is in Tissar which is some 12-50 km away from villages of Basha. Therefore, following interventions are needed, in order of priority:

Priority 1: Through the elected public representatives the local community organizations must strive to establish a vet facility in a central place of Basha valley under LS& DD. Local community should also take up this matter in DCC Skardu.

Priority 2: LS&DD should recruit Livestock Assistants and depute in the main villages like Arandu, Saisko, Sibiri, and Doghoro. One of such an employee has already been deputed by LS&DD Skardu in Arandu, who needs to be regularly present in Arandu village. A supporting agency should provide training and field kits to such employees to make them more efficient.

Priority 3: Promote community-based livestock extension services. This can be done by establishing Village Input Stores (VIS) in main villages of the valley like the one already established by AKRSP under SEED Project in village Zil. The VIS aims at providing basic treatment to livestock in the villages with the help of a community member trained in basic livestock treatment services. Problem with the VIS in Zil was replenishment of the store with required medicine after exhausting the first batch of medicines provided to the store by AKRSP under SEED Project. Performance of VIS in Zil should be evaluated and keeping in view the lessons of this interventions similar VIS should be established in other villages like Arandu, Doghoro and Sibiri. BWCDO trained extension workers could be further trained to operate the newly established VIS.

### **3.3.2. Livestock Vaccination Programme**

As stated above in section 2.3, many viral and bacterial diseases affect the livestock health and productivity. Sometimes, epidemic diseases cause huge losses of livestock in the valley. Since livestock share the summer pastures with wild ungulates (ibex and musk deer) 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, the valley should have a permanent livestock vaccination programme. For this purpose, additional seed money should be provided to BLSO to top-up the valley Conservation Fund (VCF) for sparing some portion of the interest of VCF to purchase medicine for livestock vaccination. BLSO should obtain technical support from LS&DD in this regard and locally the services of BWCDO trained workers should be acquired to conduct vaccination.

Livestock vaccination programme 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 sheds in the village, animal diseases can be reduced which are exacerbated by harsh weather coupled with unhygienic conditions. In addition, productivity of livestock can also be enhanced by improving structural composition of existing cattle sheds. For this purpose at least 2 cattle sheds in each village should be improved for proper hygiene, ventilation, feeding and resting of animals. Such interventions for demonstration purposes have already been undertaken by AKRSP in low lying villages of Baltistan. Their experiences need to be learnt prior initiating such interventions in Basha valley.

Second aspect of improving structure of traditional corrals in high pastures is to prevent killing of livestock by 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 in Basha valley. 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, using traps or guns.

In some villages of Basha valley predator-proof corrals have already been built with support of BWCDO and WWF under SEED Project. A summary of existing and required actions in this regard is given in the following table:

Village	Existing predator-proof corrals	Supporting Agency*	Required predator-proof corrals
Arandu	0	-	2-4
Bisil	02 (Gulshanabad)	BWCDO	1 in Chamanabad.
Saisko	02	BWCO (1), WWF (1)	-
Zil	03	BWCDO (2), WWF(1)	-
Bein	02	BWCDO	-
Doko	02	BWCDO (1), WWF (1)	-
Sibiri	02	BWCDO	-
Niasolo	0	-	1
Doghorro	01	BWCDO	

\*WWF has carried out the activity with financial support of Ev-K2-CNR under the framework of SEED Project.



Figure 19A view of traditional (rounded) and improved/predator proof (rectangular with roofing) corral in Saiko village is given in the following photograph.

### 3.3.4. Livestock breed improvement

The most preferred animals in the project area are goats, zo/zomo (cross breeds of cow and yak) and goats, respectively. The breeds sheep, goats and of local cattle (cow and bull) 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<sup>22</sup>.

Local people in Baltistan including low lying villages of Shigar such as Marapi, Markunja, Wazirpur 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 Basha are less suitable for AI due to

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<sup>22</sup>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



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 Bein 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 Skardu. A local farmer in Bein (Basha), namely Sheikh Mohammad Ali was identified by the BLSO 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, some 40 cows in the village were reported to be serviced 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.

### 3.3.5. Capacity building of selected herders in innovative dairy production measures

Basha valley being the largest ghee (butter) producer and supplier in Skardu market needs special attention, to promote the dairy production and marketing measures. The conventional production and processing measure are less sufficient in terms of hygiene, packaging and marketing. Basha ghee is a cherished food item in Baltistan and supplied in bulks from Basha to Skardu in large pieces like 40-50 kgs in *Betula utilis* bark or polythene bags. The poor storage and packaging affects quality of the ghee. The ghee production, processing, packaging and marketing techniques need to be improved through proper training and provision of necessary equipment and material.

There is no system for selling of fresh milk from pastures to nearest towns, despite a huge demand and all the milk products in nearby town like Skardu are brought from down country. Supply of milk from pastures to Skardu town can be made possible by providing chillers/ice boxes to local people and training them in packaging and marketing.

## 3.4. Afforestation and forest conservation

### 3.4.1. Regulate timber extraction from natural forests

At the moment timber is extracted from natural forests in Arandu and Bisil, while the other villages are mainly devoid of natural forests and hence no wood is extracted for construction purposes. Currently the extraction is regulated under specific customary laws in each village. The system seems to work properly in Bisil except proper documentation, as per the following rules:

Specified time period for harvesting of timber is one month in autumn (October-November) and one month in spring (May). A person who attempts to harvest timber other than the specified duration, a fine of Rs. 100-5000 is charged keeping in view magnitude of the violation.

For construction of houses the specified trees are Junipers (Shuqpa) and Pines (Sthangshing) while for cattle shed Birch (Staqa) and Salix are allowed.



A village person in want of timber to construct a house or a cattle shed gets verbal permission from Tsarma. A poor person is considered most deserving to avail timber from natural forests free of cost, whereas those who can afford to buy timber from market are discouraged to apply for timber from natural forests or such a person is charged Rs. 2500-4000 per tree.

This amount is deposited in Tsamra's account and used for any welfare activity such as education of a poor student, treatment of a needy person or any common cause such as repair of water channel, repair and maintenance of hot spring and repair of pavements, etc.

Whereas, in Arandu, the customary laws do exist but not as formal as in Bisil. In Arandu timber is allowed to fetch from natural forests if someone genuinely needs it for construction of a house or cattle shed. Without such a genuine need if someone cuts a tree for timber, fine is imposed @ Rs. 1500/large tree and Rs. 500 per small tree.

Following aspects need to be integrated into the customary laws regarding extraction of timber:

- In Arandu duration should be specified as done in case of Bisil
- The minimum quantity per household should not exceed 100 CFT for a one-time construction of a house, the rest should be managed from plantation (in five years duration the current timber extraction per household is 110 CFT)
- Location of extraction must be fixed for certain period of time, e.g. during 2015-2018 from location X, 2019-2022 from location Y and 2023-2026 from location Z....
- A Tsarma responsible for regulating timber use must be part of the CBCSDO
- The whole process needs to be documented by a concerned CBCSDO including information such as name of applicant, date of extraction of timber, quantity of timber extracted, location of timber harvest, plant species harvested etc.

### 3.4.2. Regulate use of firewood from natural forests

Extraction of firewood from natural forests is still high in Arandu and Bisil (>1500 kg/year/household) while it is <1500 kg/household/year in rest of the villages. Extraction of fuelwood from natural forests is also regulated under specific customary laws (see section 1.15 above), but quantity is not fixed. Following points need to be integrated in customary laws regarding fuel wood extraction from natural forest in Basha valley:

- Juniper trees: cutting or uprooting of a complete tree should be strictly prohibited, except cutting of single branches if there is no other option
- Birch trees: cutting or uprooting of a complete tree should be strictly banned, 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. Firewood 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). Similar plantation campaigns should be carried out on barren/cultivable lands and assessment of such locations in Basha valley is as under:

## Proposed areas for future plantation

Village	Name of location	Coordinates	Irrigation water availability	If no from where water can be brought?	Estimated length of water channel (m)
Arandu	Chooq	75°19'43.99"E, 35°52'12.52"N	yes		
	Khorsumba	75°20'22.15"E, 35°52'11.23"N	yes	need to repair a channel.	250-300 m
	Dilkhon	75°19'38.13"E, 35°51'34.55"N	yes		
Bisil	Umcharat	75°23'1.89"E, 35°52'37.66"N	No	Birehlter Nullah	4000 m
	Pharakhumo (area above village)	75°24'34.02"E, 35°51'57.51"N	Yes	-	-
	Ghamagon (area below the village)	75°23'58.90"E, 35°52'3.40"N	Yes	-	-
Saisko	Thumbos	75°25'16.56"E, 35°49'1.11"N	Yes		
	Hundos	75°25'32.23"E, 35°49'3.27"N	Yes	Siesko Nallah (channel denmage)	1000m
	Mazhik	75°25'28.21"E, 35°49'1.79"N	Yes		
	Shing khama	75°25'12.53"E, 35°49'40.16"N	Yes	-	-
Zil	Choqshang	75°24'29.71"E, 35°47'56.22"N	Yes	-	-
	Osayshang	75°24'36.33"E, 35°48'14.46"N	Yes	-	-
	Shukung	75°24'31.14"E, 35°47'59.53"N	Yes	-	-
	Naqpi Gon (Zil Gon)	75°24'43.04"E, 35°48'30.73"N	Yes	-	-
Doko	Above upper channel of the Doko Yul	75°23'44.39"E, 35°48'0.03"N	Yes	Need repair a channel head	150m
Bein	Bein Das	75°23'44.97"E, 35°47'3.93"N	Yes	-	-
Sibiri	Sibiri Gon	75°23'41.40"E, 35°47'17.68"N	Yes	Need repair of water channel	5000m
Niasolo	Lumburgoda	75°22'54.75"E, 35°46'3.58"N	Yes	-	-

Doghooro	Shalma (above Gond area)	75°24'4.84"E, 35°45'32.16"N	yes	Extension and expansion of the channel	1500 m
	Aponalso (in Yul)	75°24'12.98"E, 35°44'30.38"N	Yes	-	-

The firewood plantation on individual farm lands has been successful rather block plantations on large chunks of communal lands. Therefore, while carrying out plantation campaigns such lands must be considered with are divided among individual farmers and each farmer is responsible to take care of his own portion. Plantation of sea buckthorn must be promoted around a plot of plantation which serves as hedged after 3-5 years.



Figure 20: A pictorial view of suitable lands for firewood plantation in Doghooro village

#### 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 11 kg per household per day in Basha valley, with highest in Arandu (25 kg per household/year) and lowest in Doghooro (6 kg/household per year) . 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 Basha valley seldom use these technologies, which need to be promoted in the valley through subsidized rates with the help of AKPBS or other organizations aimed to improve built environment or conservation of natural forests.

Secondly, Ev-K2-CNR has also introduced an improved stove in Arandu village of Basha, Baltistan, cherished by local people for its efficient use. This stove needs to be replicated in other areas of Basha valley, by making it affordable to local people initially through some subsidized rates. This stove costs about Rs. 7000.

Thirdly, there is great potential of micro-hydro electricity production. In Bisil and Arandu villages, the electricity supply is through a 150 KW micro-hydel project carried out by AKRSP in Bisil during 2008. The project provides electricity to 130 HH of Bisil and 150 HH of Arandu. Operation of the project is the responsibility of local committees run under the leadership of Mr. Imran Nadeem, a renowned social activist of Shigar valley and former member of GB Legislative Assembly. Electricity usage by consumers is monitored through meters and on average about Rs. 150 is paid by each beneficiary household. For maintenance PWD has deputed two staff members, assisted by 10 persons from the local community, who are paid @ Rs. 3000 per month from the amount collected from the consumers. In 2013 the cost of repair was Rs. 375,000.

This lesson can be replicated in other villages of the valley. Secondly, there is a PWD hydel scheme in Doko village, currently non-functional due to some conflicting situation. The matter should be resolved and following the above mentioned experience of Bisil this project can also be made useful through joint venture of PWD and local communities.

The fourth option could be of bio-brackets as already a major portion of domestic energy in Basha valley is cattle dung, which is up to 500 kgs per household per year.

#### **3.4.5. Minimize extraction of birch bark**

By introducing an alternative for wrapping of ghee the extraction of birch bark can be reduced. For this purpose the community members of Arandu can be provided with re-usable containers to store and transport ghee to Skardu market.

### **3.5. Wildlife Conservation**

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

Monitoring of wildlife populations in Basha valley 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 (for details please refer to IPMP for CKNP, 2014). In addition, in Basha valley three community representatives used to work as Village Wildlife Guards (VWGs) during the implementation period of SEED Project (2011-2014). One of these VWGs was later on inducted by CKNP as watcher. 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 Basha valley this practice was much successful in other valleys like Thalay, Tormik, Hushey, Bagrote and Hisper. The initiative on one hand was quite helpful in regular monitoring of wildlife and associated activities and on the other hand 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 Qurumber National Park.

The biggest challenge in sustaining the VWGs is their monthly remuneration, which used to be covered in Basha valley from SEED Project during 2011-2014. One of the options is to sustain the remuneration of these VWGs from the interest of VCF. Similar practice of paying VWGs also exists from community resources, e.g. trophy hunting amount in some CMCA in Gilgit-Baltistan such as KVO, Khyber, Ghulkin, SKB, Bunji and Qurumber, etc. The system of VWGs should be revived in Basha valley together with a system of monthly reporting to CKNP Directorate on the proforma given as **appendix-C**. Moreover, these VWGs can also be helpful in keeping a vigilant eye on harmful activities 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<sup>23</sup>.

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 for Basha valley through DCC Skardu.

A system of community watcher already exists in Arandu village, where a community nominated person called Brapa, performs the duty of imposing ban on free grazing in the village during cropping season. This person is paid by local people @ of 1 kg ghee/households/year. (1 kg ghee costs about Rs. 1000-1200). Brapa monitors for any free grazing animal and if someone violates he gets fine from the violator @ Rs. 50/cattle, Rs. 20/goat or sheep and Rs. 10 or 1 egg/chicken. The Brapa can also serve as VWG in Arandu after some basic training, who is already paid in kind by locals during cropping season and could be paid from VCF of Basha valley during remaining period.

### 3.5.2. Facilitate Notification of Basha valley as CMCA

Notification of Basha valley as CMCA would enable local people earn some income from sustainable use initiatives such as trophy hunting of Himalayan ibex, which are abundantly found in villages like Arandu, Bisil and Doghoro. This should be promoted as an incentive for

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<sup>23</sup>Personal communication with Mr. Khadim Abbas, Deputy Director, Gilgit-Baltistan Environmental Protection Agency, Gilgit



conservation rather as an incentive for economic wellbeing of local people. This can be helpful in meeting some of the conservation expenses such as VWGs salary in some villages, also meant to generate employment for some community members. For CMCA notification following steps in Basha valley must be taken:

- Ensure proactive involvement of Arandu village in community-based conservation programme of Basha valley
- Facilitate BLSO in getting itself registered under any appropriate act
- Delineate boundary of CMCA in Basha from the Park boundary
- Continue wildlife survey under CKNP

### 3.5.3. Strengthen Livestock Insurance Schemes in Basha valley to promote positive human-carnivore interaction

The livestock insurance scheme in Basha 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 namely *snow leopard insurance* has been initiated by BWCDO in most of the villages in Basha valley but only meant to compensate predation cases by snow leopard. Later on the Ev-K2-CNR and WWF under SEED Project in collaboration with BWCDO also initiated a scheme namely Livestock Insurance Scheme (LIS) in Bein village of Basha valley. Salient features of the WWF introduced LIS are given in the textbox below:

- To initiate the program, community dialogues were held with the BLSO to introduce the scheme and after the community's willingness a resolution was passed by BLSO and submitted to WWF, to run the scheme initially in Bein village.
- A Terms of References was signed between WWF-Pakistan, BWCDO and BLSO specifying terms and conditions of the scheme and responsibility of each party.
- A Livestock Insurance Fund-A (LIF-A) was established with contributions from SEED Project (through WWF) and BWCDO. Local community contribution was in terms of premium amount collected by insuring their animals, this amount was also kept in a fund namely Livestock Insurance Fund-B (LIF-B).
- A membership card was printed and provided to each member containing vital information such as name of member, date of membership, type and number of animals insured, amount of premium, amount of compensation obtained etc.
- A sub-committee of BLSO namely Livestock Insurance Monitoring Committee (LIMC) was formed to monitor the LS insurance scheme in the valley. Member of the LIMC would be trained in planning, implementation and monitoring of the insurance scheme. The LIMC member will collect registration fee and premium amount and deposit in LIF-B. When a predation case occurs, the LIMC members shall visit the site of incidence and verify the case (irrespective of the predator type).
- After verification, the LIMC will recommend affected policy holder for compensation, depending upon the numbers of cases reported and total amount of interest of LIF-A.

- A compensation form has been developed in Urdu and provided to BLSO to report a compensation case
- The overall idea is to compensate predation cases from the interest amount of LIF-A while miscellaneous expenses such as cost of monitoring of predation cases from the interest of LIF-B.
- The livestock insurance scheme would compensate predation cases both from wolf and snow leopard. BLDO would try to enhance the amount in LIF-A. Initially the LIF-A would not be sufficient to compensate the full cost of an animal but in the long run the plans are to enhance the LIF-A to compensate full cost of the animals.

Following are the challenges in running insurance schemes in Basha valley:

BWCDO led schemes

- Only meant to compensate predation cases by snow leopard, and it is very much challenging for community representatives to verify the cases
- All herders held snow leopard responsible for predation cases because wolf cases are not considered in the scheme
- The contribution of BWCDO amounting up to Rs. 150,000 is not enough to compensate all cases and if compensation amounts are disbursed this funds erodes to zero. Subsequently there remain no funds for compensation.

WWF (under SEED Project) led scheme

- Only the interest of LIF-A (seed money Rs. 300,000) is not enough to compensate all the cases

Therefore, following recommendations are made to strengthen livestock insurance scheme in Basha valley:

- BLSO should merge all funds provided by SEED Project (through WWF as VCF and LIS) and BWCDO (snow leopard insurance in all villages) under one account (this should be approximately Rs. 1.3 million or more than this)
- The combine account should be called as CSDF, should be kept in a Bank on competitive interest rates
- At least 40% of the interest of this fund should be spent to compensate predation cases received from the whole valley including Arandu
- 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. If a village appoints VWGs (explained above in 3.5.1), monitoring of predation cases for compensation must be included in the ToRs for VWGs.

### 3.6. Improvement of water courses

The biggest issue is repairing and maintaining 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	If no from where water can be brought?	Estimated length of water channel (m)
Arandu	Chooq	75°19'43.99"E, 35°52'12.52"N	yes		
	Khorsumba	75°20'22.15"E, 35°52'11.23"N	yes	Need to repair a channel.	250-300 m
	Dilkhon	75°19'38.13"E, 35°51'34.55"N	yes		
Bisil	Umcharat	75°23'1.89"E, 35°52'37.66"N	No	Birehlter Nullah	4000 m
	Pharakhumo (area above village)	75°24'34.02"E, 35°51'57.51"N	Yes	-	-
	Ghamagon (area below the village)	75°23'58.90"E, 35°52'3.40"N	Yes	-	-
Saisko	Main channel (Shuwakildia gishko)	75°25'37.64"E, 35°49'4.11"N	Yes	Water channel head repair	400m
	Gorkha toq	75°25'44.55"E, 35°49'2.89"N	Yes	Abundant channel	1500m
Zil	Zil Gon main channel	75°24'55.03"E, 35°48'25.51"N	Yes	Water channel head repair	500m
	Zil main Channel	75°24'59.77"E, 35°48'24.02"N	Yes	Water channel head repair	600m
Bein	Main Channel	75°24'19.89"E, 35°46'40.49"N	Yes	Water channel head repair	200m
Doko	Main Channel	75°23'45.65"E, 35°48'8.94"N	Yes	Water channel head repair	100m

Village	Name of location	Coordinates	Irrigation water availability	If no from where water can be brought?	Estimated length of water channel (m)
Sibiri	Main Channel	75°23'37.44"E, 35°47'40.35"N	Yes	Water channel head repair	500m
Niasolo	Main Channel	75°23'9.85"E, 35°45'49.45"N	Yes	Water channel head repair	500m
Doghooro	Shalma (above Gond area)	75°24'4.84"E, 35°45'32.16"N	yes	Extension and expansion of the channel	1500 m
	Aponalso (in Yul)	75°24'12.98"E 35°44'30.38"N	Yes	-	-

### 3.7. Ecotourism promotion with community-participation

The community in Arandu seems to have proactive role in managing tourism. For any travel agency it has been mandatory that at least 50% porters must be hired from Arandu village. Hiring of porter in Arandu is made through lucky draw and the community organization/committee charges Rs. 200 per porter. During trekking if anyone cuts a stick from a tree Rs. 50 is charged from porters and Rs. 25/ stick from foreigners. At campsite Rs. 400 is charged for a large tent and Rs. 200 for a small tent. The committee manages campsites. Amount generated from these activities are spent on a collective or social cause, e.g. repair of a bridge, trek, mosque or to meet the travel expenses for someone who travels outside the village for any social cause.

The upper reaches of Arandu valley comprise of high peaks such as Spantik falls within Low Frequency Tourism Area (LFTA). To preserve the Core Zone integrity as much as possible, the park authorities have developed a code of conduct for LFTA<sup>24</sup>. Through CBCSDO in Arandu, this code of conduct can be followed in LFTA that falls within the territory of Arandu.

### 3.8. Promote cautious mining practices

The local community, especially the owner of mines and local workers must be sensitized about the impacts of current mining activities on environmental and human health and safety. Where possible the local people should cover the abandoned mining areas with earth to allow fast generation of vegetation.

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<sup>24</sup>IPMP for CKNP. 2014. Park Management Guidelines Part II.

CBCSDO in a mining village should have a sub-committee to deal with mining matters. The sub-committee, in consultation with CKNP Directorate and concerned department should develop a standard code of conduct for safe mining (safe for natural environment and human health). CBCSDO should make it mandatory for the mine owners to purchase set of safety equipment (such as helmets, gloves, masks, torches) to be used by all workers.

### 3.9. Institutional Strengthening of Community Organizations

#### 3.9.1. 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 and WWF have established various COs such VOs, WOs, VCCs in each village and LSO at valley level. (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, VOs, WOs, 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) or it can work by any name (preferably by the existing names), as changing the name or nomenclature may jeopardize their functioning.

However, for each villages of Bash valley the structure of CBCDOs should be as following including selected functionaries of LMIs and COs:

Village	Head	Members
Arandu	President CBCSDO (can be the existing President of Tsarma)	Religious leader, 18 Tsarma, UC member, President of Arandu Tanzeem
Bisil (Chamanabad)	President CBCSDO	5 Tsarma, President of VOs and WOs, Religious leader and other member of Tanzeem Elm-o-Amal
Bisil (Gulshanabad)	President CBCSDO	5 Tsarma, President of VOs and WOs, Religious leader
Saisko	President CBCSDO	5 Tsarma, Presidents of VOs and WOs
Zil	President of CBCSDO	2 Tsarma, President of VOs and WOs
Bein	President CBCSDO / (can be the existing Mirwaiz/Sheikh)	3 Tsarma, UC member, President of VOs and WOs
Doko	President CBCSDO (can be the existing Trangpa)	10 Tsarma, UC member, President of VOs and WOs
Sibiri	President CBCSDO	12 Tsarma, UC member, Presidents of VOs and WOs
Niasolo	President of CBCSDO	6 Tsarma
Doghorro	President CBCSDO (can be the existing Sheikh)	4 Village level Tsarma, UC member, Presidents of VOs and WOs

All the Presidents of village CBCSDOs should have representation in BLSO as general body member. Some existing ones are already members in BLSO; however, it should be mandatory where required.

### 3.9.2. Capacity-building of CBCSDOs

The newly established CBCSDO at valley level (BLSO) must be registered with competent government authority (as deemed necessary by the CBCSDOs). Their bylaws should be developed with a view to deal with diversified and multi-faceted aspects of environmental conservation such as climate change adaptation, sustainable use initiatives such as trophy hunting and sustainable harvest of medicinal flora, access to biological resources, co-management of protected areas, etc.

The BLSO/CBCSDO'S 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.

### 3.9.3. 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. AKRSP and WWF in case of Basha valley

Following measures are recommended to streamline financial mechanism of Basha valley for conservation purposes

Existing Sources	Problem	Recommendations
Endowment Fund		
VCF: PKR. 300,000 LIF-A PKR. 250,000 by WWF and up to 800,000 by BWCD Total: Up to Rs. 1.3 million	<ul style="list-style-type: none"> <li>- Difficulty in managing multiple funds</li> <li>- Insufficient to meet organizational and conservation needs</li> <li>- Improper record keeping</li> </ul>	<ul style="list-style-type: none"> <li>- 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: 40% Livestock Insurance: 40% Livestock vaccination: 20%</li> <li>- Strengthening CSDF by annual allocation of at least 50% amount generated from trophy hunting and CKNP entry fee</li> </ul>



## Management actions

Name of villages: A=Arandu, Bs=Bisil, Sa=Saisko, Z=Zil, Be=Bein, Dok=Doko, Si=Sibiri, N=Niasolo, Dg=Doghoru

All=means all villages of Basha valley

### 3.10. Sustainable mountain agriculture

#	Action	Village*	Priority Rank
1.	Improve marketing of high value agriculture products (buck wheat and walnut) by linking with export agencies in GB	All	Medium
2.	Improve post-harvest techniques (processing and packaging) through improved technology and training	All	Medium
3.	Study the impact of greenhouses and nursery raising activity to promote horticulture in Basha valley	All	Medium
4.	Establish vocational centre for local women to promote local handicrafts (woolen products and rugs) from wool and hair of domestic animals	A, Sa, Be	Medium

### 3.11. Pasture management

#	Action	Village*	Priority Rank
1.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	A, Sa, Be	High
2.	In consultation with local community declare SMPA and initiate controlled grazing	A, Sa, Be	High
3.	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	A, Sa, Be	High
4.	Promote cultivation of fodder crop such as alfalfa on individual farmlands	All	Medium
5.	Improve pavement to selected pastures	A, Bs, Do, Be, Dg	Medium
6.	Develop drinking water points in selected pastures	A, Bs, Sa, Dg	Medium

### 3.12. Livestock management

#	Action	Village*	Priority Rank
1.	Establish Village Input Store (VIS), following an evaluation study of the current VIS in Zil	A	High

#	Action	Village*	Priority Rank
2.	Train livestock extension workers in improved animals husbandry and veterinary care and provide them with basic kits (linked to 12, 13, 14 and 15)	All	High
3.	Develop a package (basic equipment and training) for milk processing, storage, marketing of dairy products in Arandu	A	High
4.	Establish and operationalize a permanent livestock vaccination programme (following guidelines of Ev-K2-CNR vet experts)	All	High
5.	Improve one cattle shed in each village on demonstration basis (for improved hygiene, feeding, watering to improve animal health and productivity)	A, Sa, Si, Dg	Medium
6.	Improve primitive corrals to make them predator proof structures and top provide shelter against rainfall	A, Bs, N	High
7.	Improve breed of local cattle for enhanced productivity and to reduce number of less productive animals	A, Sa, Dg	Medium

### 3.13. Afforestation and sustainable forest management

#	Action	Village*	Priority Rank
1.	Through VWGs/Tsarma/Braparegulate use of timber (as prescribed in section 3.4.1)	A, Bs, Dg, Si	High
2.	Through VWGs/Tsarma/Brapa regulate use of fuelwood as prescribed in section 3.4.2)	All	High
3.	Hold community-based afforestation campaigns annually in the areas specified in section 3.4.3, reward at least two farmers per target village with a cash prize of Rs. 20,000 for highest number of plants in each village	All	High
4.	Regularly monitor progress on afforestation campaigns carried out by CKNP/WWF under SEED Project	All	High
5.	Replicate fuel-efficient stoves in Arandu and introduce the same in Bisil	A, Bs	High
6.	Introduce a Public Private Partnership/community-based set up to operationalize hydel power station in Doko	Do	Medium
7.	Introduce alternative packaging material for ghee in Arandu to reduce debarking of <i>Betula utilis</i>	A	Medium

### 3.14. Wildlife Conservation

#	Action	Village*	Priority Rank
1.	Establish community-based watch and ward system by appointing VWGs	A, Bs, Sa, Dg	High
2.	Provide basic training to VWGs in monitoring of wildlife	All	High
3.	Monitor wildlife populations (number and structure) following standard survey protocols for CKNP	A, Bs, Sa, Dg	High
4.	Undertake notification of Basha valley as CMCA	All	High
5.	Enhance allocations for Livestock Insurance Fund	H, K	High
6.	Train LIMC members and engage CKNP directorate in monitoring of LIMC	H, K	High

### 3.15. Improvement for water courses

#	Action	Village*	Priority Rank
1.	Construct water channels as prescribed in section 3.6	Any suitable	Medium
2.	Repair water channels as prescribed in section 3.6	Any suitable	Medium

### 3.16. Community-based ecotourism

#	Action	Village*	Priority Rank
1.	Review role of CBCSDOs in tourism management	H, K,	Medium
2.	Through CBCSDO ensure tourism management in LFTA	H, K, M, T	Medium

### 3.17. Mining

#	Action	Village*	Priority Rank
1.	Develop a CBCSDO code of conduct for safe mining	All	High
2.	In place a set of safety equipment for mining activities in each village	All	Medium

### 3.18. Institutional Strengthening of Community Organizations

#	Action	Village**	Priority Rank
1.	Establish new CBCSDOs in all villages and restructure BLSO with representations of village level CBCSDOs	All	High
2.	Develop new bylaws and operational procedures BLSO and register BLSO under any appropriate act	All	High
3.	Orientate CBCSDOs on new bylaws and operating procedures	All	High
4.	Provide office support to BLSO	All	High
5.	Enhance CSDF for Basha valley	All	High
6.	Develop Conservation and Sustainable Development Plan for Basha valley	All	High

## 4. 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
<b>5.1. Sustainable Mountain Agriculture</b>			
1.	Improve marketing of high value crop such as buck wheat and walnut	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 buck wheat, walnut or other agro products	Marketing perspectives enhanced for value added products
3.	Study the impact of greenhouses and nursery raising activity to promote horticulture in Basha valley	1 research study	Success and failure of existing interventions with prospects of explicability known by stakeholders
4.	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 target village	Enhanced role of local women in household economy
<b>5.2. Pasture management</b>			
5.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	2 research studies (one each in Arandu and two other villages)	Baseline available regarding health, productivity and carrying capacity of pastures
6.	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
7.	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

8.	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
9.	Improve pavement to selected pastures	1 trail to identified pasture improved in each of the target village	Grazing pressure uniformly distributed among pastures
10.	Develop drinking water points in selected pastures	1 drinking water facility developed in each of the target village	Grazing pressure uniformly distributed among pastures
<b>5.3. Livestock Management</b>			
11.	Establish Village Input Store (VIS), following an evaluation study of the current VIS in Zil	One village input store established in Arandu	% increase in number of beneficiary households getting treatment for their animals
12.	Train livestock extension workers in improved animals husbandry and veterinary care and provide them with basic kits (linked to 14, 1516 and 17)	One training (15 days) organized for at least 8 herders from Basha valley	% increase in number of beneficiary households getting treatment for their animals
13.	Develop a package (basic equipment and training) for milk processing, storage, marketing of dairy products in Arandu	One training and 4 sets of equipment provided to local herders	Increased production and marketability of dairy products with reduced losses in high pastures
14.	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
15.	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



16.	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
17.	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
<b>5.4. Afforestation and Sustainable Forest Management</b>			
18.	Through VWGs/Tsarma/Brapa ensure ban on cutting of forest trees for timber	VWGs/Tsarma/Brapa is on duty to regulate timber use from natural forests in each village	Extraction of timber from natural forest in regulated in Arandu and Bisil and banned in all other villages
19.	With the help of VWGs/Tsarma/Brapa monitor duration, quantity and pattern of fuelwood collection from natural forests as prescribed above	VWGs/Tsarma/Brapa remain on duty during fuelwood extraction period	Duration, quantity and prescribed pattern of fuelwood collection is followed by local people
20.	Hold community-based afforestation campaigns annually in the areas specified in <b>section 3.4.3</b> , 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 target 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
21.	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
22.	Replicate fuel-efficient stoves in Arandu and introduce the same in Bisil	At least 50% of the households in target villages use fuel efficient stoves	% reduction in consumption of fuelwood per household
23.	Introduce a Public Private Partnership/community-based set up to operationalize hydel power station in Doko	A PPP system is placed to run Doko power house	Local people use electricity from Doko power house
24.	Introduce alternative packaging material for ghee in Arandu to reduce debarking of <i>Betula utilis</i>	Alternative packaging/ storage material adopted by local people to wrap ghee	Extraction of <i>Betula utilis</i> bark minimized

5.5. Wildlife Conservation			
25.	Establish community-based watch and ward system by appointing VWGs	One VWG in placed in each of the target village	No poaching or illegal hunting incidences in the target villages
26.	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
27.	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
28.	Undertake notification of Basha valley as CMCA	Basha valley designated as CMCA	Trophy hunting of H. ibex initiated in the valley
29.	Enhance allocations for Livestock Insurance Fund	An additional amount of Rs. 100000 provided to BLSO for LIF-A	Predation cases are being compensated annually
30.	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
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 LFTA	Agreement with CBCSDOs for ecotourism promotion	Ecotourism promoted in LFTA

5.8. Safe mining			
35.	Develop a CBCSDO code of conduct for safe mining	Code of conduct document	Agreement with community for adherence with Code of Conduct
36.	In place a set of safety equipment for mining activities in each village	Set of equipment provided to target villages	Safe mining techniques are being adapted by local communities
5.9 Institutional Strengthening of Community Organizations			
37.	Establish new CBCSDOs in all villages and restructure BLSO with representations of village level CBCSDOs	CBCSDOs are established or restructured in all the target villages and BLSO restricted as CBCSDO	CBCSDOs have representation of key functionaries as indicated in section 3.8.1
38.	Develop new bylaws and operational procedures BLSO and register BLSO under any appropriate act	Bylaws of BLSO developed	BLSO registered with competent government authority
39.	Orientate CBCSDOs on new bylaws and operating procedures	2 orientation sessions conducted	CBCSDO board and management officials are aware of their bylaws and operating procedures
40.	Provide office support to BLSO	Needful support provided to BLSO for office management	BLSO office is functional
41.	Enhance CSDF for Basha valley	Additional amount of Rs. 1000000 provided to BLSO	CBCSDOs are meeting their expenses of conservation and office management from CSDF
42.	Share Conservation and Sustainable Development Plan for Basha valley for local communities and stakeholder to solicit their technical and financial support	Approval of CSDP of Basha valley after consultation with local communities and other stakeholder	Basha valley CSDP in place for implementation

## 5. Implementation mechanisms

### 5.1. 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:

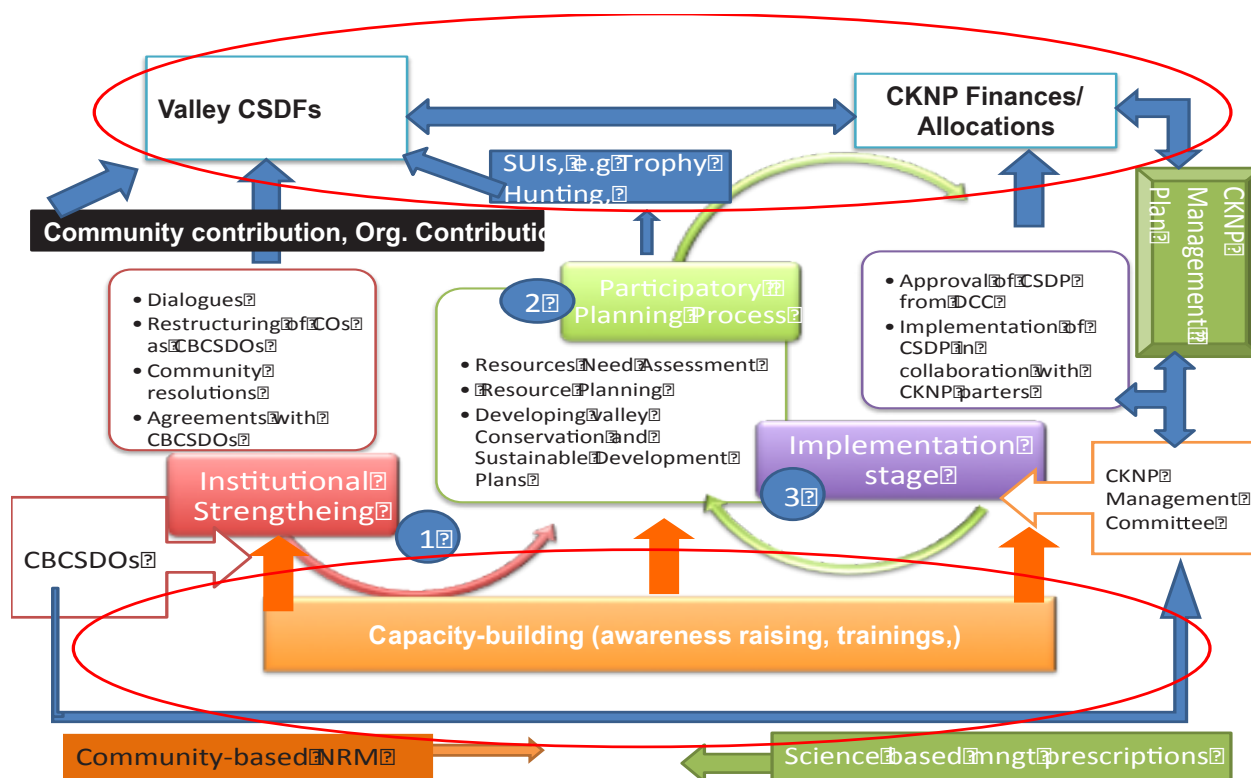
The **first step** should be to restructuring of existing partner COs of CKNP into CBCSDOs as prescribed above. Agreements should be signed with CBCSDOs for their proactive participation in CKNP Management. The local communities are now well mobilized in support of CKNP. Their representative organizations are needed 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 VOs 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 Skardu, and facilitate and monitor the implementation on CSDP in the subsequent DCC meetings.

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 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

## 5.2. Available Capacities

Local/Community Level	District Level	Provincial Level
<ul style="list-style-type: none"> <li>BLSO is functional</li> <li>Presence of BLSO Office and paid staff</li> <li>Presence of VCF and other financial resources such as LIF</li> <li>Membership of BLSO VCC in DCC Skardu</li> </ul>	<p>District Conservation Committee is functional</p> <p>Line Departments (LS&amp;DD, Wildlife and Parks Department, Forest Department, Tourism Department) are supportive</p> <p>Presence of conservation NGOs in Basha valley such as BWEDO</p>	<p>CKNP Directorate</p> <p>CKNP Management Committee</p> <p>GB Wildlife Management Board</p>

## 6. Expected outputs

By 2020:

### 6.1. 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

### 6.2. Pasture Management

- Degradation of pastures stopped by adopting best management techniques

### 6.3. Improved Livestock management

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

### 6.4. 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

### 6.5. Wildlife Conservation and management

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

### 6.6. Efficient uses of water resources

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

### 6.7. Sustainable mountain ecotourism

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

### 6.8. Safe mining

- A code of conduct for safe mining available with CBCSDOs of target villages and adhered by workers and mine owner to a greater extent

### 6.9. Institutional Strengthening of Community Organizations

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



## 7. 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, walnut, 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 alternative 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

## 8. Monitoring mechanism

### 8.1. 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

### 8.2. District Conservation Committee Meetings

The CSDP should be presented in DCC Skardu and endorsed by the Chairman of DCC with recommendations from CKNP Director. The DCC Skardu 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.

### 8.3. 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 CBCSDO management

### 8.4. CBCSDOs Audit and Record Keeping

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 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.

### 8.5. 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 Basha valley to write down their 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 of CBCSDOs to be filled in by a visitor can be as following:

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.....

## 9. Proposed budget for implementation

For five years (2015-2020)

#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
<b>5.1. Sustainable Mountain Agriculture</b>					
1.	Improve marketing of high value crop such as buck wheat and walnut	Business plans	1	250000	250000
2.	Improve post-harvest techniques (processing and packaging) through improved technology and training	Training workshops	2	100000	200000
3.	Study the impact of greenhouses and nursery raising activity to promote horticulture in Basha valley	Study	1	100000	100000
4.	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
	<b>Sub-total</b>				<b>3750000</b>
<b>5.2. Pasture management</b>					
5.	Study productivity, carrying capacity and utilization of selected pastures (In collaboration with KIU and CKNP Directorate)	Research studies	2	200000	400000
6.	In consultation with local community declare SMPA and initiate controlled grazing	Community consultation workshops	4	20000	80000
7.	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

#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
8.	Promote cultivation of fodder crop such as alfalfa on individual farmlands	Hectare	20	4000 0	80000 0
9.	Improve pavement to selected pastures	Improved trails	5	1000 00	50000 0
10.	Develop drinking water points in selected pastures	1 drinking water facility developed in each of the target village	4	3000 00	12000 00
	<b>Sub-total</b>				<b>31800 00</b>
<b>5.3. Livestock Management</b>					
11.	Establish Village Input Store (VIS), following an evaluation study of the current VIS in Zil	VIS	1	5000 00	50000 0
12.	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	8000 00	80000 0
13.	Develop a package (basic equipment and training) for milk processing, storage, marketing of dairy products in Arandu	Set of equipment	4	2500 00	10000 00
14.	Establish and operationalize a permanent livestock vaccination programme (following guidelines of Ev-K2-CNR vet experts)	Funds	1	2000 00	20000 0
15.	Improve one cattle shed in each village on demonstration basis (for improved hygiene, feeding, watering to improve animal health and productivity)	Improved cattle shed	4	1000 00	40000 0
16.	Improve primitive corrals to make them predator proof structures	Improved corrals	4	1000 00	40000 0
17.	Improve breed of local cattle for enhanced productivity and to	Proven Jersey bull	3	7000 0	21000 0



#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
	reduce number of less productive animals				
	<b>Sub-total</b>				<b>3510000</b>
<b>5.4. Afforestation and Sustainable Forest Management</b>					
18.	Through VWGs/Tsarma/Brapa ensure ban on cutting of forest trees for timber	VWGs Honorarium (Man Months)	240	1000	240000
19.	With the help of VWGs/Tsarma/Brapa monitor duration, quantity and pattern of fuelwood collection from natural forests as prescribed above	VWGs Honorarium (Man Months)	240	1000	240000
20.	Hold community-based afforestation campaigns annually in the areas specified in <b>section 3.4.3</b> , 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
21.	Regularly monitor progress on afforestation campaigns carried out by CKNP/WWF under SEED Project	Visits	20	20000	400000
22.	Replicate fuel-efficient stoves in Arandu and introduce the same in Bisil	FES (subsidized)	150	4000	600000
23.	Introduce a Public Private Partnership/community-based set up to operationalize hydel power station in Doko	Consultative meetings	3	30000	900000
24.	Introduce alternative packaging material for ghee in Arandu to reduce debarking of Betula utilis	Stainless steel Containers	50	50000	2500000
	<b>Sub-total</b>				<b>5670000</b>

#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
<b>5.5. Wildlife Conservation</b>					
25.	Establish community-based watch and ward system by appointing VWGs	VWGs Honorarium (Man Months)	240	1000	240000
26.	Provide basic training to VWGs in monitoring of wildlife	Training workshop	1	100000	100000
27.	Monitor wildlife populations (number and structure) following standard survey protocols for CKNP	Wildlife surveys	20	50000	1000000
28.	Undertake notification of Basha valley as CMCA	Consultative meetings	1	30000	30000
29.	Enhance allocations for Livestock Insurance Fund	Funds	1	1000000	1000000
30.	Train LIMC members and engage CKNP directorate in monitoring of LIMC	Training workshop	1	200000	200000
	<b>Sub-total</b>				2570000
<b>5.6. Improvement of water courses</b>					
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
<b>5.7. Engage CBCDOs in Tourism Management</b>					
33.	Review role of CBCDOs in tourism management	Review report	1	50000	50000
34.	Through CBCDO ensure tourism management in LFTA	Community consultations	1	20000	20000
	<b>Sub-total</b>				70000

#	Action	Units	Quantity	Unit cost	Total Cost (PKR)
<b>5.8. Promote cautious mining</b>					
35.	Develop a CBCSDO code of conduct for safe mining	Consultative meetings with CBCSDOs	5	2000 0	10000 0
36.	In place a set of safety equipment for mining activities in each village	In place a set of safety equipment for mining activities in each village	4	1000 00	50000 0
	<b>Sub-total</b>				<b>60000 0</b>
<b>5.8 Institutional Strengthening of Community Organizations</b>					
37.	Establish new CBCSDOs in all villages and restructure BLSO with representations of village level CBCSDOs	Consultative meetings	8	2000 0	16000 0
38.	Develop new bylaws and operational procedures BLSO and register BLSO under any appropriate act	Bylaws and registration (L/S)	1	1000 00	10000 0
39.	Orientate CBCSDOs on new bylaws and operating procedures	Orientation sessions	1	5000 0	50000
40.	Provide office support to BLSO	Monthly expenditure (L/S)	1	5000 00	50000 0
41.	Enhance CSDF for Basha valley	Funds	1	1000 000	10000 00
42.	Share Conservation and Sustainable Development Plan for Basha valley for local communities and stakeholder to solicit their technical and financial support	consultative workshops (8 at community level and 1 at other stakeholder level)	2	3000 0	60000
		DCC meeting	1	1500 0	15000
	<b>Sub-total</b>				<b>18850 00</b>
	<b>Grand total</b>				<b>30035 000</b>

## 10. 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	
	<b>Total</b>	<b>995</b>	<b>277</b>	<b>4</b>	<b>2</b>
	<b>%</b>		<b>27.8</b>		
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
	<b>Total</b>	<b>588</b>	<b>233</b>	<b>3</b>	<b>4</b>
	<b>%</b>		<b>39.6</b>		
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

Valley	Name of villages for survey	Population (HH)	Sample size (Household heads CI 5, CL 95%)	Number of days	FGD
	Arindu gond	13	4	0.1	
	<b>Total</b>	<b>730</b>	<b>252</b>	<b>4</b>	<b>3</b>
	%		<b>34.5</b>		
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
	%		<b>16.8</b>		
	<b>Grand total</b>	<b>4213</b>	<b>1082</b>	<b>15.0</b>	<b>11</b>
	%		<b>25.7</b>		

*Appendix-B: Participants of FGDs in Basha Valley*

#	Bein	Saisko	Zil
1.	Mazahir Hussain	Ali Nawaz	Abideen Abbas
2.	Ahmad Ali	Mohd Ali	Mohd Ibrahim
3.	Salman	Ghulam Muhammad	Ali Musa
4.	Hassan	Ali Hussain	Mustafa
5.	Mehdi	Sikhawat	Walayat Ali
6.	Kazim Hussain	Fida Ali	Ali Muhammad
7.	Sharif Hussain	Mehdi Ali	Akbar Ali
8.	Wali Mali	Mohd Yasin	Muhammad Bahi
9.	Inayat Akbar	Ghulam Abbas	Inayat Ali
10.	Rustam Ali	Mubashir Hassan	Abdul Hussain
11.	Bashi	Ali Musa	
12.		Haji Ismail	
13.		Ibrahim	



## Appendix-c: Template for Monthly Report by VWGs

### ماہانہ کارکردگی رپورٹ - ویلج وائیڈ لائف گائیڈز

رپورٹ برائے ماہ \_\_\_\_\_ علاقہ \_\_\_\_\_

#### ۱۔ جنگلی حیات کا مشاہدہ:

نمبر شمار	وقت تاریخ سروے	قسم جانور	نام جگہ جہاں سے جانور دیکھے گئے	نام جگہ جہاں پر جانور دیکھے گئے	جانوروں کے گروپ کے بارے میں معلومات	ثرائی ساز (ز)	موسم کی صورتحال	مسکن کے بارے میں معلومات
					فکر مادہ ایکڑ بچے میں کی قسم کل			

نوٹ

- ☆ قسم جانور: آئی ٹیکس، مارخور، اڑیاں، برفانی چیتا، بھیڑیا، دیگر (نام)
- ☆ موسم کی صورتحال: دھوپ، ابر آلود یا بادل، بارش، بڑا 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 شمار	سرگرمی	تعداد اور قسم جانور	جگہ جہاں پر یہ واقعہ پیش آیا	کائیڈ کی طرف سے کارروائی	دی سی کی طرف سے کارروائی
۱	غیر قانونی شکار ہوا				
۲	جنگلات کی کٹائی میں آئی				
۳	آزاد 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 شمار	نام مویشی مالکان	تعداد اور قسم جانور	جگہ جہاں پر یہ واقعہ پیش آیا	مویشی مالک کا رجسٹر	دی سی کی طرف سے کارروائی
۱					
۲					
۳					

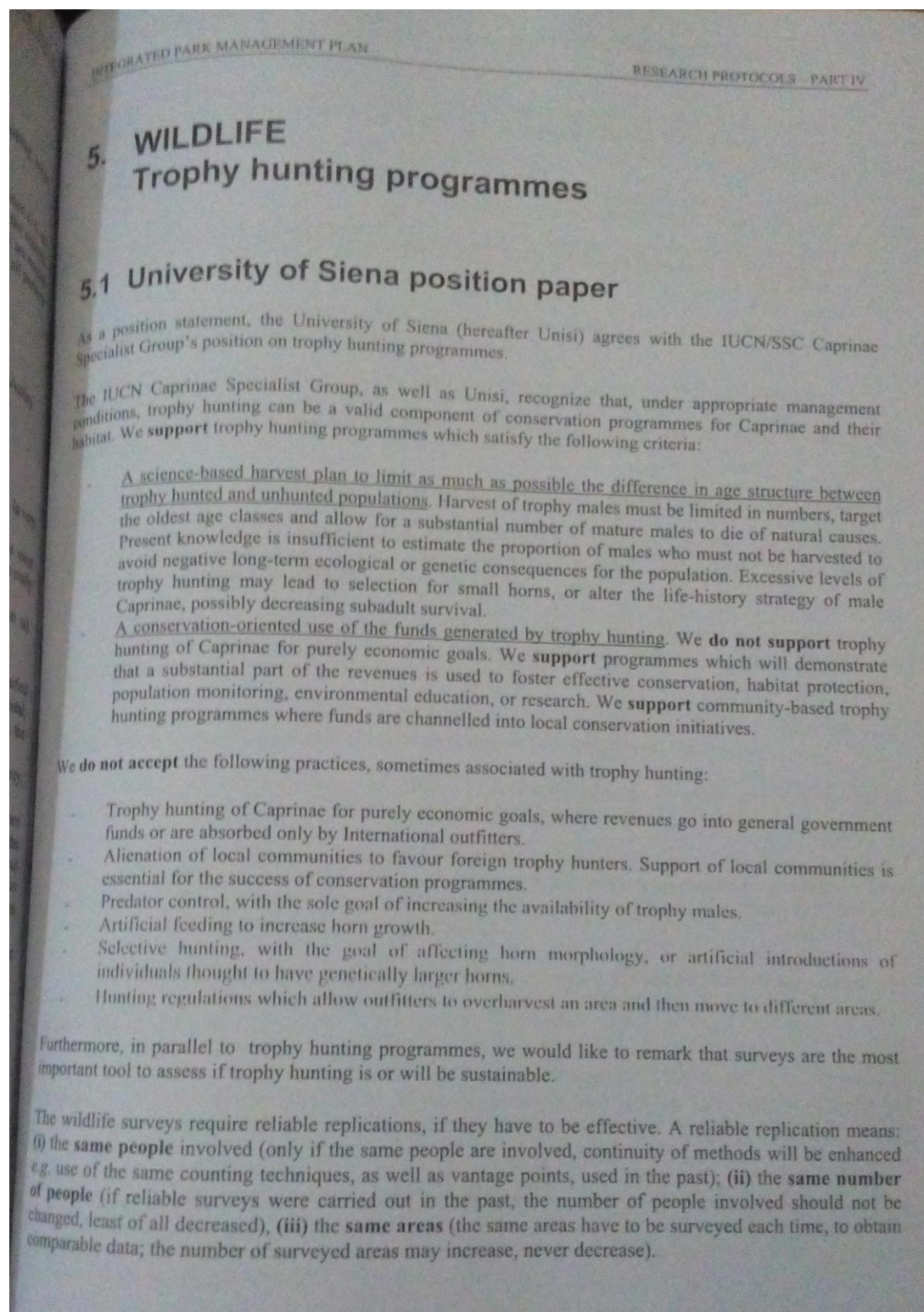
نام و دستخط کائیڈ ۱۔ تاریخ \_\_\_\_\_ نام و دستخط کائیڈ ۲۔ تاریخ \_\_\_\_\_

نام و دستخط کائیڈ ۳۔ تاریخ \_\_\_\_\_

تصدیق کی جاتی ہے کہ کائیڈ نے مقررہ فرائض کی انجام دہی کی ہے۔ ہم اس کی کارکردگی سے مطمئن ہیں اور سفارش کی جاتی ہے کہ ان کا مشاہدہ ادا کیا جائے۔

چیرمین/صدر و بلی کزنرویشن 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.

*Appendix F. Pictures of field activities*



Figure 21 A view of FGD in Arandu village