

# **CONNECTIVITY AREA BETWEEN CENTRAL KARAKURAM NATIONAL PARK AND DEOSAI NATIONAL PARK**





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## Table of Contents

ACRONYMS .....	i
EXECUTIVE SUMMARY .....	ii
<b>1. INTRODUCTION AND BACKGROUND.....</b>	<b>2</b>
1.1. Why a Connectivity required? .....	3
1.2. Structural and Functional Connectivity .....	3
1.3. Purpose of Establishment: Why this Connectivity area and No Others .....	4
1.4. Connectivity Area Management .....	6
<b>2. ECOLOGICAL SYSTEMS AND SOCIO-ECONOMIC CONDITIONS.....</b>	<b>7</b>
2.1. Area Description.....	7
2.2. Geology .....	7
2.3. Climate .....	7
2.4. Land cover .....	8
2.5. Hydrology .....	8
2.6. Vegetation .....	9
2.7. Fauna .....	11
2.8. Demography of Connectivity Area .....	12
2.9. Livelihood Sources .....	13
2.9.1. Agriculture .....	13
2.9.2. Livestock.....	13
2.10. Basic Facilities .....	13
2.11. Cultural Heritage .....	14
<b>3. MANAGEMENT GUIDELINES .....</b>	<b>17</b>
3.1. Guidelines Development Process .....	17
3.1.1. Methodology.....	18
3.2. Management Guidelines .....	20
3.2.1. Community Participation .....	22
3.2.2. Biodiversity Conservation Management .....	22
3.2.2.1. Community-based natural resource management.....	22
3.2.2.2. Fauna.....	23
3.2.2.3. Sustainable Forest Guidelines .....	23
3.2.2.4. Firewood collection .....	24
3.2.2.5. Medicinal plants sustainable use .....	25

3.2.2.6. <i>Livestock and Pastures</i> .....	26
3.2.2.7. <i>Culture-historical, Archaeological and Paleontological Management</i> .....	28
3.2.2.8. <i>Soil Erosion and Control</i> .....	28
3.2.2.9. <i>Invasive-Species Management</i> .....	29
3.2.2.10. <i>Research</i> .....	29
3.2.3. Valley Conservation Plans (VCPs).....	30
3.2.4. Propose an organic agriculture program in the lowland area .....	32
<b>3.3. Propose a Joint Management Committee for Connectivity Area</b> .....	32
<b>4. BOUNDARIES DELINEATION AND ZONING</b> .....	35
<b>4.1. Boundaries and zoning surface</b> .....	35
4.1.1. <i>Sustainable use zone</i> .....	36
4.1.2. <i>Connectivity Area Lowland</i> .....	39
<b>5. ECOTOURISM PROPOSAL</b> .....	45
<b>5.1. Proposed Interventions</b> .....	47
<b>5.2. Realization of Tourism Infrastructures and Buildings for Tourist Accommodation</b> .....	49

## **List of Exhibits**

Exhibit 1: Connectivity Area Map between DNP-CKNP.....	1
Exhibit 2: Land cover/use map of connectivity area .....	8
Exhibit 3: Altitudinal belts comparison between Karakorum and Western Himalaya.....	10
Exhibit 4: Demography of connectivity area .....	12
Exhibit 5: Demography chart of connectivity area .....	12
Exhibit 6: Rock with Buddhist inscription and rock painting near Gol Valley .....	15
Exhibit 7: Keris castle, Keris Valley.....	15
Exhibit 8: Keris Khanqa prayer hall, Keris Valley .....	16
Exhibit 9: Tomb monument (Astana) Hazrat Mir Mukhtar- Keris valley .....	16
Exhibit 10: Connectivity area zoning map.....	35
Exhibit 11: DNP-CKNP-Ecological Connectivity area .....	48
Exhibit 12: Tourist hub map .....	48
Exhibit 13: Touristic map .....	50

## ACRONYMS

CBD	Convention on Biological Diversity
CCHA	Community Control Hunting Area
CKNP	Central Karakorum National Park
DNP	Deosai National Park
FGD	Focal Group Discussion
GB	Gilgit Baltistan
ICDB	Integrated Conservation and Development Bodies
IUCN	International Union for Conservation of Nature
LSO	Local Social Organization
NE	North-East
NSZ	Northern-Suture Zone
NTFPs	Non-timber Forest Products
SDG	Sustainable Development Goals
SE	South-East
SMPA	Special Managed Pasture Area
UNESCO	United Nations Educational, Scientific and Cultural Organization
VCC	Village Conservation Committee
VCPs	Valley Conservation Plans
VFC	Valley Forest Committee
VO	Village Organization

## EXECUTIVE SUMMARY

Protected areas (e.g., national parks, wildlife sanctuaries etc.) form the foundation of conservation strategies to sustain biological diversity. It is generally believed that the protected areas are created at the expense of the larger natural ecosystem that it represents, which is much bigger in size than its representative protected area.

Although protected area plays an important role in the conservation of Biodiversity, it is being felt that because of these, the degradation risks for the rest of the ecosystems enhances manifold in the non-protected land is then ignored and allowed for all sorts of misuses.

Accordingly, conservationists of today prefer to have a network of inter-connected protected areas rather than having them in isolation from each other to prevent ecosystems and populations from becoming isolated, reduce the risk of extinction, and help sustain biodiversity.

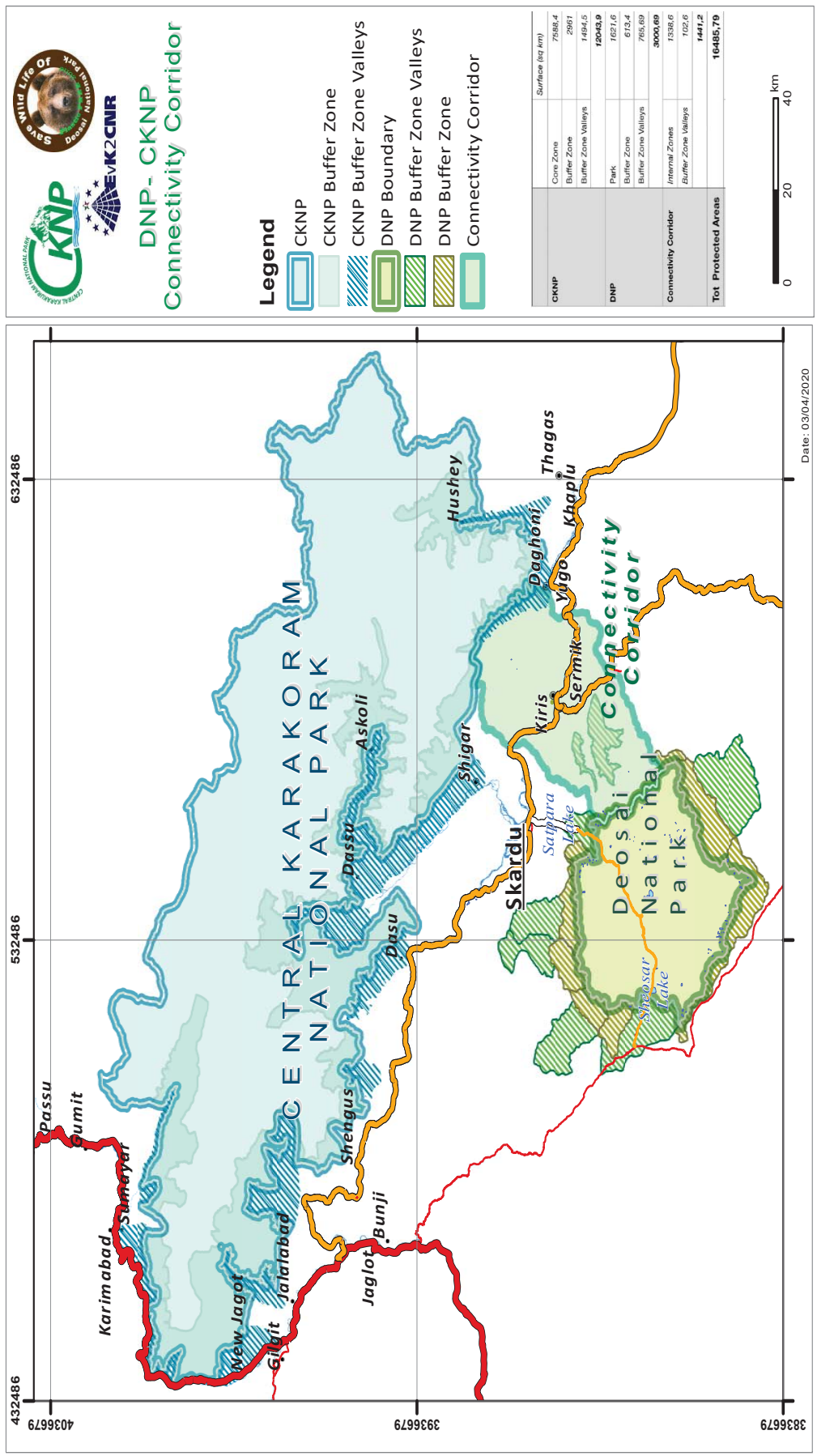
In order to cover this deficiency, an area was identified to connect the two of the national parks, one in the Karakorum, the other in Himalaya. The proposed connectivity area between Central Karakorum National Park and Deosai National Park covering an area of 1441,2 km<sup>2</sup>. The connectivity area, consisting the buffer zones and lowland areas outside the boundaries of CKNP and DNP, is open to all sorts of degradation forces that has speeded up the process of fragmentation on one hand and the loss of the local biodiversity on the other. In order to identify a connectivity area, between the two Parks different characters were explored such as movement of wildlife species of the park to the proposed connectivity area and proximity to the both protected areas. The area identification, mapping and development of management guidelines for a connectivity area were formulated in accordance with the overall goal of the management guidelines for harmonization its management with the area of two national parks: CKNP and DNP. Thus, after consulting the map, the communities and local stakeholders, to have a feasible and functional area that has the real scope of improving CKNP and DNP, and is a supporting tool to improve the country CBD obligations and sustainable development goals. Different habitats/ecosystems types and urban environment are, frequently interrupting the inter-park gap between the two landscapes of DNP and CKNP. Accordingly, as such, there is no contiguous ecosystem that combines the two for the establishment of a traditional ecological connectivity but this is an option.

For the management of the connectivity area, the document proposes to establish a joint management committee with the participation of the Forest, Wildlife & Environment Department GB, Tourism Department GB, two adjacent Parks Directorates, local administration and local communities.

The Connectivity Area management guidelines have two major objectives:

- 1) to improve the contiguity and management of the natural resources in the buffer zones of the two Parks and lowland areas.
- 2) to improve ecological conditions in the buffer zones and lowland areas which offer an extended habitat for wildlife.

Exhibit 1: Connectivity Area Map between DNP-CKNP



## 1. INTRODUCTION AND BACKGROUND

Protected areas are notified to protect those parts of an ecosystem that are still intact regarding its flora and fauna and their habitat. Once notified, the management and protection responsibilities shall be undertaken by the relevant departments, the forest and wildlife department in this case.

This is normal the world over that protected areas are better shape within healthier environment as compared to the adjoining areas, and this is what the conservationist feel concern about.

It is generally believed that the protected areas are created at the expense of the natural ecosystem, which is much bigger in size than its representative protected area and protecting a part of it convey a wrong message; things that are forbidden here, are allowed in the adjoining areas. Accordingly, the process of degradation gets much faster in the surrounding areas after managing a protected area, especially after the government implements some restrictions about its protection against grazing, harvesting of natural resources etc.

Gilgit-Baltistan (GB) covering a land area of 72,500Km<sup>2</sup>, is rich in biological diversity and home to some of the world's highest mountain ranges. The main ranges are the Karakoram and the Western Himalayas and these mountain ranges are experiencing changes to their natural environments. Habitat degradation and fragmentation are widespread and profound. Mankind is responsible for species decline, endangerment and extinction of enormous proportions, and widespread deterioration of the basic resources on which all of life depends i.e. the quality of air, soil, and water. Such degradation of the natural resources and environment is not a new phenomenon, but it is the rapidity and global scale at which changes is now take place that causes great alarm<sup>1</sup>. For the conservation and sustainable use of natural resources, the two main mountain Protected Areas are protecting the Central Karakoram and the Western Himalaya.

The Central Karakoram National Park (CKNP) is located in Karakoram mountain range and Deosai National Park (DNP) in Western Himalaya. The CKNP declared as National Park in 1993, covering over 10,000 Km<sup>2</sup> area. CKNP is the largest protected area of Pakistan, and encompasses the world's largest glaciers, outside the polar region. It is characterized by extremes of altitudes that range from 2,000 m a.s.l., to over 8,000 m a.s.l., including K2, the second highest peak in the world. The CKNP's area is part of the "transitional zone" between the arid Central Asia and the semi-humid subtropics of the South Asia. The great altitudinal range and the climatic conditions have carved out distinctive ecological zone, which have been identified on the basis of researches on vegetation and on the faunal component associated to each zone. The major ecological zones represented in CKNP are Alpine dry steppe, Sub-alpine scrub zone, Alpine meadows and alpine scrub zone, and Permanent snowfields and cold deserts (sub-nival and nival zone). The major part of the CKNP is cover by snow and glaciers (66.5%), bare rock and bare soil represent substantial part (15.4%), whereacs vegetation base classes represents about more than 14.7% of the area<sup>2</sup>. While DNP declared as National Park in 1993, covering 3000.7 Km<sup>2</sup> area. Deosai "land of the giants" is the second highest plateau in the world, at an elevation ranging from 3500-5200 meters a.s.l., according to Himalayan Wildlife Foundation-1996, 63% of the area has an elevation range from 4000-4500 m, and 22% of the

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<sup>1</sup> Bennett, A.F. (1998, 2003). Linkages in the Landscape: The Role of Corridors and Connectivity in Wildlife Conservation. IUCN, Gland, Switzerland and Cambridge, UK. xiv + 254 pp.

<sup>2</sup>Management plan for Central Karakoram National Park, 2014.

park area is above 4500 m. The major ecological zone represented in DNP is Alpine zone; Deosai plains lying between Sub-alpine, and Sub-nival and nival zone<sup>3</sup>.

Although there are arrangements for the adequate protection of both of the National Parks. The area in between, and outside the boundaries of the Parks, is open to all sorts of degradation forces that has speeded up the process of fragmentation on one hand and the loss of the local biodiversity on the other.

### **1.1. Why a Connectivity required?**

Connectivity is achieved by conserving and maintain a connected network of natural areas. Connectivity support the movement of species and ecosystems functions. Like planning for infrastructure for people, planning for ecosystem connections is required in landscapes with extensive human modification. Habitat loss and fragmentation are the two main threats to continuing biodiversity decline across the landscape. A comprehensive approach is required across both public and private lands to protect and manage natural ecosystems and ensure connectedness between remaining habitats<sup>4</sup>.

When native vegetation is cleared, fragmented patches are created; these patches may become increasingly cut-off from other areas of habitat resulting in many species becoming isolated, especially when land between the patches is permanently modified for human activities. These isolated patches ultimately lead to a break down in ecological processes such as species migration, dispersal, recycling of nutrients, pollination of plants and other natural functions required for healthy ecosystem. The likely result is severe biodiversity decline and local extinction of species. Here are some key reasons for supporting and maintaining connectivity;

- Support delivery of ecosystem services
- Moderate the impacts of climate change
- Support genetic diversity and the movement wildlife
- Reduce human-wildlife conflicts
- Combines benefits for ecosystems and species with benefits for people<sup>5</sup>

### **1.2. Structural and Functional Connectivity**

Structural connectivity refers to the physical relationship between habitat patches; functional connectivity describes the degree to which landscapes actually facilitate or impede the movement of organisms and processes<sup>6</sup>.

Structural connectivity indicates the part of the landscape that is actually connected via corridors. While in contrast, functional connectivity includes species-specific aspects and their interaction with landscape structures. Therefore, from species perspective functional connectivity is actual connectivity<sup>7</sup>.

The individual's movement across landscapes can affect many ecological processes across scales, from individual survival through the viability of populations and meta-populations, to community dynamics, ecosystems resilience, and wider biodiversity. The distribution and

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<sup>3</sup> Management Plan for Deosai National Park, 2016.

<sup>4</sup> Hansen, L. 1992. Cougar: the American Lion. Northland Publishing, Flagstaff, Arizona. 129 pp.

<sup>5</sup> Taylor, P.D., L. Fahrig, K. Henein & G. Merriam. 1993. Connectivity is a vital element of landscape structure. *Oikos* 68: 571-573.

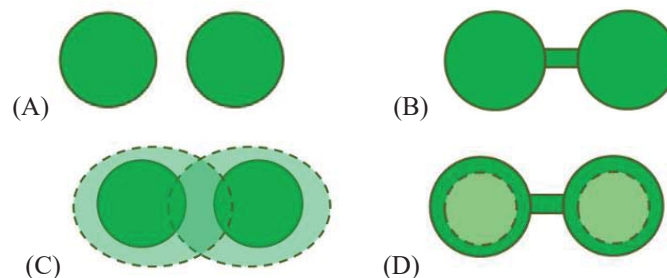
<sup>6</sup> Ament, R., R. Callahan, M. McClure, M. Reuling, and G. Tabor. 2014. Wildlife Connectivity: Fundamentals for conservation action. Center for Large Landscape Conservation: Bozeman, Montana.

<sup>7</sup> Laliberte, A. S. and W. J. Ripple. 2004. Range contractions of North American carnivores and ungulates. *BioScience* 54: 123-138.

shifting of species (e.g. in response to climate change) depends on the species movement capacities and yet are mediated by landscape structure. The loss of connectivity, mainly due to the exceptional expansion of anthropogenic infrastructure, is an increasingly central driver of the global biodiversity loss. Yet to enable policy and management to enhance or maintain connectivity, general agreement is needed on what connectivity means and how to measure it in an appropriate way<sup>8</sup>.

In (1993) Taylor *et al.*, introduced the term “Landscape Connectivity”- “the degree to which the landscape facilitates or impedes movement between resource patches”<sup>9</sup>. Later on, a derivation of this term is the concept of “Functional Connectivity”- which focuses on the landscape from the perspective of the species, and thus, the outcome of interactions between individuals and landscape structures in accordance to their needs, perception, and the response norms of species or individuals (Box 1). This term, which strongly adheres to the “Movement Ecology” paradigm in focusing on individuals and their response to their environment, has become very dominant in landscape ecology<sup>10</sup>.

**BOX 1:** To understand the concept of “Functional Connectivity”, Suppose (A) two disconnected habitat patches, (B) two habitat patches that are structurally connected by a corridor. (C) an individual that can move beyond the boundaries of patches and into the unsuitable environment might perceive the disconnected neighboring patches as functionally connected (marked by the dashed) (D) a core habitat species, which avoids habitat edges, may not move into the corridor, and so structurally connected habitat patches may remain functionally disconnected.



### 1.3. Purpose of Establishment: Why this Connectivity area and No Others

A connectivity area is a link of wildlife habitat, generally native vegetation, which joins two or more larger areas of similar wildlife habitat. Connectivity areas are critical for the maintenance of ecological processes including allowing for the movement of animals but also to create a unique habitat in which the opportunities to be in the middle of two National Parks create a virtuous circle that promote the Park themselves<sup>11</sup>.

<sup>8</sup> Kindlmann, P., and F. Burel. 2008. Connectivity measures: a review. *Landscape Ecology* 23:879-890.

<sup>9</sup> Taylor, P. D., L. Fahrig, K. Henein, and G. Merriam. 1993. Connectivity is a vital element of landscape structure. *Oikos* 68:571-573.

<sup>10</sup> Nathan, R., W. M. Getz, E. Revilla, M. Holyoak, R. Kadmon, D. Saltz, and P. E. Smouse. 2008. Movement Ecology Special Feature: A movement ecology paradigm for unifying organismal movement research. *Proceedings of the National Academy of Sciences of the United States of America* 105:19052-19059.

<sup>11</sup> McRae, B. H., B. G. Dickson, T. H. Keitt, and V. B. Shah. 2008. Using circuit theory to model connectivity in ecology, evolution, and conservation. *Ecology* 89(10):2712-2724.

By providing landscape connections between larger areas of habitat, connectivity area enable migration, colonization and interbreeding of plants and animals<sup>12</sup>.

Studying the possibility of connecting the two Parks different options were analyzed and the proposed area observed to be more feasible because some wildlife movement has been noted in the past and proximity between the two Parks. The proposed connectivity area between CKNP and DNP is located where the two Parks are closer and have similar ecosystems, connecting the north-east (NE) border of DNP with the south of CKNP in correspondence of the Valley of Keris. The territorial limits are: Satpara Wildlife Sanctuary including Satpara lake are outside the NE border, Kharmang valley outside the south-east (SE) border, CKNP Buffer zone Thallay valley on the NE border.

CKNP and DNP are mountain areas endowed with rich biodiversity, natural beauty and important resources. DNP is focused on the conservation of Himalayan brown bears and CKNP is famous being the biggest glaciated park in the world, if connected together would form a contiguous conservation and sustainable development area. Both the national parks are on the UNESCO's tentative list of world heritage sites and the connectivity area can become an opportunity for the local inhabitants to their socio-economic status through conservation and eco-tourism and diversified interesting touristic, cultural and outdoor opportunities for travelers and same time a perfect location for awareness and education about protected areas. The connectivity area between CKNP and DNP has enormous potential to improve and support management and conservation of natural resources, gene flow, and contribute to the resilience of the landscape in a changing climate.

- CKNP+ DNP+ Connectivity area (16,486 km<sup>2</sup>)

The need of connectivity area between CKNP and DNP is also expressed in the management plans of CKNP and DNP. The proposed connectivity area is very wide and crossed by the Indus river, which is surely not promoting the transition of species between the two Parks, but the morphological features forced to adapt the traditional definition of the ecological connectivity to the real situation<sup>13,14</sup>. Thus, after GIS analysis, consultations with the communities and local stakeholders, and in order to propose a connectivity area between the two National Parks, feasible, functional and having the real scope of improving CKNP and DNP management and conservation of the natural resources, and is a relevant supporting tool to improve Pakistan CBD commitments and initiatives to promote sustainable development.

Different habitats/ecosystems types and urban environment are, frequently interrupting the inter-park gap between the two landscapes of DNP and CKNP. Accordingly, as such, there is no contiguous ecosystem that combines the two for the establishment of a traditional ecological connectivity.

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<sup>12</sup> Manly, B. F. J., L. L. McDonald, D. L. Thomoas, T. L. McDonald, and W. P. Erikson. 2002. Resource Selection by Animals: Statistical design and analysis for field studies. Kluwer Academic Publishers, New York.

<sup>13</sup> Management plan for Deosai National Park, 2016.

<sup>14</sup> Management plan for Central Karakoram National Park, 2014.

#### 1.4. Connectivity Area Management

Management of the connectivity area aimed to create a joint management committee with the participation of the Forest, Wildlife & Environment Department GB, Tourism Department GB, two adjacent Parks Directorates, local administrations and local communities' representatives.

Overall, connectivity area management should aim to ensure that ecological processes and connectivity area function are maximized:

- maintain and enhance vegetation cover and wildlife habitat quality to maximize connection between larger fragments of vegetation. This will help dispersal of wildlife populations between larger fragments and ensure gene flow and seasonal wildlife movement
- provide specific habitat resources and ecological needs, especially for threatened species
- maximize connectivity area width and function by revegetation and control of weeds and wild animals
- maximize the protection / linkage of landforms (i.e. valley floor, gullies, ridges, and mid slope)<sup>15</sup>.

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<sup>15</sup> Scotts, D and Drielsma, M (2003), Developing landscape frameworks for regional conservation planning: an approach integrating fauna spatial distributions and ecological principles. Pacific Conservation Biology. Vol. 8, No. 4.

## 2. ECOLOGICAL SYSTEMS AND SOCIO-ECONOMIC CONDITIONS

### 2.1. Area Description

The proposed connectivity area covers an area of 1441,37 km<sup>2</sup>. The Connectivity area offers a vast oasis-like view, with the Indus River flowing through the middle of the connectivity area. The connectivity area presents a stunningly contrasting landscape; rocky barren cliffs, cultivated terraces, and orchards all around. This proposed area covered three districts Skardu, Kharmang, and Ghanche, and total 11 valleys of these districts namely Keris, Nar, Kuru, Balghar, Thalay, Gol, Sermik, Mehdiabad, Shilla, Dappa, and Gowari.

### 2.2. Geology

In the connectivity area, Karakorum is on the right and Himalaya on the left bank of Indus river.

**The Karakorum mountain** range is built on Peri-Godwanain continental crust rifted away from Godwana during Late Paleozoic and accreted to the southern Eurasian margin during the Upper Mesozoic. The Karakorum unit is usually subdivided into three main parallel sub-units, from north to south;

- i. Northern sedimentary belt
- ii. Karakorum batholith
- iii. Southern metamorphic belt

#### **Northern/ Shyok Suture zone**

Northern Suture Zone (NSZ) or MKT separates the Karakoram block and Kohistan-Ladakh arc. NSZ is the result of collision of Asian Landmass and Kohistan-Ladakh arc. It is characterized by the ophiolitic melanges, which are comprised of serpentinites, volcanic and marine sediments. Sedimentary rocks mainly include limestone and quartzite.

#### **Kohistan-Ladakh Zone**

Kohistan-Ladakh arc is formed as a result of intra-oceanic subduction of Neo-Tethys beneath Asian plate in late Jurassic to early Cretaceous age. Main Mantle Thrust or Indus Suture Zone separates it from Indian plate in south.

### 2.3. Climate

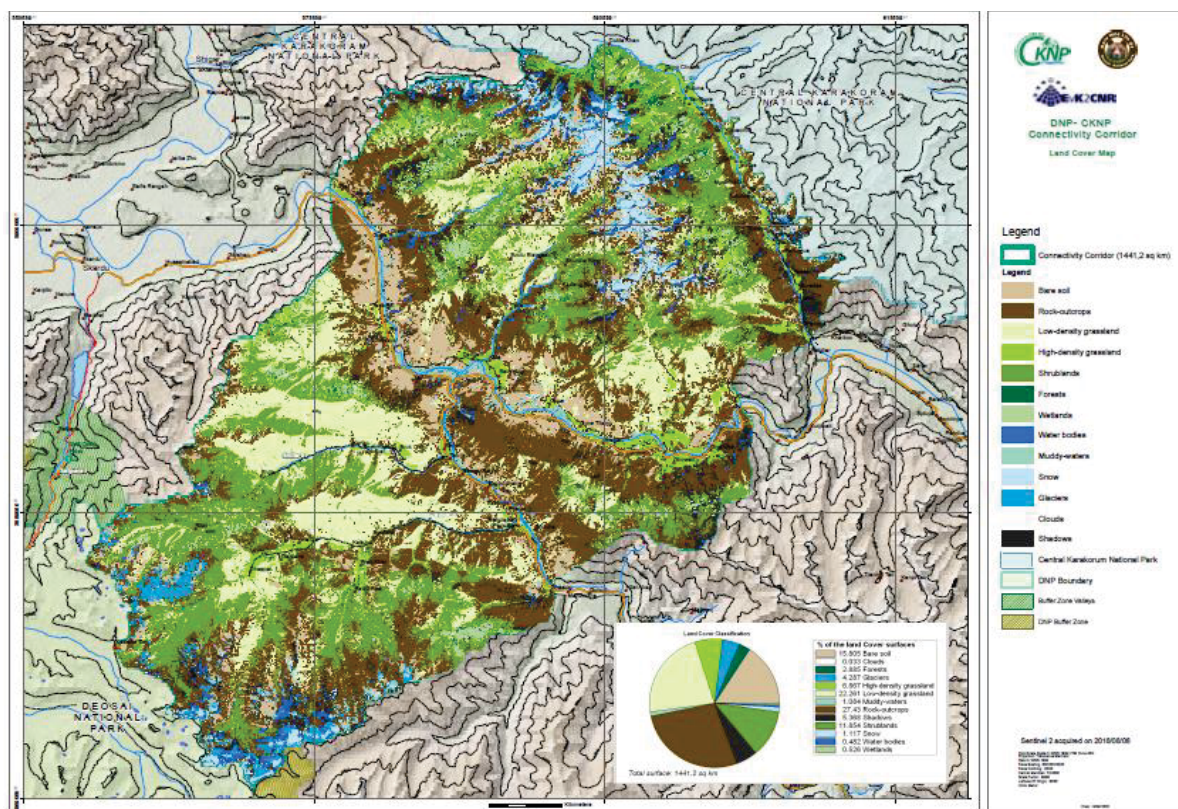
The connectivity area located between two national parks; Central Karakorum National Park (CKNP) and Deosai National Park (DNP). The climate of Baltistan varies from region to region; surrounding mountain ranges creates sharp variations in weather. The eastern part has the moist zone of the western Himalayas, but going toward Karakoram the climate dries considerably.

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. As a rule, a decreasing humidity and an increasing significance of continental climate can be observed from south to north.

## 2.4. Land cover

The land cover map of the area represents 15.805% bare soil, 2.885% forests, 29.128% grassland, 27.43% rock-outcrops, 11.854% shrubland, 0.482% water bodies, 0.526% wetland, 4.287% glaciers and 1.117% snow. (Exhibit no. 2)

Exhibit 2: Land cover/use map of connectivity area



## 2.5. Hydrology

Economy of connectivity area is relying upon agriculture and thus highly dependent on water availability and irrigation systems. The human settlements within connectivity area are tightly bound for their survival to agriculture, including wheat and more important sources of food integration (orchards, potatoes). The main source of water in this area are Indus river and Shyok river and their tributaries. The Indus river passes through the middle of the connectivity area; Karakorum is on the right and Himalaya on the left bank of Indus river, while Shyok river joins the Indus at Keris valley, district Kharman. Except these rivers there are many waterfalls and streams in this area such as Manthoka waterfall.

### Water quality

Glaciers and snow deposits are the main sources of all water. The melted water enters streams, which subsequently feed man-made channels, that bring water into the settlements for agriculture, livestock and domestic requirements. The availability of sufficient water of good quality throughout the year often remains a core issue within the community realm with many communities having settled in present locations based on water, agricultural land, and accessibility to pastures for grazing.

Sanitation problem is an emerging issue, like rest of Gilgit Baltistan, the connectivity area lacks of installed sewerage system. Sewerage water from homes, hotels and shops discharge into agriculture fields. On one hand, this contaminated water badly affecting the agriculture crops and on the other hand affecting human health.

## 2.6. Vegetation

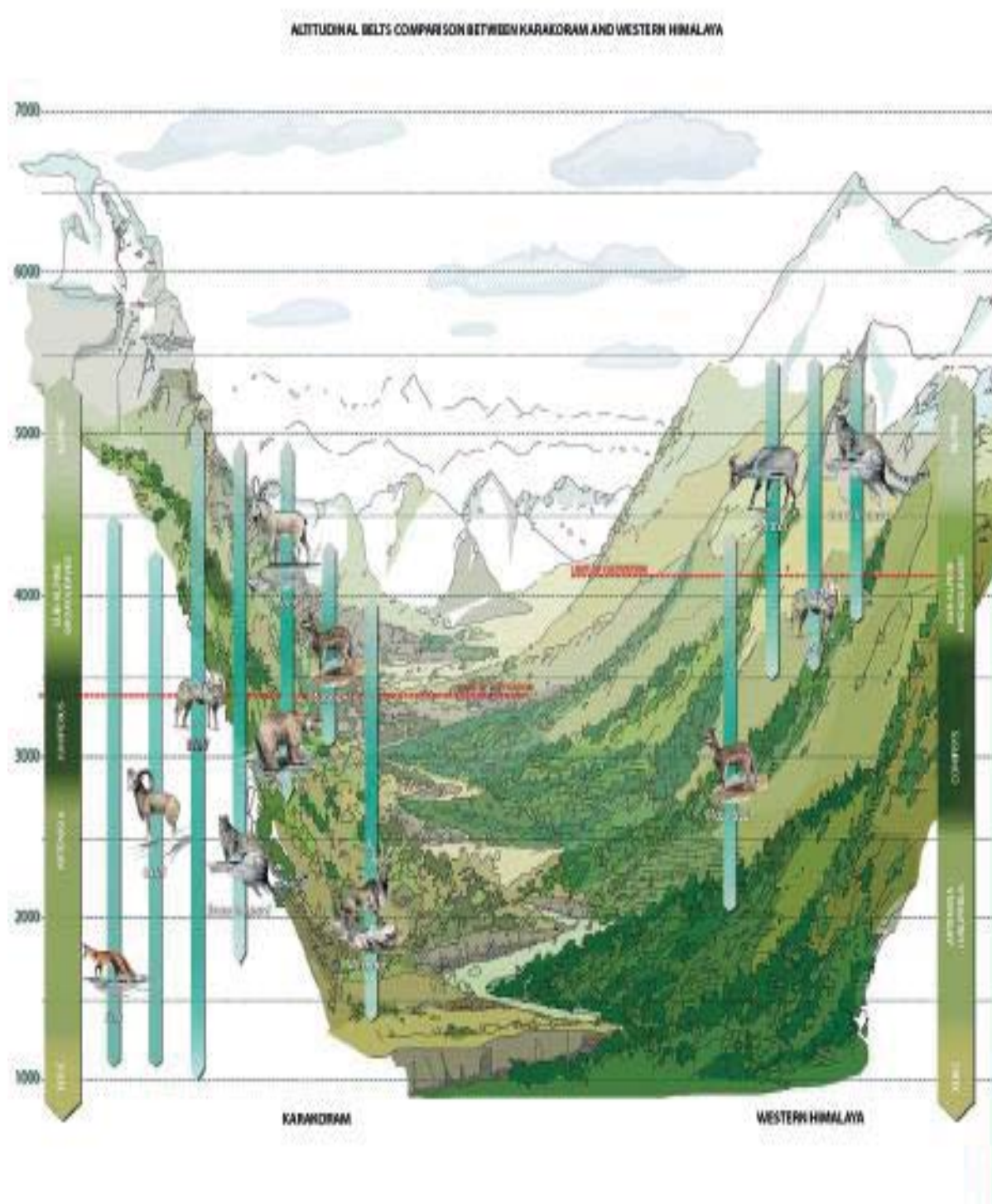
The distribution of natural vegetation is closely linked to climatic and topographic conditions. The 2.885% of connectivity area cover by forest. The vegetation of the connectivity area is the mix of sub-tropical scrub type at lower elevations and dry temperate coniferous forest zone at higher elevations. The natural forest resources are very scarce in the connectivity area. The major forest trees are Juniper, Pine, and Salix spp. The *Artemisia* spp. and Sea buckthorn are dominating shrubs in the area. Most of the cultivated area and major settlements are along the bed of the major rivers (Indus and Shyok). The most common crops of the connectivity area include wheat, barley, potatoes, millet, kitchen gardening for seasonal vegetables, apricot, pears, apples, mulberry, peach, walnuts, cherry, and almonds. Populus plantation is very common within the cultivated areas and as separated plantation for domestic timber use.

The great altitudinal range and the climatic conditions, low precipitation and the effects of westerly humid winds, have carved out distinctive ecological zone, which have been identified on the basis of researches on vegetation and on the rich faunal component associated to each zone. The vegetation of lower sub alpine areas is influenced by arid to semi-arid conditions, whereas plants of the alpine and sub-nival level are influenced by humidity.

Threats for forest resources in connectivity area are mainly a consequence of:

- Lack of management guidelines
- Historic illegal harvesting of forest resources for timber and firewood
- Unorganized grazing by livestock

Exhibit 3: Altitudinal belts comparison between Karakorum and Western Himalaya<sup>16</sup>



<sup>16</sup> Through the CKNP to discover the natural beauty and cultural heritage of Karakorum mountains (2013), EvK2CNR

## 2.7. Fauna

The proposed connectivity area has diversity in wild fauna; major wildlife of the area includes Himalayan Ibex, Grey Wolf, Red Fox, Snow Leopard, and Himalayan Brown Bear. The GB region of Pakistan has one of the most diverse fauna of the mountain regions of the world, but unfortunately, little information is available on the distribution, status and ecology of many of the species.

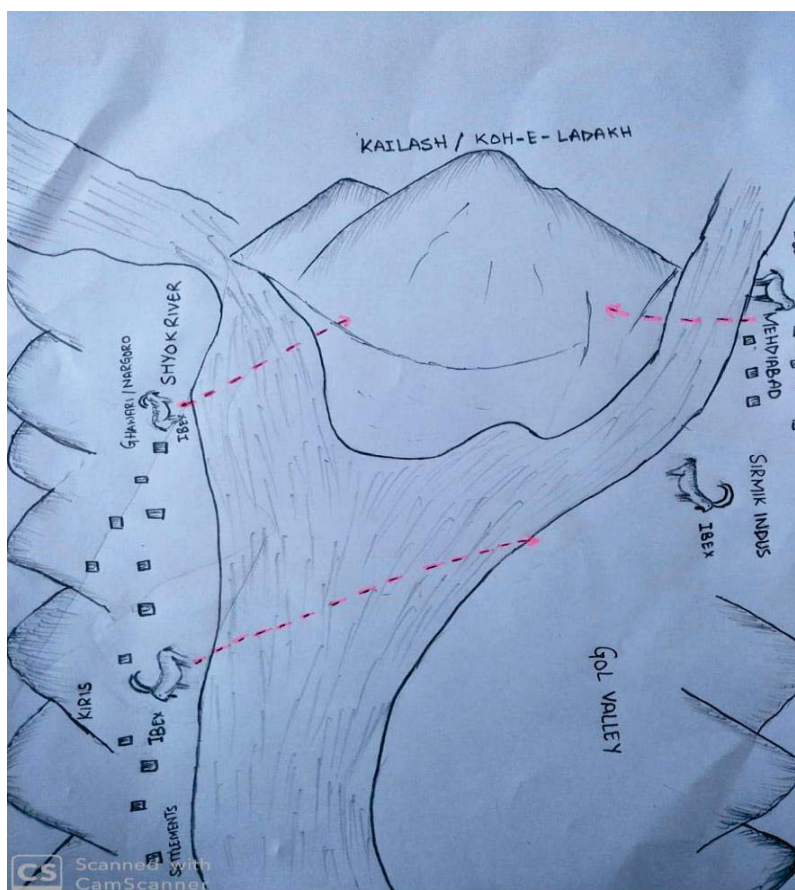
Connectivity area is mostly barren terrain and dry alpine zone, open barren valleys with small patches of alpine meadows and alpine scrub. Himalayan snow cock, chukor, snow pigeon, rock pigeon, finches, white headed redstart, wheat eater, pied magpie and birds of prey found in the area.

GB hosting a unique herpetofauna, the knowledge of the amphibians and reptiles of the GB largely incomplete, the biodiversity of the connectivity area remains poorly studied. Only few areas and species have been deeply investigated, and strong uncertainties persist on the distribution and taxonomy of the herpetofauna.

In 2018, people observed a Snow Leopard following Ibex on the mountain slope across Indus at Mehdiabad.

### ✚ Crossing of physical barriers by Himalayan Ibex

During the field surveys it revealed that the movement of Himalayan Ibex across frozen Indus was common in winter season. The Ev-K2-CNR survey team met several witnesses in the Mehdiabad Valley and Keris Valley who witnessed ibex crossing Indus in winters.



The main prevail and potential threats to the large mammals in the proposed connectivity are;

- Habitat loss due to destruction, fragmentation or degradation of habitat
- Hunting and poaching
- Feeding competition with livestock
- Retaliatory killing of mammal's predators
- Development of infrastructure and roads
- Disease transmission from livestock

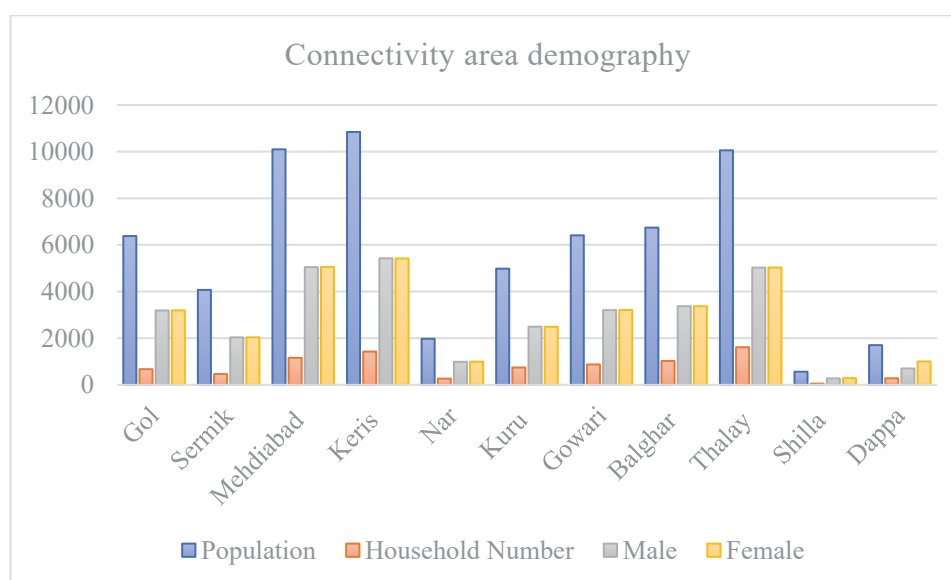
## 2.8. Demography of Connectivity Area

Connectivity area hosts 8552 households containing 63820 individuals, with an average household size of 7.4.

Exhibit 4: Demography of connectivity area

Valley Name	Population	Household Number	Male	Female
Gol	6380	670	3189	3191
Sermik	4070	460	2033	2037
Mehdiabad	10100	1155	5048	5052
Keris	10845	1425	5425	5420
Nar	1975	265	985	990
Kuru	4981	743	2492	2489
Gowari	6410	872	3202	3208
Balghar	6742	1022	3372	3370
Thalay	10057	1610	5027	5030
Shilla	560	50	275	285
Dappa	1700	280	700	1000

Exhibit 5: Demography chart of connectivity area



## 2.9. Livelihood Sources

The main sources of income are livestock rearing, agriculture, military and government jobs. A significant male population is working in Gulf countries. In GB, women in rural areas have heavy workload and carry out a wide range of tasks within and outside the house such as in agriculture, livestock rearing and off-farm activities.

### 2.9.1. Agriculture

Agriculture and livestock rearing are two main economic activities in the connectivity area. The main agriculture production of the connectivity area includes wheat, barley, potatoes, millet, kitchen gardening for seasonal vegetables, apricot, pears, apples, mulberry, peach, walnuts, cherry, and almonds.

In the last 10 years, the community is witnessing new diseases and pests to their crops, which were not common earlier. The Halmand variety of Apricot from Mehdiabad in district Kharmang is considered the top notch variety in edible apricots, but its production has been reduced and especially due to attacks of certain pests like Mealy bug and hairy caterpillar, but still community is trying to avoid the use of chemicals and to use some organic methods to control the pests. The current pest removal techniques being used by the communities are fire and removal of their nesting places and burying into the soil. The IPM techniques should be encouraged as compared to the use of inorganic material or chemical pesticides.

Agricultural practices in the area of connectivity are old and traditional, which is why crop productivity is also lower, but some mechanization is now being used in the form of tractors and threshers. Connectivity area is confronted with issues related to water quality as wastewater (soapy & oil water) is brought to the agricultural fields, which is creating health issues to the fruit plants, causing disease infestation and low productivity.

### 2.9.2. Livestock

Livestock is one of the main sources of livelihood. The trend in livestock is gradually declining due to lack of interest from the young generation and due to lower economic returns. Each household owns five or six animals, usually goats and sheep or one cow or zomo along with a small flock of poultry. Apart from cows all the livestock, including zo/zomos, goats and sheep are taken to the alpine pastures in the start of June to end September. The productivity of livestock is very low due to prevalence of diseases and malnutrition. Though people are losing interest in animal rearing and in pastoral life style, but still an important livelihood source for the inhabitants of these remote valleys.

## 2.10. Basic Facilities

**Roads:** Accessibility is a key issue in mountain landscapes and goes far beyond accessing basic infrastructures such as health services, schools, roads, transportation, markets and communicating with the outside world. This lack can be attributed to difficult topography and low population densities relative to lowland areas, factors that increase cost of investment and maintenance. The connectivity area lies next to the main Skardu-Khaplu road.

**Education facilities:** In the area of connectivity, both private and public schools are available, but don't meet the needs of the area. There is a lack of proper facilities for the schools and teachers. People send their children to big cities for higher education.

**Health facilities:** There are basic health units / dispensaries but there is a lack of medicines and medical staff. People shift patients to Skardu to treat serious illness.

**Veterinary facilities:** The people of the connectivity area are highly dependent on the services provided by the livestock, but its number is rapidly declining due to the lack of reasonable veterinary services and the spread of recurrent diseases. The most commonly reported animal diseases are Goat pox, Enterotoxaemia, Black Quarter and Mange as mentioned in interviews with the FGD. Alternatively, to the lack of veterinary facilities, people buy the vaccines without a prescription from Skardu or Gilgit City and inject them without proper training.

**Electricity:** All valleys in the connectivity area have access to electricity provided and managed by Water and Power Department, GB but load shedding manages the supply-demand lapse. The frequency of load shedding increases in winter with increased demand to maintain the temperature indoors.

## **2.11. Cultural Heritage**

Over the past few years, local tourism experience incremental growth and diversification, which has turned it into a key driver of socio-economic progress. There is huge potential for promoting ecotourism in the ecologically fragile areas of GB.

A few kilometers west of Gol valley there is a rock with old Buddhist rock paintings and inscriptions, parts of which have since been destroyed by blasting. There is only one old Matam Serai on older religious buildings Memorial hall worth mentioning. The old Khanqa prayer hall was replaced by a new building whose architectural style is completely untypical for Baltistan. In Keris valley, the main attractions are the Keris Castle, the large Muslim prayer hall called Khanqa and the tomb monument (Astana) of Hazrat Mir Mukhtar. Manthoka waterfall, and many treks are the source of tourist's attraction in connectivity area.

Connectivity area was a historical route towards Khaplu, Kharmang and Ladakh. Whole proposed connectivity area was transitional station for military and for the different kingdoms. All of the forts and cultural building in the area need to be rehabilitated and promoted to conserve the old heritage sites and to generate economic activities.

Exhibit 6: Rock with Buddhist inscription and rock painting near Gol Valley



Exhibit 7: Keris castle, Keris Valley

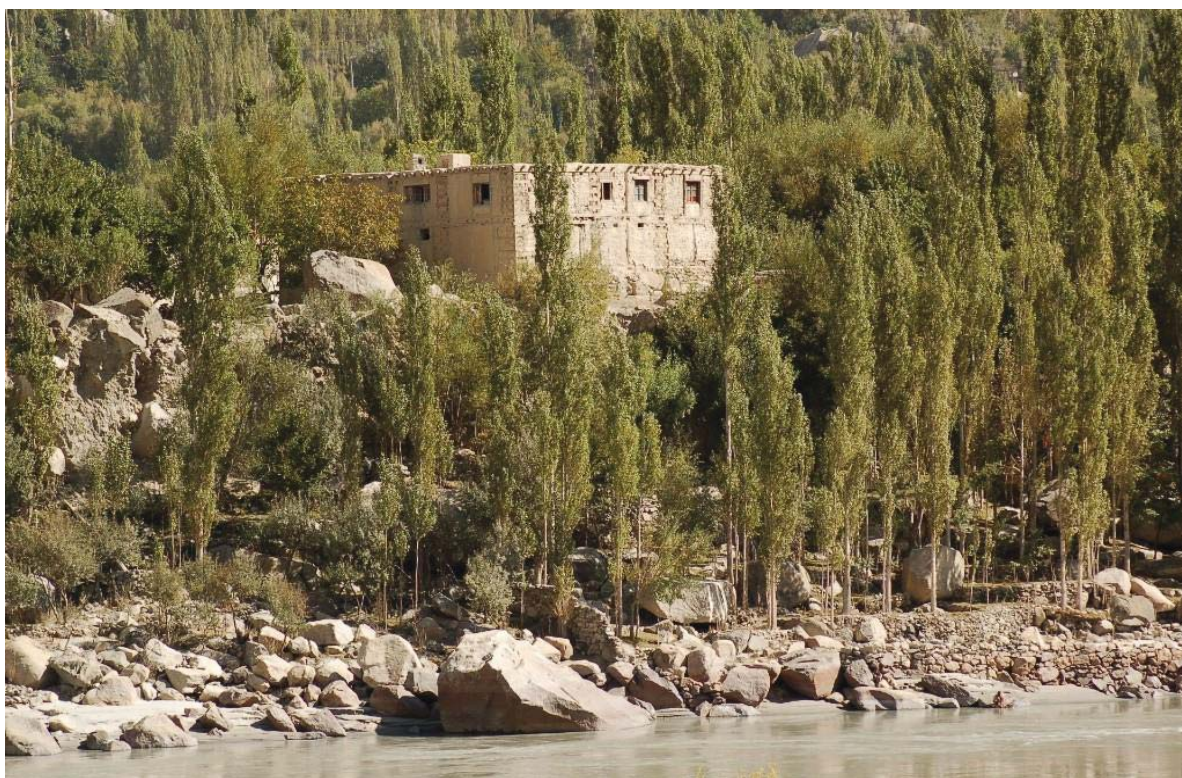


Exhibit 8: Keris Khanqa prayer hall, Keris Valley



Exhibit 9: Tomb monument (Astana) Hazrat Mir Mukhtar- Keris valley



### 3. MANAGEMENT GUIDELINES

The Identification, mapping and development of management guidelines for a connectivity area were formulated with the goal to harmonize the management between the area of two national parks: CKNP and DNP.

Currently, the management of the various Protected Areas (PAs) differs, as they represent different protection categories, management systems and settings as well as legal base and use of resources.

The ultimate goal is where natural resources are used sustainably, where the local people could be compensated with socio economic development, where the whole region including local people and stakeholders are included in all processes and where the biodiversity and geodiversity is preserved and restored.

In order to monitor the approval and implementation of the proposed guidelines, CKNP and DNP under the umbrella of Forest and Wildlife Departments agree to: jointly discuss the implementation status on a regular basis, to continuously exchange experience on challenges and successes, along with mutual support in implementing the Guidelines for the connectivity area.

The Guidelines for a wildlife connectivity area also help to achieve many goals, which are defined by the United Nations in the “2030 Agenda for Sustainable Development” (United Nation, 2015). A healthy natural environment (and the ecosystem services it provides) plays a key role to achieve at least 11 out of 17 SDG’s (Sustainable Development Goals), so even though the main focus is on nature protection, the aims described in this document can bring a benefit to the broader well-being of society within connectivity area and surroundings of CKNP and DNP.

#### 3.1. Guidelines Development Process

**“The last two decades, sustainable landscape approaches are increasingly being adopted worldwide. An important challenge for these approaches is to analyse and improve governance systems that promote non-conflicting land uses to provide multiple ecosystem services and safeguard biodiversity for diverse social groups over the long term”.**

In 2018/19, Ev-K2-CNR conducted a feasibility between CKNP and DNP to identify and status of potential connectivity areas using a combination of questionnaires and interviews, consultations, GIS surveys and ground mapping.

The most recent surveys (2018-19) suggest that the proposed connectivity area has become limited to wildlife, most likely due to anthropogenic activities and associated increases in use of land for farming and cattle grazing, both of which can have severe effects on wildlife. However, our assessment indicates that the mosaic of habitats, seasonal farming practices, and low level of permanent settlements throughout the connectivity area make the movements of large mammals between CKNP and DNP feasible in the future. Brown bear and ibex have been witnessed by the communities to move rapidly and discretely.

The conservation and management of proposed connectivity area should be site-tuned, with community-led land use planning being the primary long-term solution. Indeed, if communities

are not involved from the outset, political problems are likely to snowball and the damaging and erroneous perception of connectivity area conservation as a land-grab may gain ground.

### 3.1.1. Methodology

The connectivity area management guidelines development included following stages;

- a) Literature review
- b) Designing of questionnaire
- c) Sample size and interviewee classification
- d) Consultative workshops
- e) Scientific research and GIS based field surveys
- f) Drafting of guidelines

To ensure the successful ecosystem planning community-based approach was employed for which development of detailed questionnaire was recommended by the technical experts. The 10% of local community in 11 valleys has been interviewed as sample population. The minimum scale for age the interview was 40 years because of the enough acquaintance to the nature based on their life experiences compared to young generation. Information for socio-economic and ecological profile of the 11 valleys were obtained with the help of focal group discussions (FGDs), and GIS-based field surveys were conducted to develop map of the connectivity area.

Sustainable utilization of natural resources, keeping resource conservation-exploitation balance and transferring wealth as an inheritance to the future generations are desired management goals of connectivity area. Strong involvement of communities, politicians and religious leaders is very important where this connectivity area intends to creates a resource balance between development and conservation. The cultural, biological and geological features of this area are unique and involves large and diverse stakeholders, which demands careful institutional arrangements and innovative governance approach. Therefore, the connectivity area must have its own unique management system by committing regional, national and international rules and guidelines. IUCN category VI: Protected area with sustainable use of natural resources would be appropriate for this connectivity area.

IUCN defines protected area with sustainable use of natural resources as “Protected areas that conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area.”<sup>17</sup>

#### **Distinguishing features**

- Category VI protected areas are unique and have the sustainable use of natural resources as a means to achieve nature conservation, together and in synergy with other actions more common to the other categories, such as protection

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<sup>17</sup> <https://www.iucn.org/theme/protected-areas/about/protected-area-categories>

- Category VI protected areas aim to conserve ecosystems and habitats, together with associated cultural values and natural resource management systems. Therefore, this category of protected areas tends to be relatively large (although this is not obligatory).
- The category is not designed to accommodate large-scale industrial harvest.
- In general, it recommends that a proportion of the area is retained in a natural condition<sup>18</sup>

The Connectivity area concept provide an additional layer of protection around protected areas as well as to balance the development needs of the local people and conservation objectives of protected areas and create a link not only theoretical but also in the management. The creation of buffer areas encourages both sustainable uses and public participation in protected areas management through decentralization of natural resource use along with financial and technical support to the user groups. This opportunity to meet the dual goals of conservation and poverty reduction has generated major interest among governments, and has resulted in global implementation around protected areas.<sup>19</sup>

The buffer zone concept has been adopted as a national strategy to address the issues between parks and adjacent communities to ensure an optimal balance between the long-term conservation objectives and immediate needs of local residents. The major goal is to involve and seek support from local communities for nature and wildlife conservation. The Connectivity Area management guidelines have two major objectives:

1. to improve the management of the natural resources in the buffer zones of the two Parks and lowland areas at the same time guarantee a continuity of ecosystem
2. to improve ecological conditions in the buffer zones and lowland areas which offer an extended habitat for wildlife.

Additionally, legislation has provision for benefit- sharing mechanism for implementation of conservation and community development programs related to institutional development, alternative natural resource development, capacity building, financial management, conservation education and awareness, and gender and special target group mainstreaming. Overall, the application of buffer zones has demonstrated utility and success but has also borne conflicting priorities between conservation and development goals. Furthermore, buffer zone policy has also been perceived to be coercive by some local community residents given the top-down managerial structure.

The understanding of ecological and conservational principles, reliable ecological data are fundamental requirements for successful conservation and management actions. Information on size and distribution of any wild species are important to assess their status (*i.e.* declining, stable, increasing), in this way the strategy for their conservation could be properly addressed.

The most significant problem being faced in proposed connectivity area is the social and financial circumstances of people living there. In particular, the livelihoods of the residents are

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<sup>18</sup> [www.iucn.org/theme/protected-areas/about/protected-areas-categories/category-vi-protected-area-sustainable-use-natural-resources](http://www.iucn.org/theme/protected-areas/about/protected-areas-categories/category-vi-protected-area-sustainable-use-natural-resources)

<sup>19</sup> Ament, R., R. Callahan, M. McClure, M. Reuling, G. Tabor. 2014. Wildlife Connectivity: Fundamentals for Conservation Action. Center for Large Landscape Conservation. Bozeman, MT

natural resource dependent. Local people benefit from the area by livestock rearing, agriculture, grazing, collection and use of NTFPs. Other issues in connectivity areas are grazing, reclaiming of land from steep mountain slopes for agriculture, deforestation, poaching, roads/bridges construction and construction of community settlements.

- **Goal**

Conserving potential wildlife areas is increasingly important for maintaining ecological and genetic connectivity in times of unprecedented habitat fragmentation.

- **Governance**

Conservation takes place in socio-ecological systems, where it is not just the biophysical dimension of biodiversity-rich places that matters, but also the way humans choose to organise the actions and the decision-making processes that impact these places. The governance dimension of sustainable landscapes concerns the critical interrelations between ecological systems and the social institutions influencing the planning, management and monitoring of natural capital. Assessing relevant ecological, economic, regional development, social, cultural and political dimensions requires deep integration of different actor interests through participatory processes.

### **3.2. Management Guidelines**

The aims of the document are to ensure identification, mapping and propose it for official notification as designated connectivity area with clearly established goals and activities to guide the conservation and sustainable use of its natural, scenic and heritage resources. This document therefore proposes the IUCN category and zonation to the field of connectivity, proposed boundaries and demarcation, GIS presentation, structure of governance and providing management guidelines.

A remarkable change in land-use conservation occurred in the late 20th and early 21st centuries, with increased number of protected areas in the world. This achievement has arisen in reaction to an international agreement to conserve a representative sample of all countries' natural and cultural heritage. The need to create and maintain the connectivity of natural lands among protected areas also emerged in the 1990s in parallel with this effort. Scientists and conservations had become increasingly conscious that protected areas might not always be able to preserve all of their biodiversity in isolation.

As evidence of human-induced climate change became more pronounced, and climate change projection models revealed the implications of changes in biodiversity and ecosystems, interest in creating and conserving connectivity areas has grown.

Connectivity areas are no replacement for protected areas that should be highest priority in accordance with the Action Plan for Protected Areas Secretariat for the Convention on Biological Diversity. Connectivity is an important next national conservation initiative. The proposed connectivity area hosts Himalayan brown bear, Golden Marmot, Ibex and musk deer habitats and allows the animals to travel. A large interconnected natural land with embedded national parks and CCHAs between the Himalayas and Karakoram offers opportunities for many species to adapt to the expected effects of climate change and other human pressures.

Connectivity areas between national parks should form an integral part of GB 's strategy for biodiversity conservation.

It should be noted that the planned connectivity area includes water streams from Karakoram and Deosai Plateau, meadows and pastures, lakes and springs, low land with mountain agriculture farming. The great Indus, Shyok and parts of the cold high-altitude desert, and human settlements. Connectivity area land is incredibly important for their important habitats, ecosystem functioning and less human interference, and must be managed in order to maintain natural value.

This document proposes guidelines for management of an identified connectivity area between CKNP and DNP. Its primary aim is to protect nature and biodiversity in the GB region for coming generation. Public or private land with acceptable requirements for other uses can also be consistent with the protection of connectivity.

- **A potential area for Sustainable Development of local communities**

Some parts of connectivity area like Shilla, Dappa, Thallay, Mehadiabad, Sirmik, Goal and Keris may play important roles for communities in localized landscape and may be considered for watershed management, pasture management, slope stability, scenic and recreational areas and areas reserved for wildlife.

- **Part of Global Initiative**

Creating and management of connectivity areas have been initiated in several parts of the world. The CBD defines explicitly for incorporating protected areas into larger ecosystems. IUCN WCPAs strategic plan and the World Park Congress have aimed to direct countries' policies and goals in this regard.

- **Future**

It is estimated that the global population will be 9.8 billion in 2050 with severe climate changes, resource shortages, and the sixth major species extinction on Earth. These future challenges make the creation and management of connectivity areas formidable for the conservation of natural resources and better management of protected areas. Connectivity Area initiatives are important as they are one aspect of a sustainable solution that will help to create a better future.

Identification of possible connectivity between protected areas may act as key conservation and sustainable development areas. It contributes to landscape connectivity, which contains valuable flora and fauna with threat analysis and mitigation measures. While there is no single formula for designing connectivity areas, the ultimate aim is to re-establish or preserve a connection between isolated patches of the ecosystem.

Some aspects which were consider in the connectivity area design stage include:

- PA presence to serve as core conservation areas.
- Movement of some of target species such as Ibex and brown bear
- Favorable natural vegetation coverage and mosaic
- Important conservation sites presence
- Use of natural boundaries i.e. mountains, rivers, watersheds and other water bodies.
- Watershed management

### **3.2.1. Community Participation**

GB Connectivity area shall strive to promote successful and mutually beneficial collaborations that, in effect, will result in equity for economic and/or biodiversity. This would be done by developing economic opportunities in support of the economic relief interventions and employment opportunities. The connectivity area can also improve the socio-economic benefits for local communities with the support of community-based social development initiatives. The lowlands of connectivity area have good population and human settlements including small towns, valleys and villages, so an environmental education plan need to be developed to be used as a tool to contribute to environmental awareness, and promote involvement in conservation initiatives.

The major objectives of the environmental education plan will be:

- To encourage tourists and communities to view the environment as an interdependent and interrelated to which they are an essential part
- To educate people through various tools and awareness material
- To create and introduce environment education initiatives tailored to the needs to specific target groups;
- To develop and implement an interpretation plan to compliment the educational plan

Relationship with all relevant stakeholders need to be established in order to maintain healthy and sustainable community/ stakeholder relationships within the connectivity area. Establishment of an efficient coordination mechanism for liaising with concerned and effected parties/communities and where appropriate, task teams and working groups can be set up to deal with key issues in the connectivity area.

### **3.2.2. Biodiversity Conservation Management**

#### *3.2.2.1. Community-based natural resource management*

The harvesting of natural resources in connectivity area is currently permitted with exception of state-owned forest patches and some restrictions in buffer zone areas of CKNP and DNP. Type and quantity of natural resources harvested across the connectivity area should be undertaken with research and field investigations as to assess where current harvesting is sustainable and/or what potential threats are foreseen.

Management programs, incorporating sustainable use of resources, are planned to:

- reduce conflicts between conservation and development,
- create long-term income sources from habitats which otherwise may have no economic value and may be altered to pursue other forms of revenue,
- create economic incentives to restore habitats degraded through unsustainable uses, presence of feral animals or noxious weeds
- discourage illegal trade in flora and fauna,
- provide economic and employment opportunities, particularly to indigenous people
- increase the knowledge of species and ecosystems,
- identify and quantify the response of flora and fauna species to use, which may help assess conservation risks of negative trends.

#### 3.2.2.2. *Fauna*

Conservation of wildlife is the important approach in delineating a connectivity area between the national parks, where several species are present and subjected to different kind of authorized hunting. In fact, trophy-hunting program could affect “threatened” species. Furthermore, an understanding of ecological and conservational principles, as well as reliable ecological data are necessary requirements for a successful management.

- **Monitoring of species**

One of the priorities is to have more information regarding the fauna present in the connectivity area, not only implementing the check lists, but trying to obtain data on distribution and relative density. As described above, the large mammals, as umbrella species, were monitored to develop the zone system and to give reliable management indications. Therefore, it is suggested to maintain a routinely and standardized monitoring of the large mammals, considering especially the Brown Bear that is moving outside the DNP along the valleys of connectivity area.

It is necessary to implement this monitoring program focusing on other groups like: small mammals, birds, reptile and amphibians’ fishes.

**Priority rank** High for the development of the monitoring plan for the different groups with focus on Brown Bear.

Following the management approach described above, data on fauna are fundamental for the management purposes of a National Park they have to be collected in all the different areas of the connectivity area for all the species, on both sides’ DNP and CKNP. Anyhow, due to the impediments highlighted above, it is suggested to concentrate mainly on large mammals of both sides for their role as umbrella species.

#### 3.2.2.3. *Sustainable Forest Guidelines*

One basic point in the delineation of the management guidelines of forest resources in the Connectivity area is that the local communities of those remote areas are still dependent from forest products (e.g. firewood and timber), a key asset for their subsistence economy.

A sustainable management approach must be implemented. Sustainable forest management, by definition, is the practice of meeting the forest resource needs and values of the present without compromising the similar capability of future generations, practicing a land stewardship ethic, managing for useful products with the conservation of soil, air and water quality, wildlife and fish habitat, and aesthetics.

To meet these objectives, three basic conditions, are fundamental:

1. to assess and evaluate precisely the forest area, forest productivity and degradation status.
2. to accurately estimate the forest products (timber, firewood and non-timber forest products) necessities of local communities.
3. to implement a careful analysis of the local cultural heritage, of the ongoing tradition knowledge, its motivations and constraints.

The long-term sustainable management, indeed, is reached when harvesting rate (point 2) is not exceeding forest increment rate (point 1).

The following management indications aim at setting the basis for participatory and sustainable forest management in the valleys of connectivity area. This is a long lasting and continuous process, where technical skills, community awareness and civil society responsibility are all necessary ingredients for the delivery of an effective and successful plan.

The first step is the constitution of **Valley Forest Committees** in each valley to manage the whole process, starting from the realization of the **Valley Forest Analysis** where the actual situation, the local community's needs and actual regulations are reported.

On the basis of the situation some general guidelines are indicated for the development of these operations in a sustainable way:

- Harvesting of timber and firewood: in areas with *Mountain Dry Temperate Forests*, that has to be delineated;
- Firewood collection: in areas with absence of *Mountain Dry Temperate Forests* where the collection is focused mainly on *Juniperus tree*, shrubs and riparian vegetation
- Firewood plantations: as support for the firewood necessities in those areas where this is critical due to the scarcity of degradation of the wood sources.

Moreover, local people involved in the forest management need to be trained in order to improve the effectiveness of management measures and hence such trainings should be promoted in each valley.

#### 3.2.2.4. Firewood collection

Firewood collection, being an essential practice for the community living inside the connectivity area borders, cannot be restricted if alternative energy resources are not found. Moreover, in the short-term-future we do not foresee any feasible possibility for a significant reduction of firewood needs of local communities. Nevertheless, actions for raising local communities' awareness about the unsustainable long-term effects of the current firewood collection practices should be implemented.

Most of firewood necessities are actually being met using a wide array of different forest resources according to village location: *Juniperus*, riparian vegetation and other minor shrubs (like *Artemisia*) in dry valleys.

In principle, even the firewood collection activity should be a consideration for the Forest committee and Joint Management Committee (JMC) (e.g. reduce collection in heavily degraded areas for a certain time).

Management indications for firewood collection, which might be considered by JMC/ forest committees, include:

- *Juniperus* trees: it is recommended to not harvest
- Regarding riparian vegetation: for coppice plants like sea-buckthorns or willows it is suggested to cut single basal shoots from each plant to preserve its root system. By 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 individuals. In these cases, local knowledge and traditional management system should be emphasized and taken into consideration.

#### **Firewood plantation**

In those areas where firewood from local forests is hardly sufficient to cover the needs of local communities, or where forest degradation has depleted above ground biomass to extremely low amounts, specific actions should be implemented to increase wood availability from non-forest areas. Plantation of trees (poplar, willow, sea buckthorn) to be managed as coppices for the production of firewood, therefore, should be promoted as an effective tool to reduce the pressure on natural forests. Those activities shall be directed particularly to those valleys where forest cover is naturally scarce.

#### **Trainings on forest management**

Within the buffer areas, trainings on forest management could be promoted for each valley through the support of local communities. The objective of training on forest management is to train local park rangers and members of the forest committees in different forest management practices. Different types of cuttings can be adopted and the effects on forest regeneration monitored, in time. Those would be ideal areas also for evaluating the regeneration capabilities of forests in time. One forest training shall be identified for each most common forest typology present in the valleys.

**Priority rank** High

#### **Provision of alternative forms of energy**

The biggest amount of wood products is gathered for heating purposes and this could not only have an impact on some forested areas but it can also be a time-consuming activity. This is being carried out mainly because in some areas wood is the only possibility to get energy or where other sources are available, wood products are however a cheaper option.

A very important step is to develop a specific analysis of the possibility to use different alternative energies with particular attention to the renewable ones; regarding the last ones the possibilities linked to hydropower is considered promising in the local situation; the solar energy is another interesting opportunity.

**Priority ranks** High

#### *3.2.2.5. Medicinal plants sustainable use*

For medicinal plants sustainable harvesting, potential areas need to be identified and should be linked to the real productivity of that area, till now the determination of a sustainable harvesting level for different species has to be determined.

Considering that, the direct collection is only one part of the problems affecting the presence and reproduction of the medicinal plants, these selected areas (experimental or sample areas) could be developed in the connectivity area with special conservation value. A well-balanced harvesting could be allowed in some areas in agreement with the local communities.

Another suggested tool is the promotion at local community level of farming only for some species; this could reduce the pressure on the wild ones, and increase incomes for local people.

**Priority rank** High at both level:

- i. determination of sustainable harvesting level for different species
- ii. promotion of their farming

#### *3.2.2.6. Livestock and Pastures*

The pastoralist system involves seasonal movements between villages and temporary settlement in the high alpine zone, following the altitudinal gradient of the vegetation availability.

In general, sheep and goats' herds are guarded during the day, while lactating cows are unguarded, but both groups are herded for the night. Male and dry cattle, but especially Yak and yak-cattle hybrid, are free ranging from late spring to autumn.

A general decrease in the number of reared animals is reported in the area; moreover, this is followed by a decrease in productivity, due to two main factors: the poor sanitary conditions of the livestock and the food shortage.

For the first aspect different diseases are recorded in this area affecting mainly sheep and goats, with an high rate loss; regarding the second one, this is linked to the low availability of fodder during winter time (November - March) and poor status of rangeland and pastures, due to overgrazing, where a fragile ecosystem is present for the critical environmental conditions.

This situation has a negative impact on the economy of the local communities, as livestock and agriculture are the main sources of livelihood. At the same time, the increasing number of raised livestock can have a negative impact on the environment too. This can be caused by overgrazing of pastures, which are a source of nourishment for wildlife and livestock, however the contemporaneous presence on the pasture of both wildlife and livestock can increase the transmissions of diseases from domestic to wild animals. This disease transmission could cause a reduction in local communities' revenues.

One of the concepts of connectivity area is to allow local communities to continue their natural development processes, but at the same time minimizing the damaging effects of man induced factors. Therefore, the purpose is to allow traditional land use for grazing, preserving its economic value for local communities, but activating at the same time a conservational approach that minimize its impact.

In view of the above, a pilot management project is proposed with the creation of a "Specially Managed Pasture Area" (SMPA) focused on the activation of good practices to decrease the number of heads, by improving the livestock productivity and health; this approach decreases the risk of pathogen spill-over from livestock to wildlife.

After the agreement with local communities, the first step to realize the SMPA program at valley level and constitution of a committee in each valley for specially managed pasture areas

### **SMPA Committee**

It is important to promote the establishment of the committee at valley level, with the aim to support a sustainable management of the livestock and pasture, in the prospective to:

- assure the long-term productivity of pastures, by avoiding that the number of grazing animals exceeds their carrying capacity;
- sustain and improve the fodder availability also for winter time, through activation of specific farming programs in the cultivated areas;
- promote, in cooperation with regional agencies in charge of animal health affairs, good practices for animal rearing and periodical basic veterinary surveillance, also considering vaccination and chemoprophylactic programs.

### **Livestock and pastures analysis**

The land cover map developed for the connectivity area could be used as base for livestock and pasture analysis.

The collection of i) basic information on the prevalent causes of disease-related mortality; ii) information on sympatric use of pastures by livestock and wild Caprinae; iii) eventual accounts of suspect disease episodes in wildlife.

From these data an estimate of the risk of overgrazing could be obtained based on simple formulae taking into account: i) the number and diversity of domestic ruminants exploiting a pasture; ii) its surface; iii) the number of weeks/months during which that pasture is grazed by domestic ruminants. A policy of livestock reduction will be progressively encouraged on pastures with a high to medium overgrazing risk factor.

### **Improving sanitary conditions of livestock**

A specific survey should be designed for:

- 1) survey of representative herds and flocks grazing in the connectivity area, aimed to define the most prevalent infections to consider for vaccination and/or chemoprophylactic treatment. The survey should be carried out in coordination with the regional agencies in charge of animal health affairs/ GB livestock department.
- 2) data dealing with: i) best timing and operational costs of vaccination and chemoprophylactics (anti-parasitic) treatment campaigns under the generally uncomfortable local conditions; ii) bureaucratic steps to follow to comply with the country national and regional veterinary legislation.
- 3) the definition of Good Practices Guidelines to improve the general sanitary conditions of livestock and indications of the most important vaccinations and prophylactic treatments that have to be considered.

The output is a first three-year sanitary plan for the SMPA-related herd, including: i) periodic veterinary surveillance; ii) yearly mass vaccination against prevalent infectious diseases which, besides being regionally prevalent, must be characterized by high pathogenicity and spreading potential; iii) a single yearly mass strategic treatment against highly pathogenic endo- and ecto-parasites which may be cross-transmitted to sympatric wild Caprinae. This

sanitary plan has to be developed and sustained in strict cooperation with the regional agencies in charge of animal health affairs.

#### **Improving fodder production**

As previously described the traditional livestock breeding system utilizes the primary productivity of pastures during the warm season, and mainly fodder in winter time; the shortage of fodder during winter is one of the recognized factors limiting livestock economy. This chronic seasonal deficiency of nutrients is linked to under nourishment, low productivity and predisposes the livestock to parasitism, epidemics and breeding problems.

A program to increase the availability of fodder through its cultivation has to be promoted. This program will be run in parallel in some areas with the aforementioned livestock reduction policy. Direct incentives will be necessary to support the program in its starting phase (e.g. for improvement of irrigation for fodder cultivation). Nevertheless, it is reasonable to assume that initial economic losses related to reduced livestock will be balanced by enhanced productivity as a consequence of: i) grazing pastures which are less intensively exploited; ii) being fed more adequately during winter; iii) being less exposed to disease-related mortality and production loss. In the medium term, additional benefits will derive to local communities by a predictable increase of wild ruminants due to diminished resource competition and sanitary risk.

##### *3.2.2.7. Culture-historical, Archaeological and Paleontological Management*

There are various old ruins, rock carvings, remains of Buddhism, old forts and palaces in connectivity area. Some of the ruins are on the verge of collapse, and need to be propped up to make them safe. The ruins are all in a dilapidated state, and overgrown. In Baltistan these engravings can be seen on old settlements and popular ancient routes along the river Indus and the Shyok. Even today, these inscriptions can be easily found in villages mostly on eastern bank of river Indus, nonetheless, these are in dilapidated conditions. The unplanned development activities, marketing practices of painting, wall chalking, hatred by local people about these pre-Islamic carvings, and apathy of governmental department have led to rapidly disappearing of these historic rock arts. The hub of rock inscription in the village of Gol (35 km from Skardu) has been rapidly disappearing due to use of these easy cutting rocks for building roads and buildings. In Gol again, ill marketing practices have also depleted rock art from many rocks. On others sites, these rocks are being cut and used in construction of roads and building by governmental department. In Nar (36 Km from Skardu), there is a beautiful Neolithic engraving of hunters of pre-historic time, but new religious slogans have been added on the same rock degrading the old carving.

The need is to develop a multi-dimensional strategy for the identification, preservation, and restoration of these rock art sites in Gilgit Baltistan. Otherwise, we would be losing a great treasure of the past and our history will disappear forever.

##### *3.2.2.8. Soil Erosion and Control*

Potential human impacts should be avoided by adequate infrastructure preparation and maintenance. Areas historically destroyed by human activities, and no longer in use, should be returned as close to their natural state as possible. Appropriate methods can monitor the disturbed areas and areas affected by excessive accelerated erosion. It will also find the cause

and management of problem erosion sites. Planning and maintenance of adequate infrastructure could avoid potential human impacts. Areas that had been previously degraded by human activities and are no longer in use will be restored as close as possible to their natural state. Disturbed areas and areas affected by unnatural accelerated erosion will be controlled by means of appropriate methods. The cause and management of problem at erosion sites shall also be considered.

Soil management measures in connectivity area include the following:

- The identification and recording of all soil erosion sighted, including the assessment and development of restoration plans, where required
- Use of soil erosion data and GIS for recording and mapping
- Application of fixed-point monitoring at identified soil erosion sites
- Accurate documentation of management actions applied to restoration sites, including results from areas responding to these actions

#### *3.2.2.9. Invasive-Species Management*

The management of invasive and alien species shall be a priority in connectivity area. Alien biota need to be controlled and, where possible, eliminated in order to facilitate the reestablishment of natural biodiversity and processes in invaded areas.

Invasive and alien-species management in the connectivity area is applied in accordance with the GB Forest Act. Invasive alien plant species could spread rapidly if management fails to continue to implement a properly planned and coordinated program. An integrated connectivity area management plan needs to be developed and implemented.

In order to protect indigenous vegetation from invasive aliens, the following measures are required:

- Prioritization of areas for alien removal, focusing on biodiversity restoration
- The implementation of removal programs for priority species and areas
- The development and implementation of an invasive and alien management plan as well as a management plan for alien fauna. Invasive and alien faunal species can also be eradicated in the connectivity area. Formal plans outlining the monitoring of the removal of identified species are required however.

#### *3.2.2.10. Research*

Research topics need to be identified that are beneficial to the connectivity area management. Then these subjects can be prioritized and followed. Many of the projects are being carried out by outside student researchers and organizations and are not informed by the management needs of the connectivity area. There should be an attempt to obtain copies of data and reports from projects carried out within the limits of the connectivity area.

#### **Proposed research topics:**

1. The complete inventory of plants and animals found in the connectivity area in different seasons
2. Identification of habitats that are of crucial importance to certain species-existing and potential threats of such habitats

3. History of the animals or birds that used to visit this area but are no longer there for the last 10 years maximum, and possible reasons
4. Impacts of climate change on the area in general and its people and species in particular
5. Good and bad practices in the surrounding villages and impacts on the local flora and fauna with focus on pollinators
6. Local crops and the land-use practices in the context of Biodiversity conservation
7. The social and ecological impacts of land degradation processes in the connectivity area on the adjoining parks and their species
8. Identification of potential segments of the connectivity area that could be used by the park animals in the near or far future and rationale
9. The social structure of local communities and possible improvement
10. Major conflicting issues in the context of carnivores
11. The existing level of awareness of local communities about the importance of habitats for the survival of human being and the sustainability of their crop production and methods to improve upon it

### 3.2.3. Valley Conservation Plans (VCPs)

VCPs provide a good account of the general situation in the valley regarding potentials for development and valuation of ecosystem services, and general environmental problems in the area. The VCPs elaborate in detail on the prevalent flora and fauna, and provide an overview of the needs of the local population and suggest development and conservation projects and initiatives.

However, they have the following fundamental structural weaknesses:

Internal consistency: The relation between “Problems” and “Solutions” is not elaborated. The internal consistency between the summary table of the PCP, planning narrative and the subsequent action plan are usually weak: the activities of the action plan are not clearly related to the narrative section and include outputs as well.

Conceptual clarity: The plan does not have an overall vision, goal, objectives, intended change or impacts. “Solutions” include partly outputs, seldom results, in few instances approaches, mostly activities or normative statements. “Strategies” include outputs and activities. “Targets” in the action plan correspond largely to outputs, but sometimes include a specification of the activities, or describe results.

Clear timeframe and responsibilities: The annual action plan does not consist schedule timeline of the activities.

Indicators and monitoring mechanisms: The plans do not include any indicators to evaluate achievement of results, whatsoever. “Support” for activities through NGOs and government agencies is not specified. The lack of indicators, ambiguity of results and responsibilities does not allow for a monitoring of performance or change.

Required resources: The plans do not specify the human, financial, technical, and institutional resources required for implementation. It does mention generic small-scale projects, which are suggested to support its implementation, but relate them only vaguely to results. Due to the lack of indicators, the size, cost, and location of these projects remains undefined.

It is strongly advised to revise and amend the future VCPs accordingly to a tested and universally acknowledged planning instrument, such as the logical framework approach, for example, if they are to fulfill their function as an instrument for grass-root planning and implementation.

Despite these weaknesses, the valley conservation planning process remains a valuable and important part of management planning and implementation process, in terms of participation of local communities such as “Valley Conservation Committees (VCCs)”.

A significant factor influencing participation in the process seems to be the condition and effectiveness of the Local Support Organizations (LSOs) in the area. VCCs lack a clear structure rooting the valley level process in municipality governance and communal natural resource management (NRM). LSOs on the other hand have an explicit link to the municipality-level through the definition or development of village organizations (VO) and their integration into the LSO at the Union Council-level.

LSOs and VCCs should be supported for integration into integrated conservation and development bodies (ICDB).

*Institutionalize an integrated conservation and development approach at the community-level*  
CBRNM initiatives generally struggle with the creation of incentives for conservation efforts. Especially VCCs without the trophy hunting programs, which were initially conceived as providing incentives for conservation efforts, lack such means. LSOs are created with the aim to allocate and implement development projects at community-level. An ICDB would allow communities to link conservation and development initiatives, e.g. by establishing social and environmental criteria for allocation of projects to municipalities whereby creating incentives for conservation efforts. The benefits of many rural development-projects exceed the boundaries of municipalities, especially in the health and education sector, as well as larger infrastructural projects. In contrast, NRM is largely considered to be strictly a municipality-affair. Such a linkage would therefore also foster coordination of conservation activities at the valley level.

*Increase effectiveness of project implementation*

LSOs feature a trained administration and transparent project implementation and monitoring mechanisms. Drawing on this capacity for conservation-related activities could substantially increase their efficiency and effectiveness.

*Empowering women and strengthening representation of communities in management processes*

Although the involvement of women in policy making is generally low or non-existent, within an ICDB, women organizations, established in the framework of the community-organization process for development projects, could provide a means to empower women in policy making for environmental issues.

### 3.2.4. Propose an organic agriculture program in the lowland area

#### ***Creation of Organic farms***

The key environmental factors limiting the extent to which agriculture can be carried out in the arid valleys of the connectivity area are irrigation, altitude, topography and vegetative characteristics. Cropping and fruit production is generally carried out on irrigated land, which is formally and informally acknowledged as household property.

All households of the connectivity area cultivate grains, predominantly wheat and/or barely and buckwheat, often with legumes as cash crop, households maintain commonly a varying number of agro-forestry trees poplar, willow and Russian olive, and on average 5 - 10 fruit trees, except households of some villages which cultivate only few, if any, fruit trees.

Given the scarcity of arable land, households prefer to cultivate their own land themselves, if required by means of informal reciprocal labor arrangements. However, permanent out-migration often entails sharecropping-arrangements with community members for the arable land left behind.

Notwithstanding the general food deficit in the connectivity area, some households manage to produce a surplus in the form of peas, fruits, nuts, buckwheat, or potatoes - the latter is cultivated predominantly as a cash crop - which is sold in Skardu or to local middlemen. Surplus wheat, the predominant staple of the connectivity area, is only sold or traded among the households of the community.

Over the past decades, population growth and splitting of households, formerly managed predominantly in joint-family systems, has led to a reduction of average arable landholding available to households as well as its defragmentation. Currently subsistence production is barely able to meet the households' food requirements for the entire year. The extent to which subsistence production falls short of the requirements depends on individual factors, however, on average, food supply makes up 50 to 80% of the households' annual cash expenses. The percentage correlates inversely proportional with land and livestock holdings - a universal criterion for poverty and wealth throughout the connectivity area. The lean period falls into spring to early summer until the first crops are harvested.

### **3.3. Propose a Joint Management Committee for Connectivity Area**

Connectivity area is a novel concept and it is first of its kind in the Pakistan. The connectivity area is not yet a notified area and this should be in coming future. Connectivity area hosts thousands of people living in several settlements, wildlife, forests, pastures, river banks, streams, plantations and desert. Hence it needs a unique kind of management aimed at sustainable management of natural resources and sustainable development of communities

The joint Management Committee (JMC) shall make major policies and management decisions as discussed above for the connectivity area. The committee should meet at least twice a year.

The JMC is made up of following people:

Eleven community members from major settlements such as Katisho (Dappa), Mehdiabad, Shilla, Sermik, Goal, Keris, Nar Goro, Bulghar, Kuru, Ghawari and thallay valleys). The members should be affiliated with a social organization like LSO, VCC, etc.

Four members from forest department including Conservator Baltistan and DFOs of Kharmang, Skardu, and Ghanche.

Two members from Wildlife Department including Conservator Parks and Wildlife and WLMO Baltistan.

Two members from two national Parks: Director CKNP and In-charge DNP

Three members from local administration

Three members from line departments including Tourism, Roads and Agriculture/Livestock.

## **TORS**

The JMC is responsible for the following matters:

- Provide leadership and direction
- Preparation of conservation and development plans
- Responsibility for the implementation of the plans
- Responsibility for the achievement of budgetary requirements
- Management and regular review of the progress

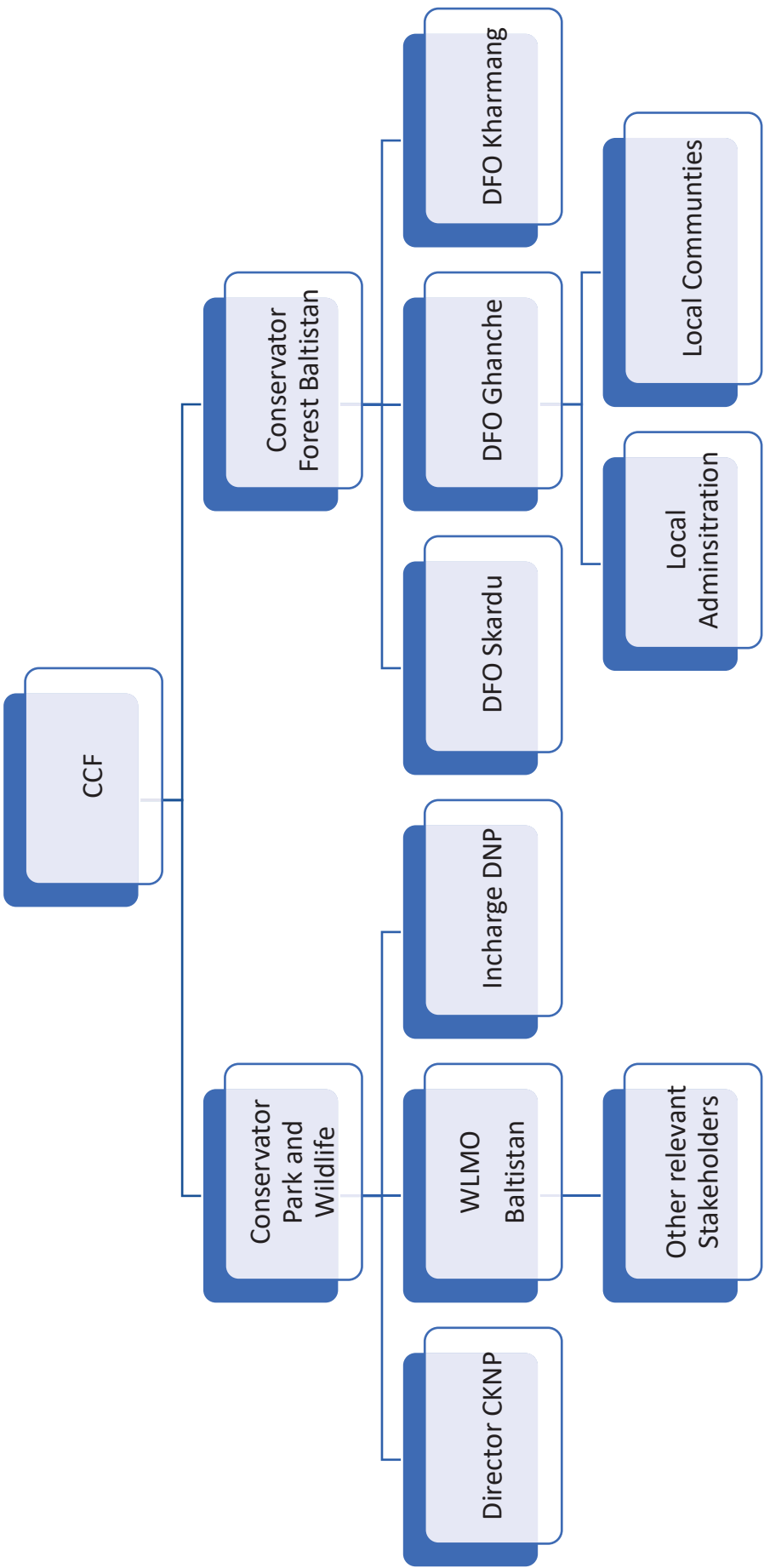
## **Notice of meetings**

- The JMC meeting's agenda and papers should be circulated at least one week prior to the meeting

## **Documentation, communication and reporting**

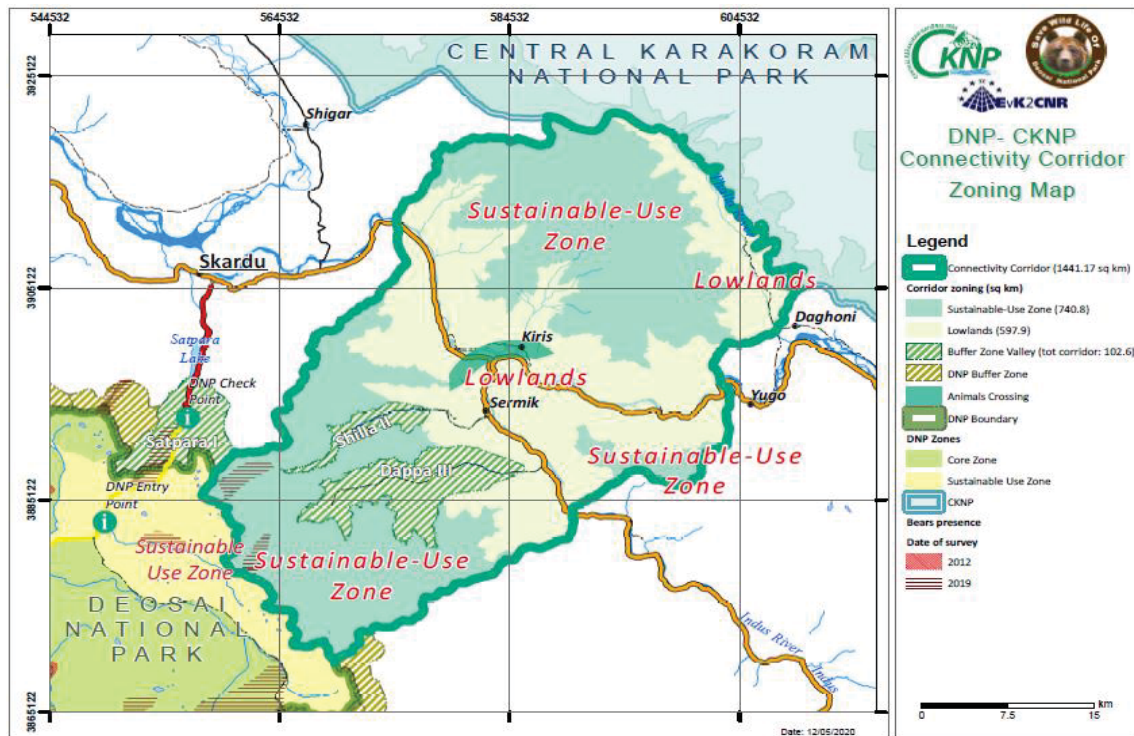
- Minutes of the JMC meetings are to be kept and held at DNP & CKNP directorates
- The JMC reports to the wildlife management board

Joint Management Committee



## 4. BOUNDARIES DELINEATION AND ZONING

Exhibit 10: Connectivity area zoning map



### 4.1. Boundaries and zoning surface

The area of the connectivity that links the two Parks has been delineated considering the watersheds: the total surface individuated is 1441.37 km<sup>2</sup>, that is large enough similar to the DNP. The IUCN category VI suits more for the sustainable use of natural resources.

Inside the Connectivity area, different areas are delineated with relative rules. The support of the adjacent National Parks is necessary to create a management system for the connectivity area.

The zoning areas are:

1. Sustainable use zone
2. Buffer zone valleys of CKNP and DNP
3. Connectivity area Lowland

Connectivity Area			
<i>Sustainable use Zone</i>	<i>BZ Valleys</i>	<i>Connectivity area lowland</i>	<i>Tot connectivity area</i>
740.81	102.61	597.95	<b>1441.37</b>

#### 4.1.1. Sustainable use zone

<p><i>Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.</i></p> <p><b>IUCN Category VI</b> <i>Protected areas with sustainable use of natural resources</i></p>	<p>Areas specified for sustainable use by local communities and the Gujjar-Bakarwals.</p> <p><b>Surface: 740.81 Km<sup>2</sup></b></p>
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The purpose of this zone is to ensure sustainable management to retain the natural character of the area. Occasional visitors need to be reduced to a minimum level, and can move only along designed trails, or with a special permit.

The criteria for the delineation of this zone are:

- Brown bear distribution including the information of the census of 2018 and 2019
- Altitude contour line of 4,000 mt. that represent the forest limit derived from the land cover map and the physical boundaries (rivers, mountain ridges and watersheds
- The land cover map that show the grass availability
- Area where it is allowed the livestock grazing for the customary practice of the Nomads and local communities that has use rights (with some restriction and strict control of the Park staff)
- Flora and fauna distribution and protection
- In this zone:
- Selected activities that are important for community livelihoods permitted with restrictions and subject to results of monitoring
- Visitors are allowed only along the road and the designed trails (or with special permit if they want to move outside for research purpose)
- Jeep safari are not allowed
- Herders are allowed in specific areas and according to the rules (see below)
- Controlled and rotational grazing systems in the resource use zones (pastures) of the connectivity area
- Implementing community led pasture management and livestock insurance schemes to stop retaliatory killings of the top predators and to improve pasture health conditions
- It is suggested that inside the connectivity area only local communities through a specific license, issued by the responsible authority, could carry out the harvesting of the medicinal plants. This is done in order to promote the opportunity of a new income source linked to the sustainable use of another renewable natural resource.

<b><i>SUSTAINABLE USE ZONE IUCN VI</i></b>	
Entrance	Allowed for local communities', people for National and Foreign visitors they can move only along specific trails designed on the map or only with specific authorization released by relevant authority.
Fees and duties	No fee
Transfer and stay inside the area	<ul style="list-style-type: none"> <li>• vehicles are allowed only along the road designed on the map</li> <li>• only local community people are allowed to transit</li> <li>• out from the roads it is allowed to move on foot (no motorized way) and along trails marked in the main points</li> <li>• camping is considered only in the designated areas</li> <li>• use of kerosene and butane gas for cooking in the designated areas is considered, no fire can be used to cook or to burn waste</li> <li>• avoiding the use of nylon bags and bottles or glasses bottles and boxes</li> <li>• waste has to be collected and transported out to connectivity area or properly disposed of.</li> </ul>
Jeep safari	Not allowed
Hunting	Not allowed
Game bird hunting	Not allowed
Fishing	Not allowed
Limitation of livestock number	Has to be considered a limitation of the number of grazing livestock in this area by local communities.
Presence of livestock	It is allowed the grazing of livestock of local communities following a sustainable approach. It is allowed the presence of vaccinated livestock in good health condition owned by local communities or with Nomads. For this reason, this area is considered high priority to conduct veterinary controls and vaccination/chemoprophylaxis campaigns.
Presence of pack animals (horses,	Allowed

<b>SUSTAINABLE USE ZONE IUCN VI</b>	
mules and donkeys)	
Presence of dogs	Allowed only for vaccinated animals of the herders
Grazing	It is allowed the grazing of livestock of local communities following a sustainable approach.  Introduce a rotational system in the use of the pasture decided year by year after a yearly survey of the pasture degradation conduct
Wood and shrub collection	It is allowed the fire wood and shrub collection by locals following a sustainable approach
Collection and extraction of medicinal plants	It is allowed the harvesting by locals following a sustainable approach under license of responsible institution;
Research activities	It is not allowed to conduct research activities in the whole Park area without a preliminary written permission by the authorities.

### **Visitors and Related Waste Management**

To improve the sustainability of the area, the following basic indication are suggested:

- use of kerosene and butane gas for cooking in the designated areas is considered, no fire can be used to cook or to burn waste
- segregated waste disposal, solid and human waste
- avoiding the use of nylon bags, plastic bottles or glass bottles and boxes
- waste has to be collected and transported back outside the area

### **Conserving Species and their Ecosystems**

These areas have been identified because range of endangered large mammals (first of all brown bear, snow leopard) and forest are present there.

#### **Monitoring of Species**

A detailed monitoring plan has to be developed for different groups, to obtain data related to their distribution and their relative density, at the same time to better understand the potential impact of human activities on different groups.

Start monitoring the large mammals due to their role as umbrella species to develop zone system and reliable management indications, but in order to maintain this routine monitoring, a specific monitoring plan has to be developed for different groups to obtain distribution data and relative density, to obtain more specific management indications.

Priority rank High for the development of the monitoring plan for the different groups.

High for the realization of the program but related to the operative possibilities

#### **Reduction of human impact**

The human activity that could mainly interfere with the presence of wildlife, mostly ungulates, in this area is the livestock grazing. Livestock presence and its density in the same area used by endangered species usually elicit a numerical response from wildlife. The decline in the wild ungulate's population effects not only the conservation of these species in the long term, but also the possibilities for local communities to develop trophy-hunting program.

Priority rank High

#### **Medicinal plants**

The medicinal plants are distributed in a wide altitudinal range, from forested areas to alpine and high-altitude areas, and a list of the different species present in DNP and CKNP has been developed.

The impact on these species seems mainly linked to their direct collection, as often the extracted parts are the roots and underground rhizomes, causing damages to the plant and a reduction of the possibility for vegetative reproduction; but also, to the disturbance of their habitat as a consequence of human activities.

Priority rank High

#### *4.1.2. Connectivity Area Lowland*

It is the lower altitude part of the connectivity area and include the area along the Indus and Shyok Rivers and the villages along the main roads.

It has to become an eco- multiple activity area for visitors travelling in Baltistan on the road between Skardu and Khaplu and Mehdiabad. Some center has to be promoted like horse riding, mountain Bike Park, canoeing and rafting, and others.

At the same time, sustainable activity has to start in this zone such as fishery center, eco agriculture with bio production, solar greenhouse cultivation, organic farming zone.

#### **Organic Farming**

Organic agriculture has grown out of the conscious efforts by inspired people to create the best possible relationship between the earth and men. Since its beginning the sphere, surrounding organic agriculture has become considerably more complex. A major challenge today is certainly its entry into the policy-making arena, its entry into anonymous global market and the transformation of organic products into commodities. During the last two decades, there has also been a significant sensitization of the global community towards environmental preservation and assuring of food quality. Ardent promoters of organic farming consider that it can meet both these demands and become the mean for complete development of rural areas. After almost a century of development, organic agriculture is now being embraced by the mainstream and shows great promise commercially, socially and environmentally. While there is continuum of thought from earlier days to the present, the modern organic movement is

radically different from its original form. It now has environmental sustainability at its core in addition to the founder's concerns for healthy soil, healthy food and healthy people.

Organic farming is very much native to this land. The concept of organic farming is based on following principles:

- Nature is the best role model for farming, since it does not use any inputs nor demand unreasonable quantities of water.
- The entire system is based on intimate understanding of nature's ways. The system does not believe in mining of the soil of its nutrients and do not degrade it in any way for today's needs.
- The soil in this system is a living entity
- The soil's living population of microbes and other organisms are significant contributors to its fertility on a sustained basis and must be protected and nurtured at all cost.
- The total environment of the soil, from soil structure to soil cover is more important.

In today's terminology it is a method of farming system which primarily aims at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crop, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (bio fertilizers) to release nutrients to crops for increased sustainable production in an eco-friendly pollution free environment.

In philosophical terms organic farming means "farming in spirits of organic relationship". In this system, everything is connected with everything else. Since organic farming means placing farming on integral relationship, we should be well aware about the relationship between the soil, water and plants, between soil-soil microbes and waste products, between the vegetable kingdom and the animal kingdom of which the apex animal is the human being, between agriculture and forestry, between soil, water and atmosphere etc. The totality of these relationships is the bedrock of organic farming.

*Organic Agriculture should be managed in a precautionary and responsible manner to protect the health and well-being of current and future generations and the environment.* Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and increase productivity, but this should not be at the risk of jeopardizing health and well-being. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken. This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture. Science is necessary to ensure that organic agriculture is healthy, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes.

In totality, organic agriculture aims at a sustainable production system based on natural processes. Key characteristics of organic agriculture are:

- relies primarily on local, renewable resources;
- makes efficient use of solar energy and the production potential of biological systems;
- maintains the fertility of the soil;
- maximizes recycling of plant nutrients and organic matter;
- does not use organisms or substances foreign to nature (e.g. GMOs, chemical fertilizers or pesticides);
- maintains diversity in the production system as well as the agricultural landscape;
- gives farm animals life conditions that correspond to their ecological role and allow them a natural behavior.

Organic agriculture is also a sustainable and environmentally friendly production method, which has particular advantages for small-scale farmers. Available evidence indicates the appropriateness of organic agriculture for small farmers in developing countries like India. Organic agriculture contributes to poverty alleviation and food security by a combination of many features, such as;

- increasing yields in low-input areas;
- conserving bio-diversity and nature resources on the farm and in the surrounding area;
- increasing income and/or reducing costs;
- producing safe and varied food;
- being sustainable in the long term.

The evaluations by IFAD in India and China reported that the income of participating farmers could increase substantially by adopting organic practices of farming. Certified production gives access to a premium market, or simply just better market access.

### **Multiple cropping opportunities and crop rotation**

Crop rotation is the back bone of organic farming practices. To keep the soil healthy and to allow the natural microbial systems working, crop rotation is must. Crop rotation is the succession of different crops cultivated on same land. Follow 3-4 years rotation plan. All high nutrient demanding crops should precede and follow legume dominated crop combination. Rotation of pest host and non-pest host crops helps in controlling soil borne diseases and pest. It also helps in controlling weeds. It is better for improving productivity and fertility of soil. Crop rotations help in improving soil structure through different types of root system. Legumes should be used frequently in rotation with cereal and vegetable crops. Green manure crops should also find place in planning rotations. High nutrient demanding crops should always be followed by legume crops and returned back to soil. Some important benefits of crop rotations are:

1. Not all plants have same nutritive needs
2. Soil structure is improved through different types of roots
3. Pest build up is avoided
4. Rotations help against the buildup of weeds.

This kind of agriculture has to be supported by a controlled and increased water supply system, and promoted for national and international markets as spot area: dry apricots production and process phases could be an example.

### **Aquaculture (Fisheries)**

The trout fishery in GB are developing in the recent years, where two species of trout, though exotic in origin, have established themselves in rivers of GB. They are brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*). In addition, there is a critical contrast between winter and summer seasons. The rivers and streams are deep or shallow, clear or muddy, cold or warm, fast or slow and may have stony, sandy or muddy bottom and rich or scanty vegetation along the banks. Suitable species were designed by nature itself for this region.

Trout fishing is not only a part of the integrated development strategy of GB but is also an essential source of recreation in these areas. Trout fishery as a sport has contributed a lot to the economy of local communities in the northern districts through the tourist trade. Direct and indirect economic benefits are accrued from trout fishing by tourists (look at the results obtained in Kaghan, Swat and Chitral) and the number of anglers is steadily increasing. Consequently, the local residents directly benefit and their income is increasing.

### **Road Infrastructure**

Specific road impacts include road mortality, erosion and loss of habitat, and decreased connectivity. The magnitude of those effects depends on the ecological features of a habitat. Apart from these obvious consequences, roads produce noise and vibration that interfere with reptiles, birds and mammals' ability to interact, track food, or escape predators. Roads also increase the spread of invasive plant species, encourage deforestation, build fishing barriers and pollute sources of water with chemicals from roadways. Studies show that vehicles deposit between 300 and 800 exotic seeds per square meter per year to areas on the roadside, often several kilometers away. Roads lighting also has major impacts on animals.

Where there are overarching justifications and reasons for building or widening roads in the proposed connectivity area, wildlife crossing structures may allow movement of wildlife across roads; these structures include overpasses of wildlife and green foot bridges, culverts and pipes. Although many of these systems were not initially designed with an ecological connection in mind, they support several organisms. No single crossing structure will permit all species to traverse a path. Rodents, for example, tend to use pipes and small culverts, while bighorn wild sheep and goats tend vegetated overpasses or open land under high bridges. A leopard or bear can readily embrace a concrete box culvert but not a deer or bighorn sheep. Small mammals, such as deer and mice, tend to overpass on short culverts. Many species avoid crossing 2-lane roads with more than 100 vehicles a day; this means that crossing systems are required to provide connectivity even on small roads that are rarely used.

### **Rivers and streams in connectivity area**

Glaciers and snow are the main sources of the water in the region and two major rivers Indus and Shayok pass through the connectivity area. All wastewater from the settlements in the connectivity area is being discharged into nearby streams and rivers. This pollution will

deteriorate the water quality of the water bodies present in the area while adversely affecting aquatic and human life. According to GB EPA “78 percent of the water tested from towns in GB falls into the categories of low to very high human health risk and just 22 percent comply with WHO guidelines”.<sup>20</sup>

- Maintain natural channel-floodplain connectivity do not harden riverbanks and do not build in the floodplain
- Maintain or improve native riparian vegetation
- It is recommended aggressive enforcement of existing regulations restricting dumping of soil, agricultural waste, and trash in streams, and restricting farming, gravel mining, and building in streams and floodplains. Vehicles travel in streams disturbs soils, damages vegetation, and disturb wildlife.

#### **Urban Development in the connectivity area**

Mehdiabad, Sermik, Keris and Goal are populated settlements; there are roads, shopping centers, offices, schools, colleges and residential areas. These diverse types of land use impact wildlife movement in several ways. In particular, urbanization causes:

Where human dwellings or other urban development of low density occurs within or immediately adjacent to the connectivity area, allow the landowners to be proud stewards of the connectivity area. In particular, encourage them to landscape with natural vegetation, reduce water runoff into streams, manage fire risks with minimal alteration of natural vegetation, keep pets indoors or in enclosures (especially at night), embrace depredation on domestic animals as part of a rural lifestyle quality, optimize personal safety with regard to large carnivores by appropriate behavior, use pesticides and rodenticides carefully or not at all, and direct outdoor lighting toward houses and walkways.

- Combine restoration of environment and habitat conservation with compatible public priorities such as recreation and water quality protection.
- Pursue unique management and protections for threatened, vulnerable and endangered species and their habitats.
- Reduce or ban the use of pesticides, insecticides, herbicides, and rodenticides and educate the public about the ecosystem-wide effects of those chemicals.
- Discourage the killing of animals as threat species such as snakes
- Encourage the use of wildlife-friendly fencing on land and field borders, as well as wildlife-proof fencing around gardens and other possible wildlife attractants.
- Install wildlife-proof trash and recycling receptacles, and allow people to safely store their garbage.
- Avoid installing artificial lights on rural areas roads in connectivity area
- Reduce vehicle traffic speeds in sensitive locations
- Discourage residents and visitors from feeding or providing water for wild mammals, or otherwise allowing wildlife to lose their fear of people.
- Develop a public education campaign to inform those living and working within the connectivity area about living with wildlife, and the importance of maintaining ecological connectivity.

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<sup>20</sup> <https://www.thethirdpole.net/2014/08/13/gilgit-baltistan-waters-run-polluted/>

If new urban construction in the connectivity area is allowed, stipulate as many of the above requirements as possible as part of the code of conduct and regulations for individual landowners whose lands are surrounded by natural connecting land. Even if some clauses are not implemented rigorously, these stipulations can encourage understanding of how-to live-in accordance with wildlife movement.

### **Recreational activity that has to be promoted in the lowland area**

#### **Canoeing, Kayaking and Rafting**

Canoeing, kayaking and rafting along the Indus river will normally not permitted, but can become an interesting visitor activity proposed by specialized Tour Operators. Some sections of the River have to be delineated for this activity with relative Park Area and embarkation /disembarkation points in view of the cold-water conditions, the activity will be subject to the following guidelines and restrictions to ensure safety in this sport:

1. All occupants must wear life vests.
2. Persons in canoes and kayaks must be experienced in the sport.
3. At least one person who is experienced in the activity must accompany persons in rafts.
4. Special permit may be granted to experienced sportsmen for extending the trips along the Indus River. Retrieval of boats and equipment in this case will be by tour operators' staff only and will be subject to payment of retrieval charges as determined in the rent contract.

### **Mountain Bike rides**

This new activity is becoming more and more popular worldwide and could be an interesting opportunity in GB. There are already some renting shops, the idea is to create a net of trails that are dedicated to Mountain bikers with specific downhill rides. The area between Indus and Thallay could be one possibility. The suggestion is to be directed to the local Tour Operators, for guided rides.

### **Horse ride**

Riding is one of the eldest activities in GB both for connect the different villages, for agricultural use, for transportation concern and for sport: Polo.

Polo grounds are common in GB and several people are involved: it would be an interesting activity also for the tourist visiting the connectivity area and could represent an income for local people and some specific Tour Operator company.

## 5. ECOTOURISM PROPOSAL

The cultural heritage sites need to be promoted and valorized through a proper strategy, museums and other initiatives.

A trail net that link these locations to the main access roads has to be delineated, including proper signage, rest points, viewpoints and information centers. A specific museum has to be organized in CKNP or in DNP Headquarters and Italian K2 museum should also a part for connectivity area presentation.



### Description

An ecological network between Deosai National Park and Central Karakorum National Park is critical for to preserve the environment and the quality of the two large protected areas. Because it cannot be only a "migration path", it is necessary to think of a flexible approach and a dynamic development plan, suited to the needs of flora and fauna and to people and local situations. A smart natural connectivity area can provide adequate solutions to the protection of the natural environment and to develop new forms of sustainable ecotourism in a harmonious coexistence of nature and human activities.

The ecological network can constitute a landscape system capable of supporting recreational and perceptive functions: it is an opportunity to create paths with environmental impacts that allow people to cross the territory and exploit the resources of the landscape and culture. The ecological network can become an opportunity for formation of paths with low environmental impact (paths and cycle paths) that allow people to cross the territory and enjoy the landscape and cultural resources.

An unplanned and unregulated tourist flow in the territories of the ecological network can cause significant damage both to the environment and to the social and cultural heritage. If an increase in the tourist flow in DNP and CKNP seems inevitable, it must be correctly guided.

Among the various possibilities of tourist development, sustainable ecotourism is a development model that can reconcile the inevitable tourist development with preserving the natural environment and protecting local communities. An important tourism planning principle includes the establishment of staging areas, and the clustering of attractions. Concentrated development can be important in attempting to minimize the impacts of tourism on the natural as well as socio-cultural environment in the host region. Another important tourism planning principle includes the dispersal of tourists and thus the dispersal of tourism's economic benefits to marginal areas. The dispersal of tourists and thus the dispersal of tourism's economic benefits to marginal areas can permit the integration of activities and attractions into one unified system. The concentration of facilities and the clustering of attractions and the dispersal strategies can be seen as antithesis. However, they can find a great synergy in the tourist routes.

The tourist itineraries permit the concentration of facilities in areas that can minimize potentially negative impacts on the natural and socio-cultural environment and at the same time permit the tourist dispersing. The realization of mini-hubs and the creation of new attractions can not only diversify the tourism products but can also increase the number of night stays of tourists.

The Eco Community Tourism involves communities controlling, managing and developing their own tourism industry, whereby tourists and travellers can experience the community's way of life and consider their social, economic, and environmental impacts upon the destination they are visiting.

An extremely important tool to foster a sustainable development of the region, to protect and strengthen both natural and cultural diversities and ensure that tourism meets its potential as a tool for to create employment and income generating opportunities also for women, young people and marginalized groups.

Gifted with rich natural and cultural heritage, the territory of the ecological network between DNP and CKNP offers unique potential for tourism development adventure, cultural and nature tourism. Moreover, its strategic location offers opportunities for trans-boundary tourism through promoting border trade, commerce, scientific, cultural and conservation exchanges.

Tourism sector has the potential to contribute economic growth and improve the livelihoods of the local communities through sale of local goods and services and local employment generation. An integrated planning and development approach could harmonize between the long-term ecological, cultural and development goals.

Connectivity area connects both sides of the Indus through its valleys rich in history, traditions and cultural heritage. Here nature, landscape and human beings meet all in once in a fragile balance that need attention.

The entire system of strategies, objectives and interventions of this proposal works as a whole and has been designed according to three overarching principles:

- A. Sustainability: the strategies, interventions and actions have to contribute to systematic reinforcement of sustainable tourism, in its various meanings in relation to

environment, territory and protection of heritage, the socio-economic system, culture and citizenship.

- B. Innovation: the strategies, interventions and actions have to contribute to systematic innovation of the products, processes, to creating new and more advanced skills to ensuring greater integration and interoperability of governance of the tourism sector
- C. Physical and cultural accessibility/permeability: the strategies, interventions and actions have to contribute to systematic reinforcement of the physical and cultural accessibility of the places and territories open to tourism. This term has various meanings, relating to: accessibility to places and territories through sustainable mobility systems; giving visitors the opportunity to understand and interpret the history, complexity and variety of the sites visited (cultural permeability).

### 5.1. Proposed Interventions

The connectivity area tourism plan is made up of several actions, which connected to each other and creates a tourism system, in addition to protecting the natural environment, can ensure visitors are given unique and authentic experiences, by creating new tourist products and improving the existent ones according to the specific characteristics of each territory and landscape.

Skardu, is the most important centre in the area, it acts as regional hub and, could satisfy most of the demand for tourist reception.

The inhabited centres of **Sermik**, **Mehdiabad** and **Keris** constitutes **tourist gates** to the protected area. Here, the small size of the settlements and the seasonality of the tourist fluxes, do not allow the construction of large facilities for tourist accommodation. To preserve the environmental quality of the villages, it would be better if small 8/10 room accommodation facilities are built that can be managed by the community or individual families.

From design point of view, accommodation facilities must respect the characteristics and shapes of traditional constructions, avoiding large and impactful buildings, using local materials for construction.

#### A) Tourist hub

A tourist hub is a place where all the tourist-friendly elements are present, as tourist attractions of various kinds like information points, guides, eating joints, shopping options, accommodation and local transport.

#### B) Scenic Route

The roads to Ghanche and Kharmang districts from Skardu remain open throughout the year and crossed by dozens of vehicles every day. The route along river Indus and Shyok is very scenic offering beautiful valleys, settlements, waterfalls, agriculture fields, streams and high summits. Tourists and vehicles stop along the route and move into the surrounding areas in a free but unorganized way. The routes to Kharmang and Khaplu are very Picturesque Route and it has to be organized creating parking areas and other facilities supporting tourists and avoiding off road excursions.

[illegible]

Discoveries routes crosses the entire area connecting its opposite sides. From Satpara and Ali Malik Mar, tourists can reach to Keris, Thallay La and Khaplu. Those itineraries are the same followed by wild animals during their seasonal moving. Watching point will be made according with the evidences on wildlife presence.

#### **D) Hiking itineraries**

Activity of moderate difficulty, which involves walking across trails or paths. It is a great way to immerse in the natural environmental and in the culture and history of an area. Each hike is a gateway to wider outdoor adventure inside lyrical landscapes. They are connected with the network of Discovery routes.

#### **E) Parking areas**

The best landscape and natural experience happen when the visitors step out of vehicle and explore the territory. It is necessary to identify the appropriate parking areas of the cars (especially in stops along the scenic routes) so that they do not damage the environment, do not become a cause for conflict and do not adversely affect the experience of visitors

#### **F) Camp Site – Guest room – Tourist hotspot (facilities)**

A series of interventions are envisaged to provide the territory with a network of accommodation facilities, such as camping sites for overnight stay in an outdoor area or guest room. They are designated areas with the necessary improvements and various facilities for tourists. They must all be eco-friendly and culturally sustainable. Specific project for construction and management has to be implemented.

#### **G) Interpretation Centre**

The project proposes three little interventions, visitor interpretive centres (inside the DNP, in Keris and in Parkutta). These interpretation centres will not have the aim to collect, conserve or study objects; their aims will be to communicate the significance and meaning of heritage. They will work to educate and raise awareness. They will use different means of communication to enhance the understanding of heritage and to aid and stimulate the discovery process and the visitor's intellectual and emotional connection to heritage.

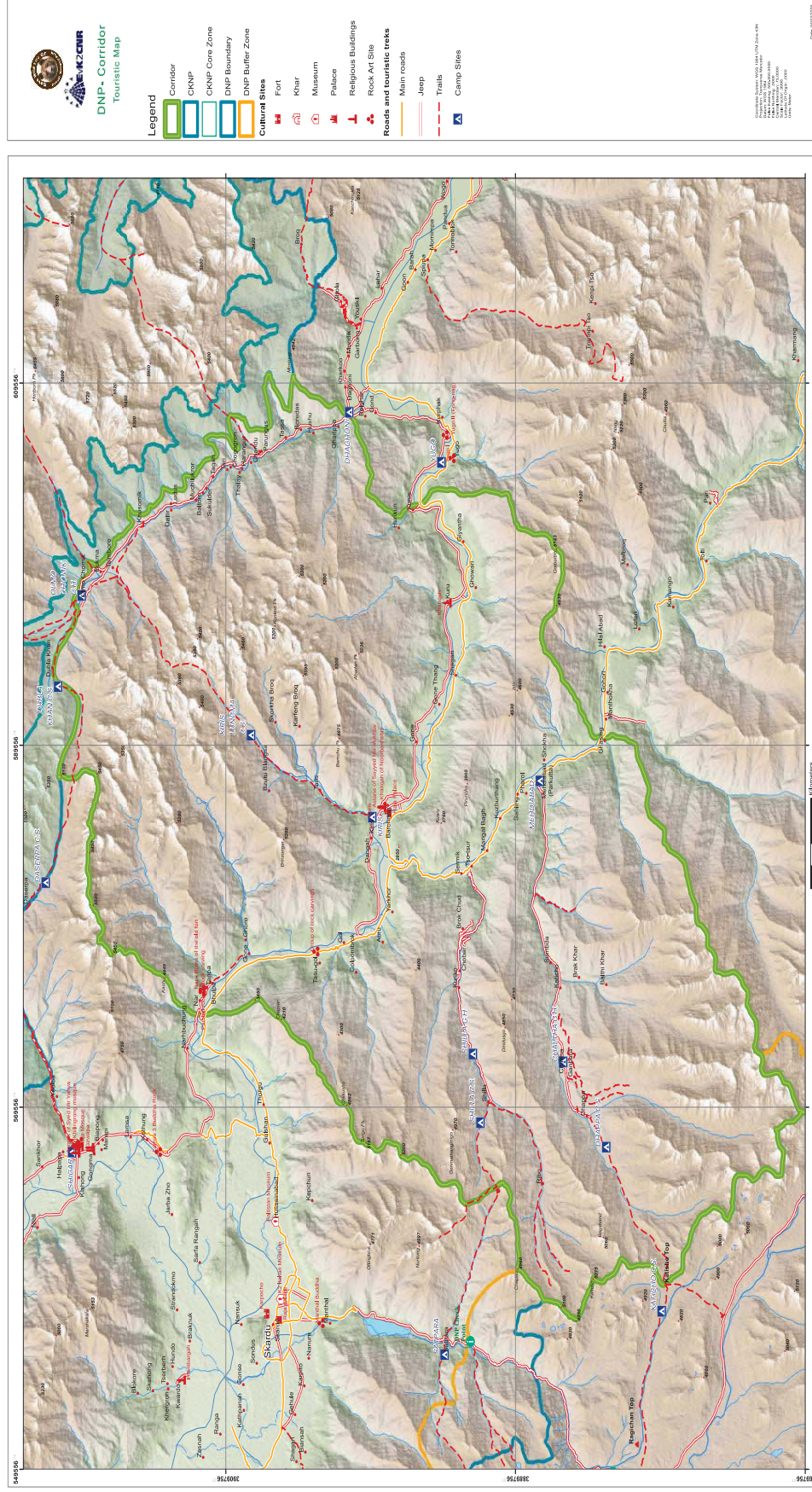
### **5.2. Realization of Tourism Infrastructures and Buildings for Tourist Accommodation**

#### **Building Construction plan**

Buildings should be far enough from the river to avoid flash flood, and should not be constructed near or on steep slopes due to the high risk of damage.

Landslides or rock fall areas should be avoided while selecting a site for building construction. Apparently, some slopes may look stable, but an earthquake could trigger failure. Landslides and rock fall can damage buildings. Cliffs made of soft or crumbly, clay loam; deposits materials, etc. should be avoided.

### Exhibit 13: Touristic map



## **Ecotourism guidelines and regulations**

The Eco-tourism opportunities located in the Buffer Zone Valleys has to follow these guidelines:

Ownership	<ul style="list-style-type: none"> <li>• Local community, residents, alone or in partnership with: NGO; touristic organization; private investors.</li> <li>• Financial sustainability.</li> </ul>
Guest house	<ul style="list-style-type: none"> <li>• Low environmental impact: no plastic, solid waste management system ...</li> <li>• proximity of a village and tourist itinerary or destination;</li> <li>• accessible by jeepable road or easy trekking path;</li> <li>• use of traditional materials for construction (wood and stones). Wood must come from environmental certified supply chains; Deodar wood is only permitted for the restoration of existing buildings.</li> <li>• Low dimensional impact, max. 2 floors and max 45 ft front of the building</li> <li>• 24 max. guest accommodations</li> <li>• managed tree plantation on surrounding area</li> <li>• green houses for organic cultivation of local products for selling and consumption in the guesthouses;</li> <li>• Organic cultivation only;</li> <li>• minimum one toilet and shower every 4 guests;</li> <li>• room size: min. 45 ft. for guest;</li> <li>• Water tank or fresh water supply system;</li> <li>• Improved stoves only, open fires are not allowed;</li> <li>• Specific area dedicated to exhibitions and interpretative activities on environment, local traditions and heritage;</li> </ul>
Camping Hostels	<ul style="list-style-type: none"> <li>• Low environmental impact: no plastic, solid waste management system ...</li> <li>• Low building impact: only one for reception, store, kitchen, common room and one for sanitary facilities;</li> </ul>

	<ul style="list-style-type: none"> <li>• proximity of a village and tourist itinerary or destination;</li> <li>• accessible by jeepable road or easy trekking path;</li> <li>• use of traditional materials for construction (wood and stones). Wood must come from environmental certified supply chains; Deodar wood is only permitted for the restoration of existing buildings.</li> <li>• Low dimensional impact, max. 1 floors and max. 30 ft front of the building</li> <li>• capacity up to 24 people</li> <li>• tree plantation surrounding area</li> <li>• open fires are allowed in dedicated areas only.</li> <li>• Water tank or fresh water supply system;</li> </ul>
Energy Supply	<ul style="list-style-type: none"> <li>• In the absence of a power supply, photovoltaic panels and solar panels must be the main energy production systems for water heating and electricity power generation.</li> <li>• Other permitted power generation systems are micro hydro and micro wind power where environmental conditions allow it</li> </ul>
Waste management	Separate waste disposal and transportation to the nearest collection point

The Guest houses and Camping hostels income has to be shared according to the decision of the VO in a percentage for the owner and for the Local Community. Only if was built with the financial support of public development programs.

In order to fill this gap with the increasing tourist flow and lack of facilities, it is necessary to provide new eco-accommodations/guest houses in selected areas of the connectivity area and in the hotspot of the DNP.

The new eco-accommodations will emphasize elements such as environmental responsibility and minimizing negative impact. They will offer as much as possible renewable energy sources (they will be equipped with a solar system as independent power supply) recycling services, eco-friendly toiletries, energy efficient lighting, locally sourced food, non-toxic cleaning supplies, non-disposable dishes, water conservation methods and various other sustainability-focused initiatives. They will be designed to be active in nature and wildlife conservation, with focus on educating visitors about the flora and fauna of local ecosystems, and more deeply connected with the area's indigenous culture. To stay in eco-accommodations will be an

exclusive experience of taking part in community initiatives, a way to help visitors to conserve and appreciate local customs, and contribute to the local economy.

#### **5.2.1. Development of Picnic spots and rest areas with toilet facilities**

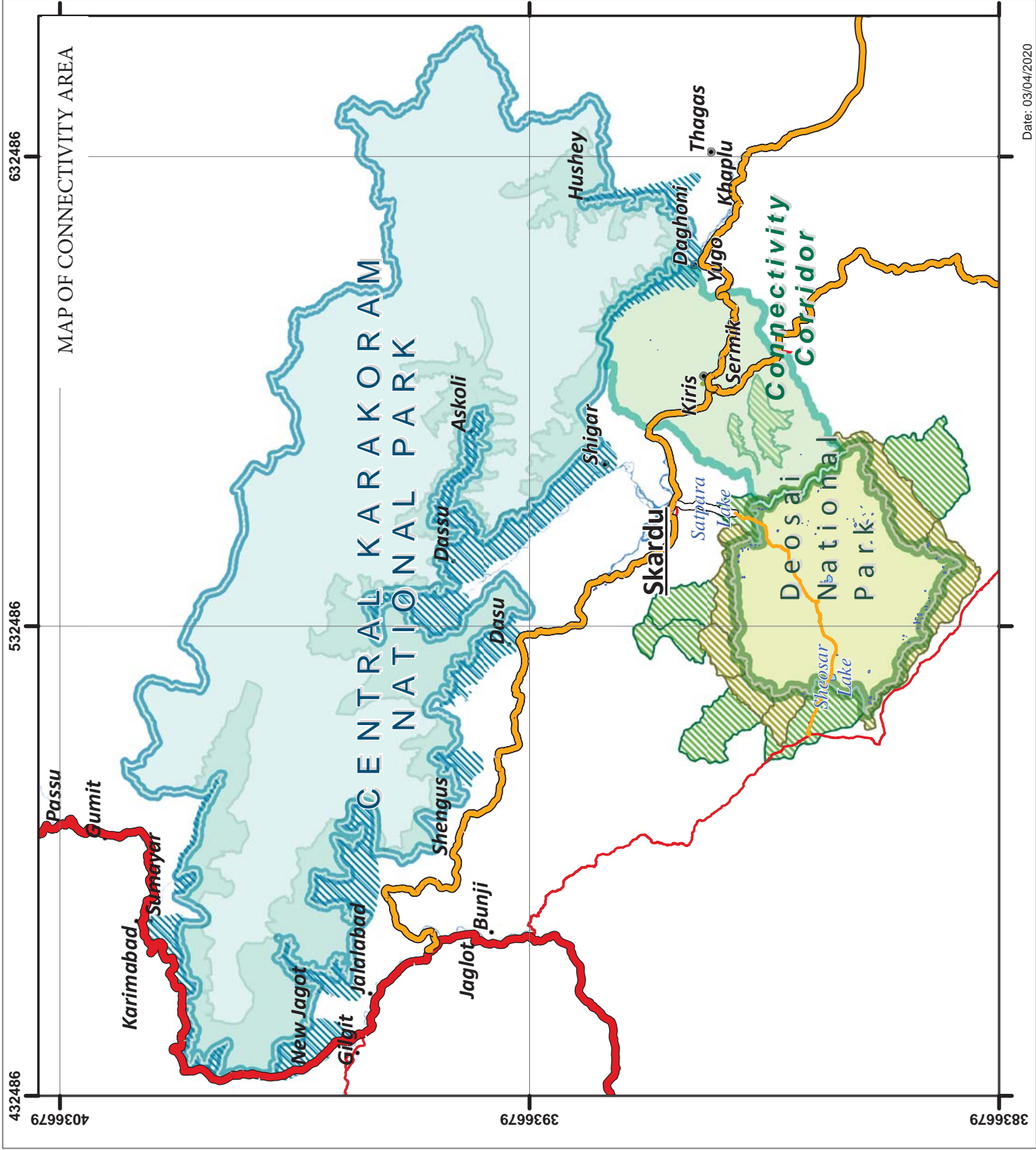
Along the main access routes and itineraries there is a lack of toilet facilities and other light facilities for tourists including women and children. Toilet facilities, picnic spots and rest areas must be provided along the main access routes to prevent that anthropogenic pressure spilling over uncontrolled into areas of high environmental value. This type of facilities could be developed following incremental schemes that can be modified and integrated as use need. Local communities can manage it and promote specific services for tourists. Hotspots will serve that tourist as interpretation centers to increase knowledge and awareness about environmental and natural resource issues.

#### **5.2.2. Placement of maps and signs on selected itineraries to improve trekking routes and support to develop local level tourist related products and services.**

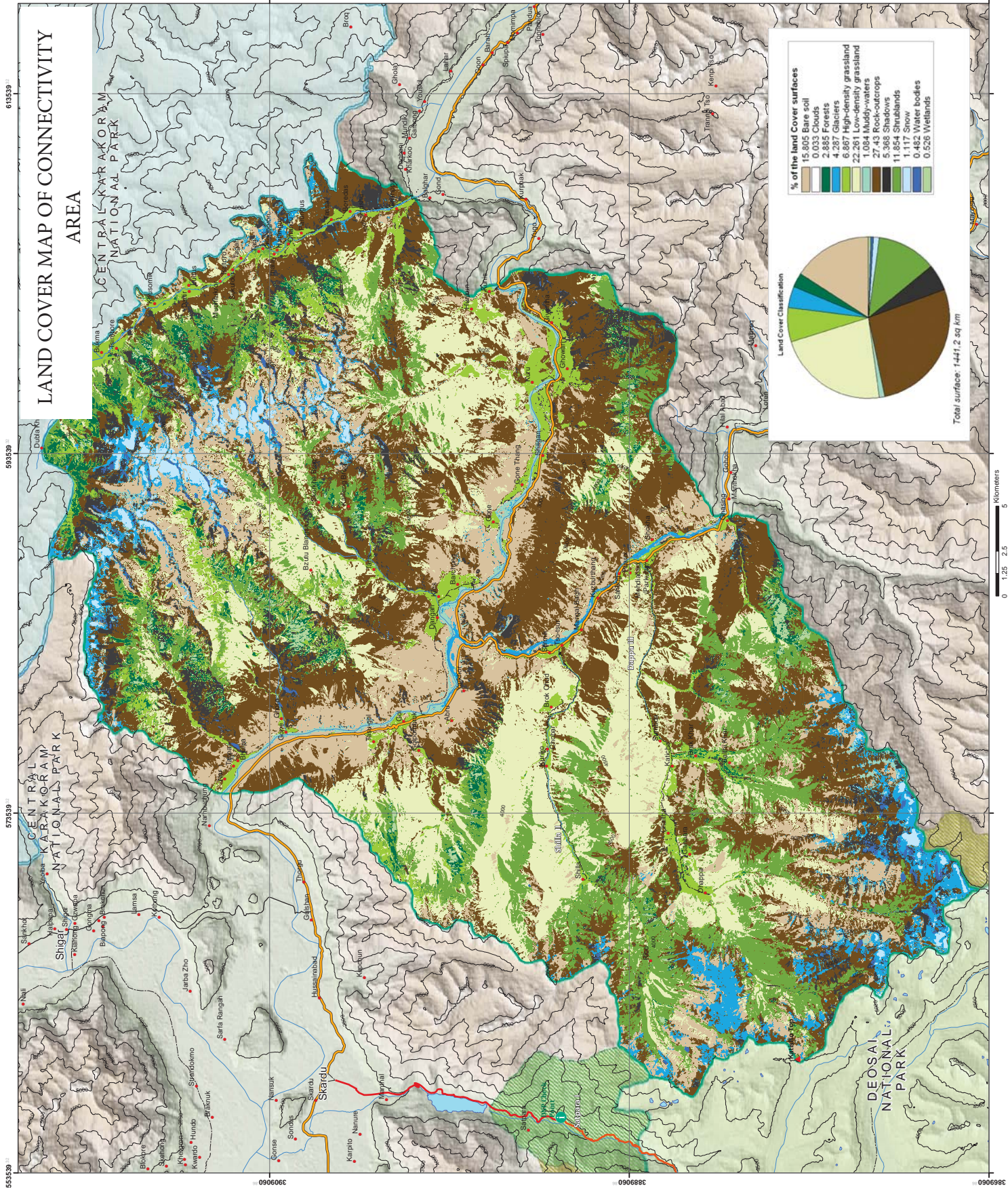
A huge number of trekkers visit the territory for short and long treks. Currently trekking routes have only been identified yet with minimum information. Signage development along the routes with adequate information can increase in the number of tourists and assist visitors in understanding and enjoying the natural and cultural heritage.











**DNP- CKNP**  
**Connectivity Corridor**  
**Land Cover Map**

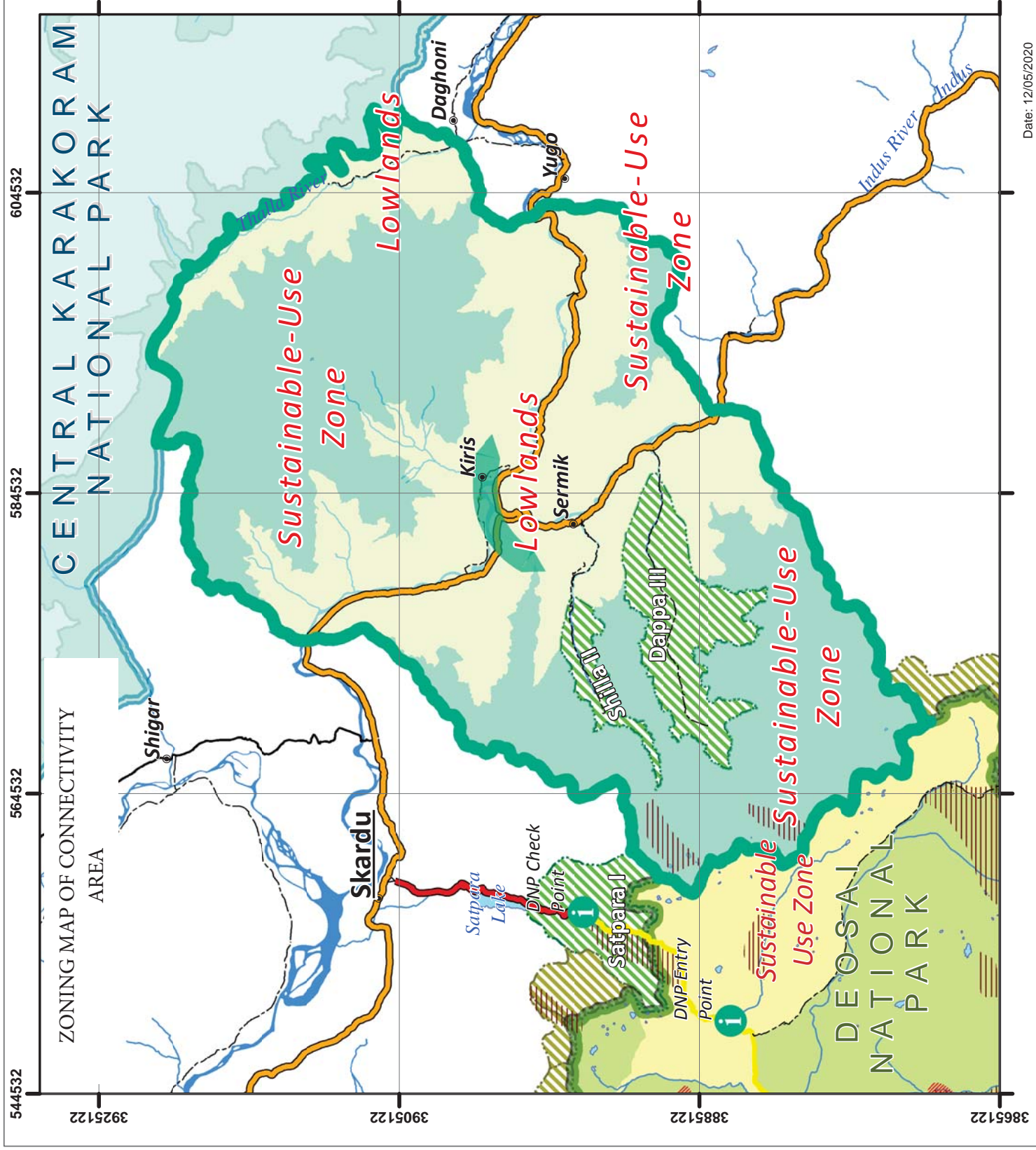
Sentinel 2 acquired on 2018/08/06

Coordinate System: WGS 1984 UTM Zone 48N  
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Projection: UTM  
Datum: WGS 1984  
Units: Meter  
Scale: 1:50,000  
Projection: UTM









# DNP- CKNP Connectivity Corridor Zoning Map

## Legend

- Connectivity Corridor (1441.17 sq km)
- Sustainable-Use Zone (740.8)
- Lowlands (597.9)
- Buffer Zone Valley (tot corridor: 102.6)
- DNP Buffer Zone
- Animals Crossing
- DNP Boundary
- DNP Zones
- Core Zone
- Sustainable Use Zone
- CKNP
- Bears presence
- Date of survey
- 2012
- 2019





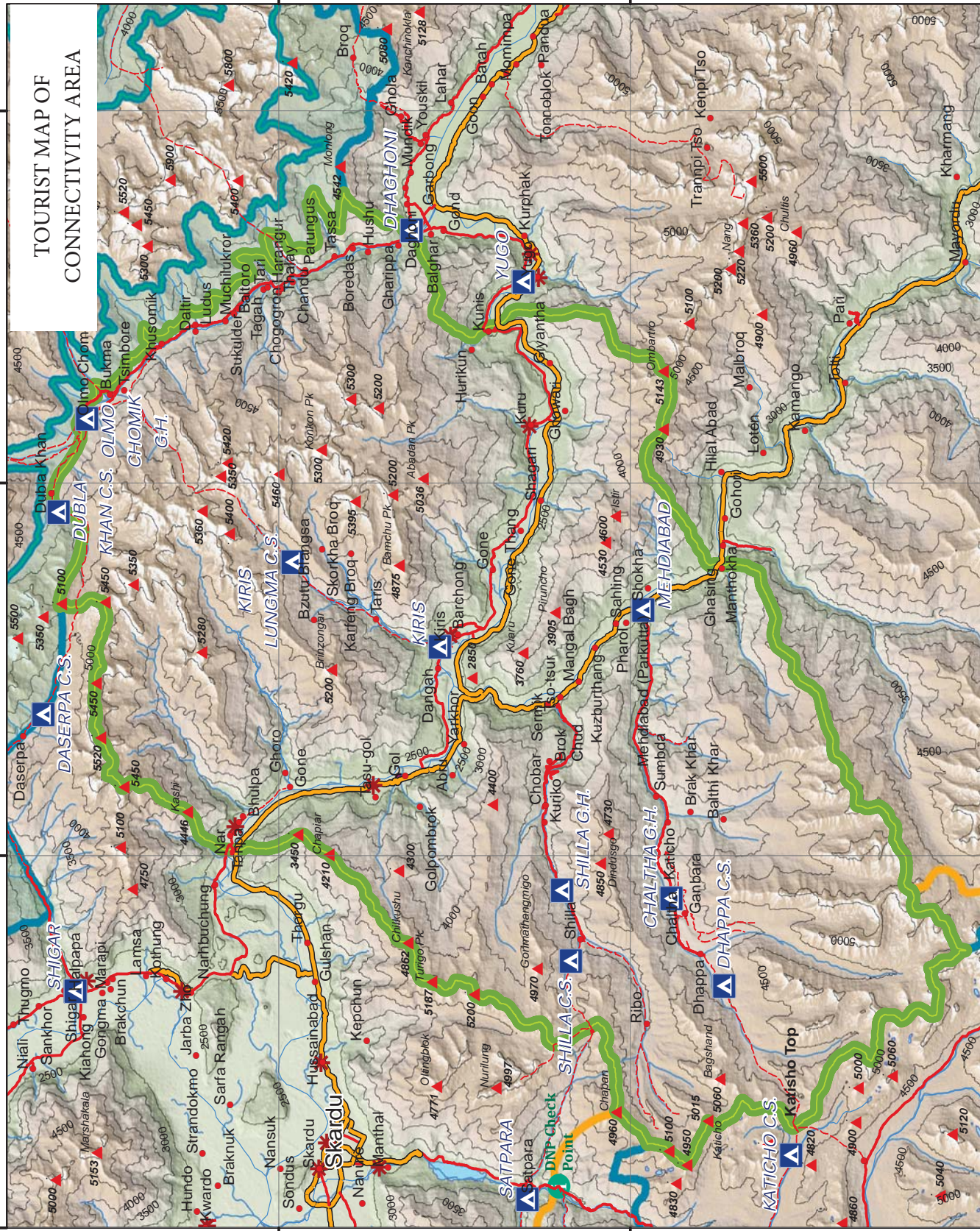
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# TOURIST MAP OF CONNECTIVITY AREA



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## DNP- Corridor Touristic Map

### Legend



Corridor



CKNP



CKNP Core Zone



DNP Boundary



DNP Buffer Zone

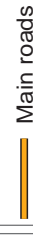


Tourism

Cultural Sites



Camp Sites



Main roads



Jeep



Trails



Settlements



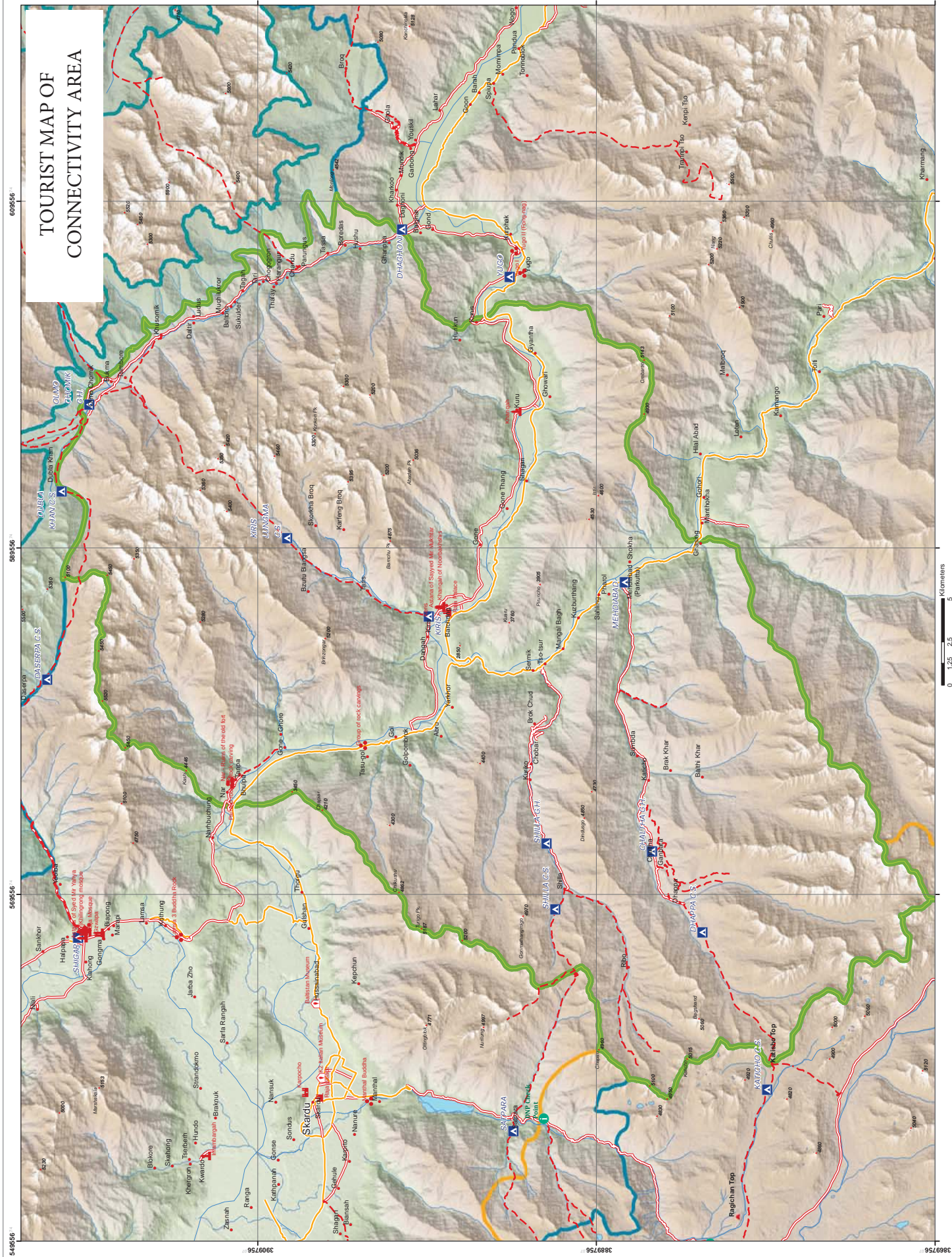
Peaks

Coordinate System: WGS 1984 UTM Zone 43N  
Projection: Transverse Mercator  
Datum: WGS 1984  
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Central Meridian: 75.0000  
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Units: Meter



Date: 01/02/2020



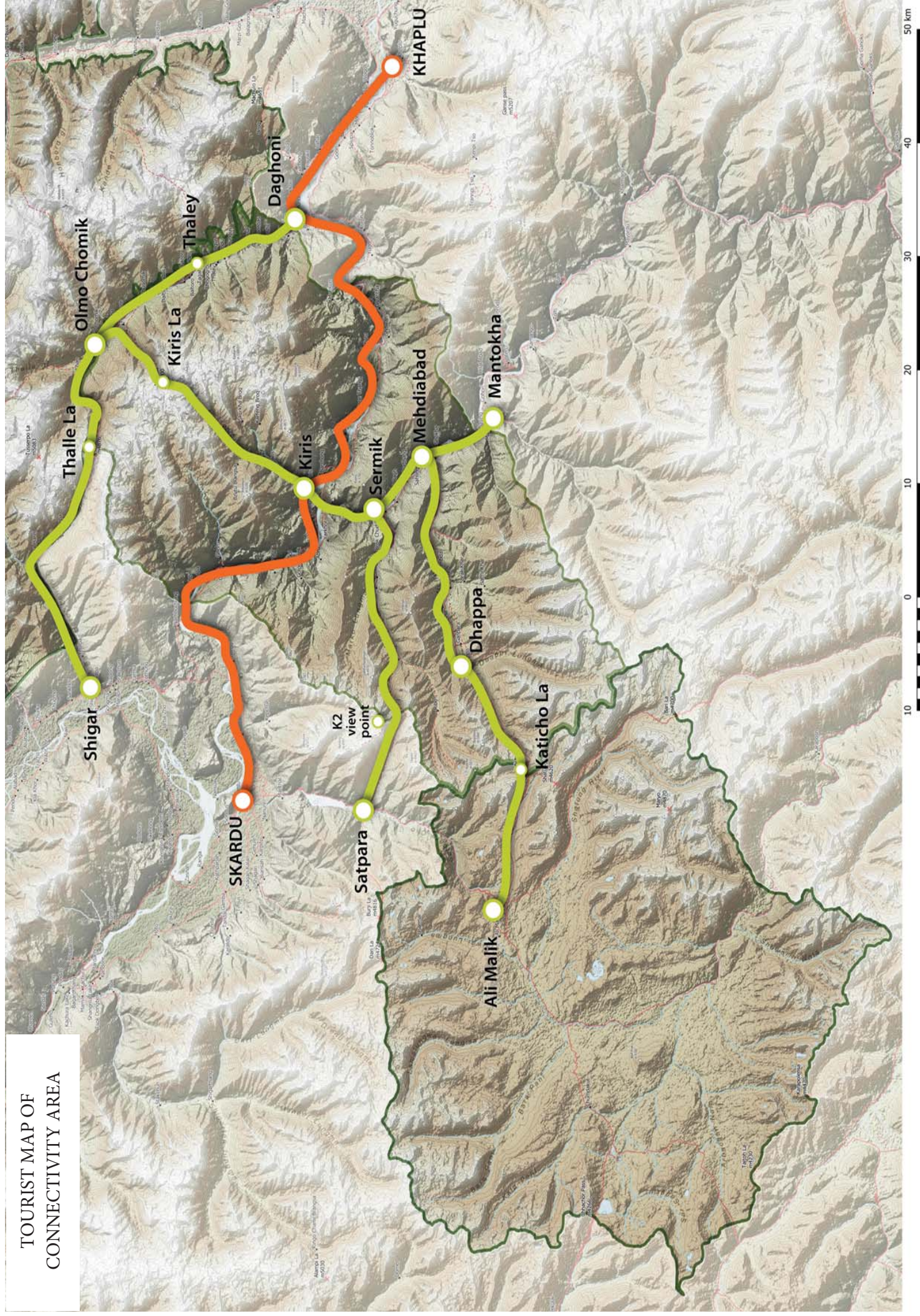


DNP- Corridor  
Touristic Map

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# TOURIST MAP OF CONNECTIVITY AREA





# DNP CKNP ECOLOGICAL CORRIDOR

## DNP-CKNP ECOLOGICAL CONNECTIVITY AREA MAP

