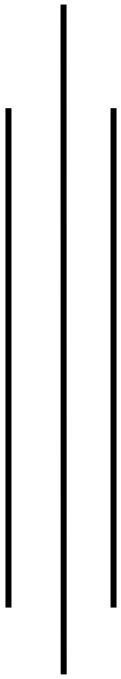
# Biodiversity Hotspot Mapping in Gandaki Province



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# Abstract

Biodiversity is the natural bank of biological resources. Areas with rich biodiversity and of great importance are generally known as Biodiversity hotspots. The biodiversity hotspot mapping is a challenging task for the world's biologists. Although it is crucial for conservation-related decision making, information related to the biodiversity hotspot was completely lacking in Gandaki Province. In this scenario, this study was designed to map the biodiversity hotspots in Gandaki Province. The study has identified the distribution of threatened fauna and medicinal plants as well as vegetation rich area. Finally, the habitat of a snow leopard or common leopard and habitat of Asiatic black bear, musk deer, medicinal plant and forest or shrubland or grassland and EVI more than 0 was identified as biodiversity hotspots in Gandaki Province. Habitats of Asiatic black bear, common leopard, musk deer, snow leopard and medicinal plants were found to be 5,528km$^2$, 3,961km$^2$, 1,179 km$^2$, 2,164 km$^2$and 3,731 km$^2$respectively. Forest areas of the middle Mountain region of *Baglung, Myagdi, Parbat, Kaski,Lamjung* and *Gorkha* district are good habitat for Asiatic black bear. The whole area of *Parbat*, *Syangja* and *Tanahun*as well as the southern part of *Baglung, Myagdi, Kaski, Lamjung* and *Gorkha* are the suitable habitat of common leopard. Dhorpatan Hunting Reserve, Annapurna Conservation Area and Manaslu Conservation area are identified as the suitable habitat of musk deer, snow leopard and medicinal plants. The accuracy of the habitat model of Asiatic black bear, common leopard, musk deer, snow leopard was found to be (for example AUC > 0.8) which shows robustness of the model. A total of 198 km$^2$ area was identified as a biodiversity hotspot in Gandaki Province. Most of the patches of the hotspot are inside the protected areas. Hotspots of the western part fall inside the Dhorpatan Hunting Reserve. All hotspot patches of *Mustang* and *Kaski*, as well as majority patches of *Myagdi, Manang* and *Lamjung* are inside the Annapurna Conservation Area. The majority of hotspot patches of the *Gorkha* district are inside the Manaslu Conservation Area. Only some hotspot patches of *Baglung, Myagdi*, *Parbat*, *Lamjung, Manang* and *Gorkha* are outside the protected areas.

# 1. INTRODUCTION

## 1.1. Background

### 1.1.1. Biodiversity

Biodiversity is the diversity among living beings. It can be divided into three levels: (1) Ecosystem diversity: Diversity in an ecosystem (forest ecosystem, pond ecosystem...) (2) Species diversity: Diversity in species (red panda snow leopard, black bear) and (3) Genetic diversity: Diversity in gene level. The number of species of plants, animals, and microorganisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of biologically diverse earth. The variety of life on earth, its biological diversity is commonly referred to as biodiversity.For rich biodiversity, a variety of topographical and climatic situations, more variety of living beings and less or right about human intervention are necessary(Global Issues, 2020).

Biodiversity boosts ecosystem productivity where each species, no matter how small, all have an important role to play. For example, a larger number of plant species means a greater variety of crops. Greater species diversity ensures natural sustainability for all life forms.Biodiversity plays a crucial role in human nutrition through its influence on world food production, as it ensures the sustainable productivity of soils and provides the genetic resources for all crops, livestock, and marine species harvested for food(Global Issues, 2020). The most obvious reason for conservation is to protect wildlife and promote biodiversity. Protecting wildlife and preserving it for future generations also means that the animals we love don't become a distant memory. And we can maintain a healthy and functional ecosystem.

Biodiversity loss affects economic systems and human society. This lack of biodiversity among crops threatens food security, because varieties may be vulnerable to disease and pests, invasive species, and climate change(Lamsal et al., 2017). At least 40 percent of the world's economy and 80 percent of the needs of the poor are derived from biological resources. Besides, the richer the diversity of life, the greater the opportunity for medical discoveries, economic development, and adaptive responses to such new challenges as climate change (Global Issues, 2020). Appropriate conservation and sustainable development strategies attempt to recognize this as being integral to

any approach to preserving biodiversity. Almost all cultures have their roots in our biological diversity in some way or form. Declining biodiversity is therefore a concern for many reasons: such as the low economic condition of local people, low level of awareness, construction of physical superstructure and infrastructure and natural as well as human-induced calamities.

### 1.1.2. Introduction of biodiversity hotspot

Species in tropical regions can account for two-thirds of all known species on earth. Many areas within the tropical zones are considered biodiversity hotspots and are home to the world's most rare and endangered species(Merritt et al., 2019).The areas where can be found the highest concentrations of endemic species and that also face the highest loss of natural habitats are called biodiversity hotspots (Hrdina and Romportl, 2017). With the enormous number of species that exist on Earth, it is remarkable that the distribution of these species is so highly concentrated in specific areas. Species richness, the total number of species found in an area, is not evenly distributed around the globe: two-thirds of all known species occur in tropical areas, especially in tropical forests, even though the causes of such uneven distribution are still a matter of debate(Merritt et al., 2019). To prioritize the areas that should be protected, scientists look for areas that are home to a large number of species, especially those species that are under threat of extinction or that are currently being destroyed at a fast pace. These areas that are particularly important for biodiversity conservation are called biodiversity hotspots. Two things are crucial when determining that a place is a biodiversity hotspot: (i) the number of different species there; and (ii) whether species in that area are endangered or currently being destroyed.

According to the criteria developed by Myers et al. (2000), To qualify as a biodiversity hotspot, an area must meet two strict criteria: (1) Contain at least 1,500 species of vascular plants found nowhere else on Earth (known as "endemic" species). (2) Have lost at least 70 percent of its primary native vegetation(Conservation International, 2020). Many of the biodiversity hotspots exceed the two criteria. For example, both the Sundaland Hotspot in Southeast Asia and the Tropical Andes Hotspot in South America has about 15,000 endemic plant species. The loss of vegetation in some hotspots has reached a startling 95 percent. There are currently 36 recognized biodiversity hotspots. These are Earth's most biologically rich—yet threatened—terrestrial regions (CEPF, 2020).Biodiversity hotspots make up less than 3 percent of Earth's land surface

and refer to regions that are both rich with life and at high risk for destruction (National Geographic Society, 2020).

Biodiversity hotspots are regions that are both biologically fertile (rich distribution of plants and animals) and highly threatened. In other words, such biogeographic regions are very productive and are constantly exposed to threats of destruction which warrant the need for them to be protected. Examples of biodiversity hotspots are forest habitats as they constantly face destruction and degradation due to illegal logging, pollution and deforestation(Conserve Energy Future, 2020).The 36 biodiversity hotspots are home to around 2 billion people, including some of the world's poorest, many of whom rely directly on healthy ecosystems for their livelihood and well-being.

As many as 35% of all species in four vertebrate and 44% of vascular plants are confined to 25 hotspots comprising only 1.4% of the land surface of the Earth (Myers et al., 2000). Regionally, mountain regions are rich in biodiversity hotspots due to moderate environmental variables. Distribution of endemic richness (i.e., number of endemic taxa) along was high at mid-elevations in Iran (Noroozi et al., 2018).

#### 1.1.2.1. Importance of biodiversity hotspot

The hotspots provide crucial ecosystem services for human life, such as the provision of clean water, pollination and climate regulation. These remarkable regions also hold some of the highest human population densities on the planet, but the relationship between people and biodiversity is not simply one where more people lead to greater impacts on biodiversity. Much of human-biodiversity impacts lay not in human density but rather in human activity. Conservation in the hotspots promotes the sustainable management of these essential natural resources and supports economic growth, which also reduces drivers of violent conflict (CEPF, 2020). Freshwater diversity was largely derived from a few ancient colonization, coupled with high diversification rates (Miller et al., 2018).

#### 1.1.2.2. Biodiversity hotspot mapping

Biodiversity hotspot mapping is a challenging task. Bazelet et al. (2016) mapped the biodiversity hotspot using a 1° fishnet gridand delineated katydid hotspots in two ways:(1) count-based: grid cells in the top 10% of the total, endemic, threatened and/or sensitive species richness (2) score-based: grid cells with a mean value in the top 10% on a scoring system which scored each species based on its IUCN Red List threat status, distribution, mobility and trophic level.Habitat maps of living beings are also useful for the biodiversity hotspot mapping (Mckerrow et al., 2018).

Although hotspot can't represent all biodiversity (Balletto et al., 2010), identification and conservation of biodiversity hotspot is the best idea to conserve the biodiversity with limited resources. Biodiversity hotspot mapping may be an artifact(Carolan, 2009), and cold spots are also important for conservation (Marchese, 2015),it can provide valuable information for conservation priorities. Identification and assessment of the biodiversity hotspot are crucial to conserving biodiversity in the province. Biodiversity hotspot mapping is a way to know the existing condition of the valuable biodiversity that exists throughout the province. Furthermore, the spatial information and mapping of biodiversity hotspot would guide for formulating a new plan and policy for sustainable use of resources, conservation of biodiversity and associated issues. In this scenario, the best way of conservation of the biodiversity of Gandaki Province is the identification of biodiversity hotspots and the concentration of resources at these hotspots for effective and efficient conservation of biodiversity of Gandaki Province. Here we defined biodiversity hotspot as a habitat of a snow leopard or common leopard and habitat of Asiatic black bear, musk deer, medicinal plant and forest or shrubland or grassland and EVI more than 0.

**Asiatic black bear (*Ursusthibetanus*)**

Asiatic blackbear (*U.thibetanus)*face several threats due to human activity. The species is listedas ″vulnerable"by the IUCN (Garshelis, D. & Steinmetz, 2016), due towidespread illegal killing, trade in bear parts, and habitat loss (Ahmadzadeh et al., 2008; Awan et al., 2016; Escobar et al., 2015). The speciesis also included in Appendix I of the Convention on International Tradein Endangered Species of Wild Fauna and Flora (CITES, 2019). Better understanding the habitat of

Asiaticblack bear in Nepal will serve to help identify important natural habitat and conserve this species and associated habitat.

**Common leopard (*Pantherapardus* )**

The common leopard (*P. pardus*) is a leopard subspecies widely distributed on the Indian subcontinent. The species *P. pardus* is listed as vulnerable on the International Union for Conservation of Nature (IUCN) Red List because populations have declined following habitat loss and fragmentation, poaching for the illegal trade of skins and body parts, and persecution due to conflict situations (Stein et al., 2016).The *P. pardus* is a versatile, opportunistic hunter, and has a very broad diet. It can take large prey due to its massive skull and powerful jaw muscles. The number of *P. pardus* in the country has significantly gone down in the last few years due to a shortage of food and a lack of safe habitat.A report published by IUCN in 2012 showed Nepal had a total of 1,000 *P. pardus*. The report had also stated that the number of *P. pardus* was decreasing every year (Stein et al., 2016).

**Musk deer (*Moschuschrysogaster*)**

Musk deer (*M. chrysogaster*), small compact deer, family Cervidae (order Artiodactyla) is a solitary shy animal. The *M. chrysogaster* lives in mountainous regions from Siberia to the Himalayas. It has large ears, a very short tail, no antlers, and, unlike all other deer, a gall bladder. The *M. chrysogaster* is grayish brown, with long coarse, brittle hair, and stands 50–60 cm (20–24 inches) at the shoulder, slightly higher at the rump. The male has long upper canine teeth that project downward from the mouth as tusks and has a musk-producing organ, the musk pod, on its abdomen. The musk from that organ is valued for use in perfumes and soaps. The *M. chrysogaster* is listed as endangered in IUCN red data list and Appendix I of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) (CITES, 2017; Harris, 2016).

**Snow leopard(*Pantherauncia*)**

The snow leopard (*P. uncia*), also known as the ounce, is a large cat native to the mountain ranges of Central and Southern Asia. It is listed as vulnerable on the IUCN Red List because the global population is estimated to number less than 10,000 mature individuals and decline about 10% until 2040. It is threatened by poaching and habitat destruction following infrastructural developments. It inhabits alpine and subalpine zones at elevations from 3,000 to 4,500 m (McCarthy et al., 2017).

**Medicinal Plants**

This study used other species such as GuchchiChyau (*Morchellaesculenta*),Kurilo (*Asparagus officinalis*), LauthSalla (*Taxusbaccta*), Nirmasi (*Delphinium denudatum*), Okhar (*Juglansregia*), Paakhanved (*Bergenia ciliate*), Panchaule (*Dactylorhizahatageria*), Satuwa (*Paris polyphylla*), Sungadhwal (*Valerianajatamansi*) and Timur (*Zanthoxylumpiperitum*) as medicinal plants. Himalayan onion/ban lasun (*A. wallichii*) is a perennial herb with numerous purple flowers, borne in a lax rounded umbel 5-7 cm across, on top of a leafless 3-angled flowering-stem; 1-3 ft. It is a high-value Non-Timber Forest Product (NTFP). Petals are broadly linear blunt, spreading in a star, at length reflexed, longer than the purple stamens and ovary. Leaves are many, spear-shaped, flat and keeled, up to 2 cm broad, often almost as long as the flowering stem. The bulb is solitary or clustered, cylindrical; tunic yellowish-brown, fibrous. Himalayan onion is found in the Himalayas, from Pakistan to southwest China, at altitudes of 2800-4300 m. Its bulb is used to treat asthma, bronchitis, and bleeding during cough, especially during tuberculosis. A paste of the bulb is applied to check bleeding from wounds and to treat pimples (Tiwari et al., 2014). Chiraito (*S. chiraita*) has been used by Nepali locals since the old days, and this is one of the traditional medicinal herbs used by the people of Nepal. This herb is mainly used for the treatment of stomach aches, constipation, excess urination, parasites cure, and malaria treatment. The *S. chiraita* is a popular medicinal herb found in forests and open slopes of the Himalayan region of 1600-2500 m above sea level. The plant of *S. chiraita* is made of an ingredient called “chiratin" which is bitter. The illegal harvesting of this herb is banned by the government of Nepal. The *S. chiraita* herbs are legally farmed within the community forests and subsidiary lands on eastern hilly regions of Nepal (GoN/MFSC, 2013).

## 1.2. Problem statement and rationale

Biodiversity is an important economic asset.Humans depend on biodiversity in myriad ways, yet species are being rapidly lost due to anthropogenic activities (Gascon et al., 2015). For example, biodiversity helps to improve the productivity of ecosystems (Wilsey and Potvin, 2000). Unfortunately, the global biodiversity resource has been declining continuously over the last several decades mainly due to increasing anthropogenic interferences (Tittensor et al., 2014). The species extinction rate is about 1000 times more than the likely background rate, and future rates are poised to increase (Pimm et al., 2014). Over-exploitation of the biological resources and agricultural activities such as crop production and livestock farming are identified as major causes of global biodiversity loss (Maxwell et al., 2016). In other words for wildlife conservation, habitat fragmentation (Bentley et al., 2000) and the impact of domesticated animals are major challenges (Loss et al., 2013). Furthermore, climate change is becoming a severe threat to biodiversity (González-Orozco et al., 2016). Often species react to climate change by shifting the distribution to follow changing the environmental situation, by adapting to changing conditions in location, or, if unable to do either, by remaining in isolated pockets of the unchanged environment or, more likely, becoming extinct (Holt, 1990). Similar to climate change, land-use change is also becoming an emerging threat to conserving biodiversity and may lead to greater species loss in tropics (Jetz et al., 2007). The conservation of biological resources and their habitats are directly influenced by the socio-political situation of the country (Barnes et al., 2016). Less developed countries are focusing on the production of food and the management of shelter for their people. Due to the poverty (Adams et al., 2004), human-wildlife conflict (Acharya et al., 2016), over-exploitation of biological resources and tourism pressure on protected areas (Bhattarai et al., 2017), people's dependency on forests and consequent deforestation and forest fragmentation (Uddin et al., 2015) developing countries are facing more difficulties for biodiversity conservation. The habitats of wildlife will be reduced and shifted due to climate change and combined effect of climate change and land-use change in the future (Aryal et al., 2016; Lamsal et al., 2018; Panthi, 2018). Forest and freshwater wetland ecosystems of Nepal are vulnerable and likely to be impacted by climate change shortly (Lamsal et al., 2017).

The top ten conservation issues of this area are (i) degradation of wildlife habitat due to deforestation and degradation of wetland and rangeland; (ii) poaching and trade of wildlife

including protected species due to absence/inadequate effective control mechanism; (iii) illegal harvest of forest resources, especially Non-Timber Forest Products (NTFPs) (iv) adverse effects due to alien invasive plant species; (v) forest fires, floods and landslides; (vi) diversion of rivers or construction of dams; (vii) crop and livestock depredation by wildlife, and human injuries or casualties; (viii) conversion of forest/forest land for non-forestry uses; (ix) inadequate awareness and motivation to protect biodiversity, and (x) weak institutional capacity (WWF, 2013).

Managers have limited resources but they have to conserve the large area. Identification of conservation priorities is imperative for decision making to allocate the resources. Although it is crucial for conservation-related decision making, information related to the biodiversity hotspot was completely lacking in Gandaki Province.

## 1.3. The objective of the study

The overall objective of this study was to identify and map the biodiversity hotspot of Gandaki Province, Nepal. Specific objectives of the study are as follows:

- To identify and assess floral and faunal species those are endangered and near to extinction.
- To analyze the distribution and coverage of these floral and faunal species
- To prepare provincial level biodiversity hotspot maps

## 1.4. Scope and coverage of the study

- The study is confined to the forest area of Gandaki Province.
- The study is limited to the mapping of floral and faunal species important for biodiversity hotspots.

## 1.5. Research hypotheses

Most of the biodiversity hotspots are located at forests of the high mountain region of Gandaki Province, Nepal.

## 1.6. Limitation of the study

Due to the Covid-19 the field work was disturbed partially. Budget limitation is another problem. It is very hard to cover the field work of whole province within this limit of budget. It is not easy to visit whole province for data collection within this amount of money. Filed was very large and difficult to visit. Some predefined / pre allocated sample points were not reachable. In these cases, samples were collected from the nearest reachable areas.

# 2. MATERIALS AND METHODS

## 2.1. Study area

Gandaki is one province out of seven provinces of Nepal. This province is situated in the center part of Nepal by covering the 11 districts: Nawalpur, Tanahun, Gorkha, Lamjung, Kaski,

Syanjya, Parbat, Baglung, Myagdi, Manang, and Mustang (Figure 1). Similarly, there are only 85 local administrative bodies in the region of Pokhara, 1 metropolitan city, 26 municipalities and 58 villages.(MoITFE, 2018).

In the north-central part of Nepal, the Gandaki Province is spreading from Himal to Terai from north to south. The total area of this state is 21,976.34 $km^2$, i.e. 14.93% of the total area of Nepal. Near the border of India, the lowest part near the Gandak canal of Narayani River is at the height of 93 meters above sea level. This height went up gradually to Dhaulagiri is a huge iceberg with 8,167 meters, Manasalu 8,163 meters, and Annapurna first 8,091 meters. In this state, only the high Himalayan mountain range has fallen to the middle of the country. The valley is situated in the upper part of Manang, Mustang, and Gorkha. (MoITFE, 2018). This province consists of five distinct geographical regions: Himalaya, high mountains, middle mountains, Shivaliks and Terai or inner Madhes.

Around 37.1% area of the province is covered by forest. Major trees species of the province are *Shorea. robusta, Dalbergiasissoo, Acacia catechu Pinusroxberghii, P. wallichianaSchima. wallichi, CastenopsisindicaAlnusnepalensis , and Taxusbaccata.*The major forest management models exercised in the provinces are community forest management, collaborative forest management, and block forest management. The scientific forest management program was launched in all these forests throughout the province. GuchchiChyau (*Morchellaesculenta*), Kurilo (*Asparagus officinalis*), LauthSalla (*Taxusbaccta*), Nirmasi (*Delphinium denudatum*), Okhar (*Juglansregia*), Paakhanved (*Bergenia ciliate*), Panchaule (*Dactylorhizahatageria*), Satuwa (*Paris polyphylla*), Sungadhwal (*Valerianajatamansi*) and Timur (*Zanthoxylumpiperitum*) are major NTFPs of a province (MoITFE, 2018).

Gandaki Province is rich in protected areas. Around 45.68 % area of the Gandaki Province is covered by protected areas. Annapurna Conservation Area, Manaslu Conservation Area, some parts of Dhorpatan Hunting Reserve and Chitwan National Park are located in this province. Annapurna Conservation area is famous for mountain trekking and unique landscape, Dhorpatan Hunting Reserve is popular for trophy hunting of blue sheep and Himalayan tahr. Similarly, Chitwan National Park is famous for rhino and tiger, and the Manaslu conservation area is famous for trekking, unique landscape, and mountain biodiversity (DNPWC, 2017; MoITFE, 2018). Moreover, The diversity of orchids is high, especially in the Panchase Hills(WWF, 2013).

Being situated at the divide of the Eastern and WesternHimalaya, the Kali Gandaki gorge is a recognizedcorridor for birds to migrate(WWF, 2013)

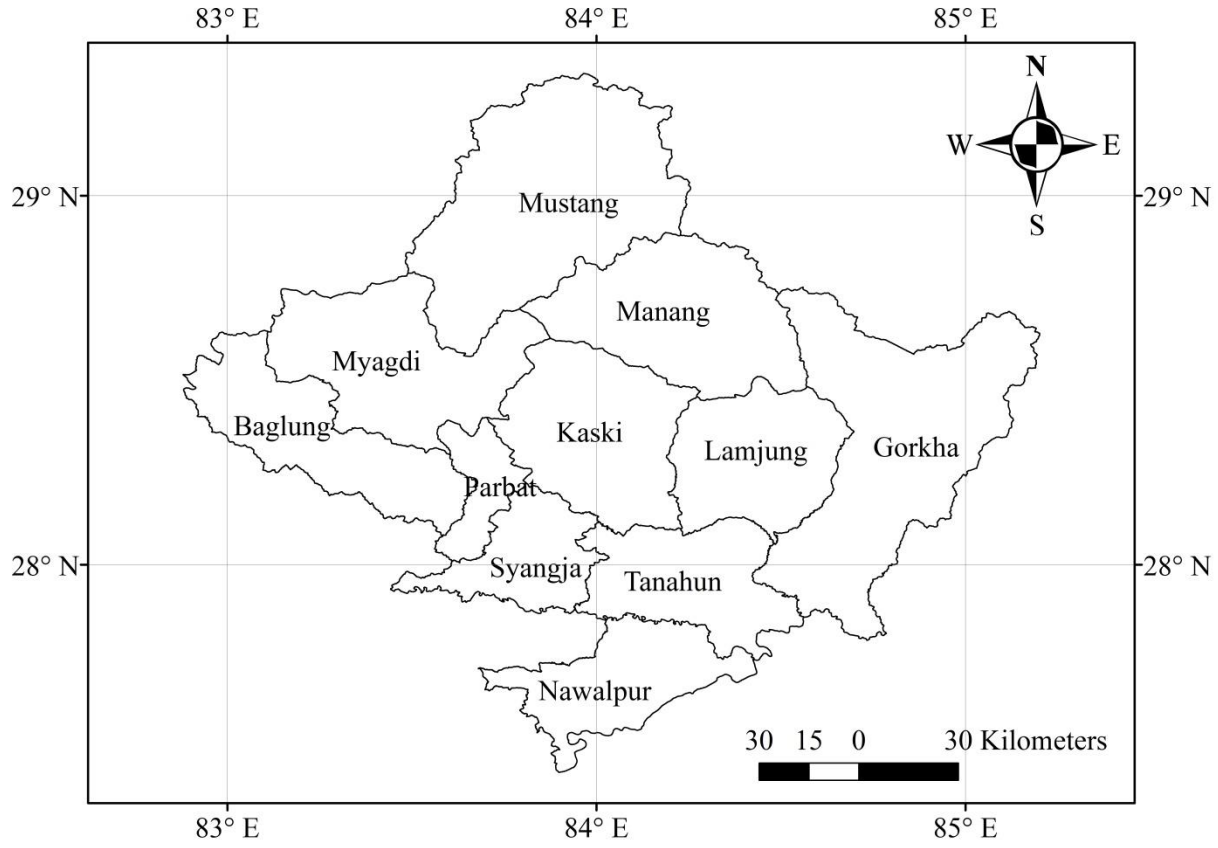


**Figure 1: Study area (Gandaki Province)**

Most of the area of the province is covered by forest and agricultural land. Major land-use types of the province are Needle leaved forest, Broad-leaved forest, Shrubland, Grassland, Agricultural land, Built-up area, Bare area, Lake, River and Snow/Glacier **(Figure 2 Source: ICIMOD)**(Uddin et al., 2015).

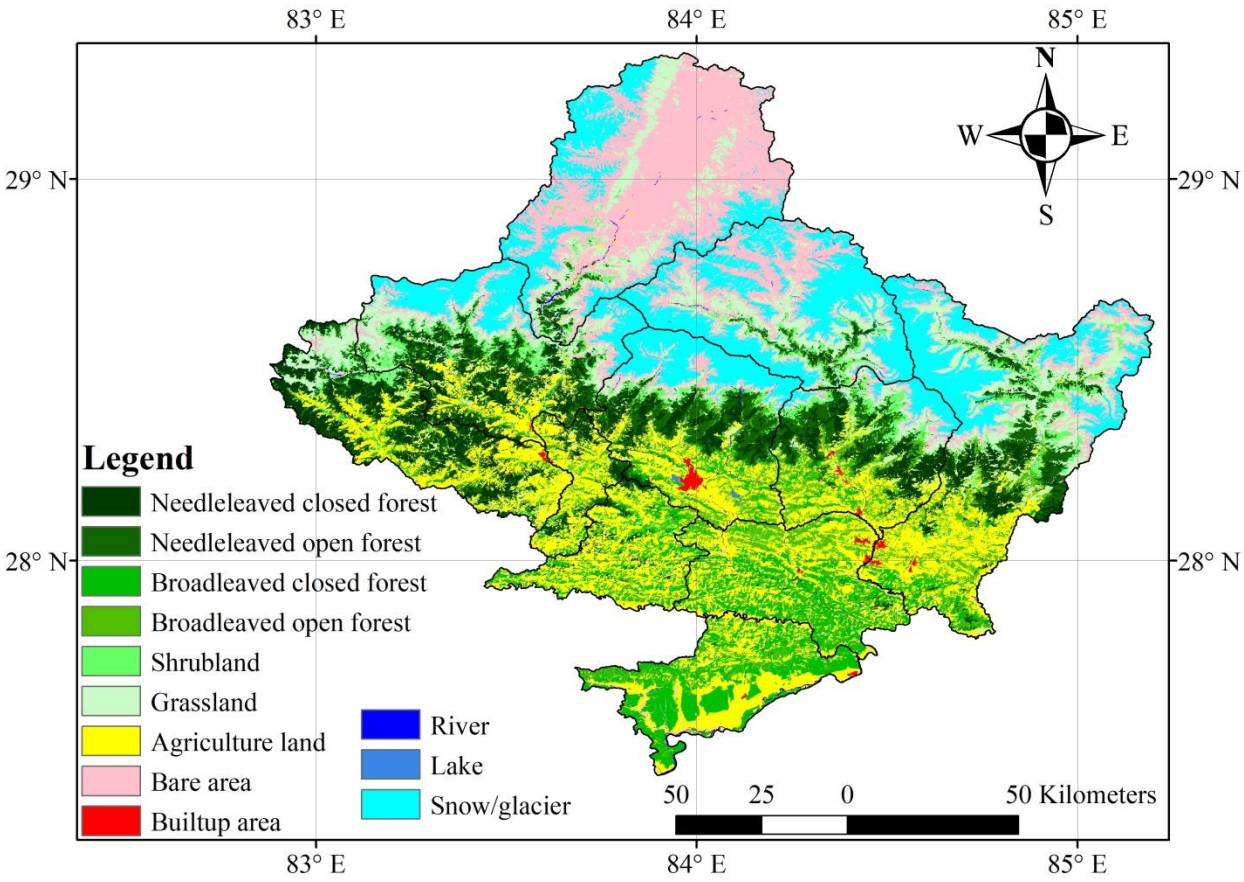


**Figure 2: Landuse of Gandaki Province**

## 2.2. Data collection

### 2.2.1. Sampling/primary data collection

The collection of biodiversity data is a prerequisite for the biodiversity hotspot mapping (Trizzino et al., 2014).The field survey was conducted throughout the Gandaki Province to collect the primary data for the study. The presence of wildlife wasrecorded based on direct sight of the particular species or its indirect signs (scats, hairs, and footprints) in the field.. Similarly, the presence of the plant species was recordedbased on the direct sight of the plant either live ordead form.

For systematic sampling, the vegetated area (forest, shrubland and grasslands) were identified by using the land cover map. Biodiversity rich potential areas were identified through literature

review and consultations with experts. Systematic sampling method was adopted to find sample points for ground data collection. A grid of 10 km X 10 kmwas applied on land cover types (**Figure 3**). In each grid, at least one transect having 100 m length and 10 m width was allocated for data collection.

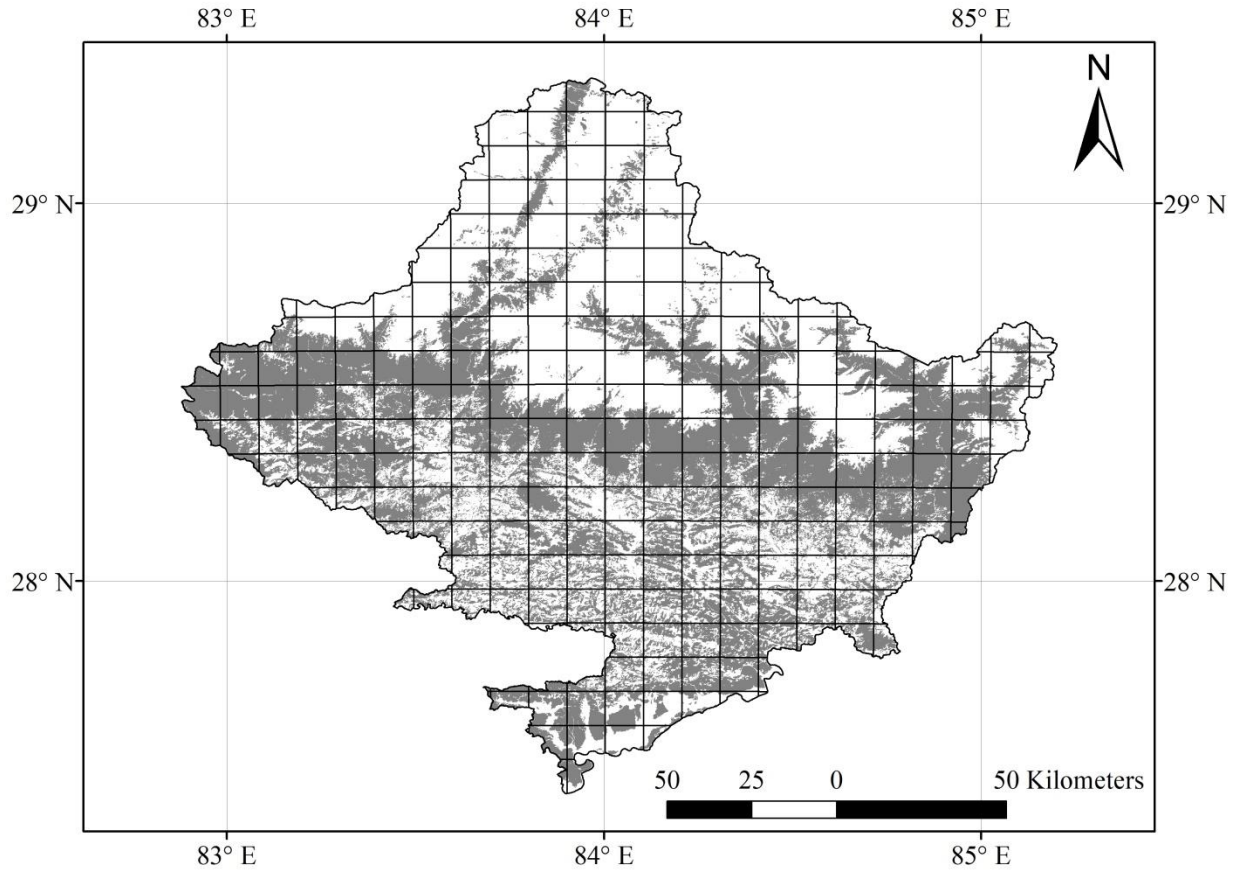


**Figure 3: Data collection grid**

### 2.2.2. Desk review/ secondary data collection

The occurrence points of species were compiled from other researchers, research reports and published as well as unpublished reports of the government of Nepal (Nepal biodiversity strategy (2002), National biodiversity strategy and action plan (2016-2020), CHAL strategy and action plan (2016-2025), Forest Resource assessment reports andForest Policy (2075). Before the data analysis, the secondary data were updated to include the available occurrence points from other possible sources.

## 2.2.3. Environmental variables

### 2.2.3.1. Topographical variables

Digital Elevation Model (DEM) data of 30 m resolution was downloaded from the United States Geological Survey website (https://earthexplorer.usgs.gov/), and the slope was computed from the DEM using ArcGIS software (ESRI, 2017). Shapefiles of water sources were downloaded from Geofabrik website (https://www.geofabrik.de/data/shapefiles.html) and converted to distance raster file using ArcGIS (ESRI, 2017). Elevation was used as a proxy of temperature due to the unavailability of high-resolution climatic variables.

### 2.2.3.2. Vegetation-related variables

Herbivores are depended on vegetation-related variables (Andersen et al., 2000) and carnivores are depending on herbivoresso the inclusion of vegetation-related variables to predict suitable habitat for this speciesis a prerequisite for robust habitat modeling.

For the variable 'forest cover' we used data prepared by Hansen et al. (2013)which were downloaded from the Global Forest Change (GFC) website. This study used Enhanced Vegetation Index (EVI) time series data for 2018 and 2019, from images obtained by Landsat 8.The data were analyzed by the help of Google Earth Engine.

### 2.2.3.3. Anthropogenic variables

Human activities have been identified as a threat to endangered animals and influence the species distribution (Choudhury et al., 2008; DNPWC, 2012). We therefore, incorporated anthropogenic variables into our model. Anthropogenic variables were the distance to human paths (used by human and animal) and roads (used by vehicle), distance to settlements, and land use. Location of paths and roads was obtained from shapefiles available on the Geofabrik website (https://www.geofabrik.de/data/shapefiles.html). Settlement locations were obtained from the Department of Survey, Nepal. Distance raster files of paths, roads, and settlements were created using ArcGIS (ESRI, 2017). Land cover and land use (LULC) data were downloaded from the International Centre for Integrated Mountain Development website (ICIMOD; http://www.icimod.org) (Uddin et al., 2015) and incorporated into the model.

Topographical, vegetation related and anthropogenic variables were downloaded from freely available sources and pre-processed in ArcGIS (ESRI, 2017) to make appropriate format (ASCII) and same spatial resolution (30 m) (**Table 1**). Climatic variables having fine resolution (30 m) werenot available therefore elevation was used as a proxy of climatic variables.

Table 1: Environmental variables for modeling

| **Source** | **Category** | **Variable** | **Abbreviation** | **Unit** |
|---|---|---|---|---|
| USGS | Topographic | Elevation | elevation | m |
| | | Slope | slope | Degree |
| | | Aspect | aspect | Degree |
| GEOFABRIK | | Distance to water | dist_water | m |
| Landsat | Vegetation-related | Annual mean EVI | evi_mean | Dimensionless |
| | | Standard deviation of EVI | evi_sd | Dimensionless |
| | | Maximum EVI | evi_max | Dimensionless |
| | | Minimum EVI | evi_min | Dimensionless |
| GFC | | Forest Cover | Forest | Dimensionless |
| GEOFABRIK | Anthropogenic | Distance to settlement | dist_settle | m |
| | | Distance to motor road | dist_motorroad | m |
| | | Distance to path | dist_path | m |
| | | Distance to building | dist_build | m |
| International Centre for | | Land use/land cover | land use | m |

## 2.3. Distribution modeling of species

To overcome the data limitation, species distribution models are popular to map the biodiversity hotspots(Choe et al., 2016).Habitat maps of living beings are useful for the biodiversity hotspot mapping (Mckerrow et al., 2018). Ecologically valuable areas were identified from species distributions and zonation(Karimi et al., 2015). Geological Information System (GIS) and Machine learning algorithm are best for mapping of the biodiversity hotspots (Baltensperger and Huettmann, 2015). The MaxEntwas used to predict the distribution of the species by using the species occurrence points and environmental variables (Elith et al., 2006; Phillips et al., 2006).

This tool is established widely used tool for predicting the distribution of the species in Nepal (Aryal et al., 2016; Bista et al., 2018; KC et al., 2019; Panthi et al., 2019; Sharma et al., 2020; Shrestha and Bawa, 2014; Thapa et al., 2018). This software is widely used to identify biodiversity hotspots (Li et al., 2019; Wulff et al., 2013).

## 2.4. Accuracy assessment of the modeling

Assessment of the accuracy is essential to validate the models and to understand the performance of the models. A total of 70 % of the species occurrence points were allocated for the training dataset, and 30 % were used as a testing /validation dataset for all models. The models were evaluated by the two methods. One method was threshold independent, and another was threshold dependent. In the threshold independent method, the area under the receiver-operator curve (AUC) of models was reported (Phillips et al., 2006; Wiley et al., 2003). The higher the AUC, the higher the model performance was. The AUC <0.7 denotes poor model performance, 0.7–0.9 denotes moderately useful model performance, and >0.9 denotes excellent model performance (Pearce and Ferrier, 2000).Although AUC is a classical and widely used model evaluation parameter, it is criticized by some researchers (Lobo et al., 2008). Therefore, threshold dependent accuracy assessment: True Skill Statistic (TSS) was also performed for the model evaluation (Merow et al., 2013).TSS was calculated for all model outputs (0-9 replications), and the final TSS was averaged of all 10 replications (Jiang et al., 2014).

## 2.5. Biodiversity hot spot mapping

Distribution/habitat of threatened fauna and medicinal plants were identified with the help of MaxEnt software. Major threatened fauna of Gandaki Province areSnow leopard, Musk deer, Common leopard, and Asiatic black bear. Among them Snow leopard and Common leopard are flagship species. They are also indications of a healthy and biodiversity-rich ecosystem. It is assumed that if there is a snow leopard or common leopard, the presence of herbivores and plants become most likely. In the case of plant biodiversity, forest, shrubland and grassland were identified as biodiversity-rich areas. An area having more than 0 EVI was identified as EVI rich

area. Finally, a habitat of above mentioned faunal and floral species with EVImore than 0 was identified as biodiversity hotspots in the Gandaki Province. ArcGIS software was used to process the MaxEnt output and to map the biodiversity hotspot.

# 3. RESULTS AND DISCUSSION

## 3.1. Habitat of Asiatic black bear

Habitat of an Asiatic black bear is identified by the help of MaxEnt software. AUC and TSS of the model are 0.840 and 0.617. The threshold 0.195 was used to calculate the TSS and to convert the probability habitat suitability map to a suitable/unsuitable binary map. A total of 5,528km$^2$ area has beenidentified as the habitat of the Asiatic black bear. Forest areas of the middle Mountain region of *Baglung, Myagdi, Parbat, Kaski, Lamjung* and *Gorkha* district are the suitablehabitat for Asiatic black bear(**Figure 4**). Habitat of red panda is subset of habitat of Asiatic black bear (Bista et al., 2018). Therefore this study assumed that, the information of habitat is included in the biodiversity hotspot.

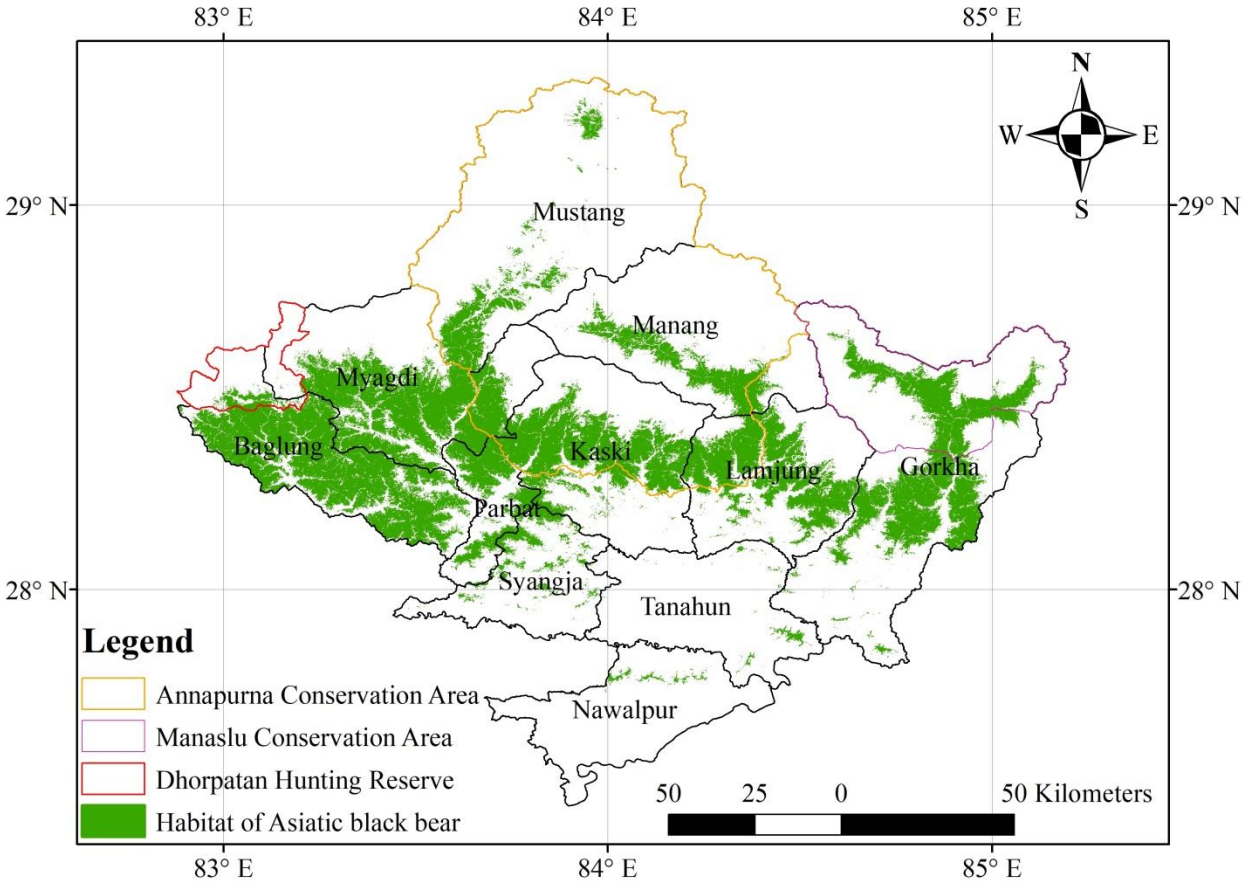


**Figure 4: Habitat of Asiatic black bear**

## 3.2. Habitat of Common leopard

Habitat of common leopard is identified by the help of MaxEnt software. AUC and TSS of the model are 0.871 and 0.626. The threshold 0.227 was used to calculate the TSS and to convert the probability habitat suitability map to a suitable/unsuitable binary map. A total of 3,961 $km^2$ area has beenidentified as the habitat of a common leopard. The whole area of *Parbat, Syangja* and *Tanahun*as well as the southern part of *Baglung, Myagdi, Kaski, Lamjung* and *Gorkha* are the suitable habitat forthis Leopard (**Figure 5**).

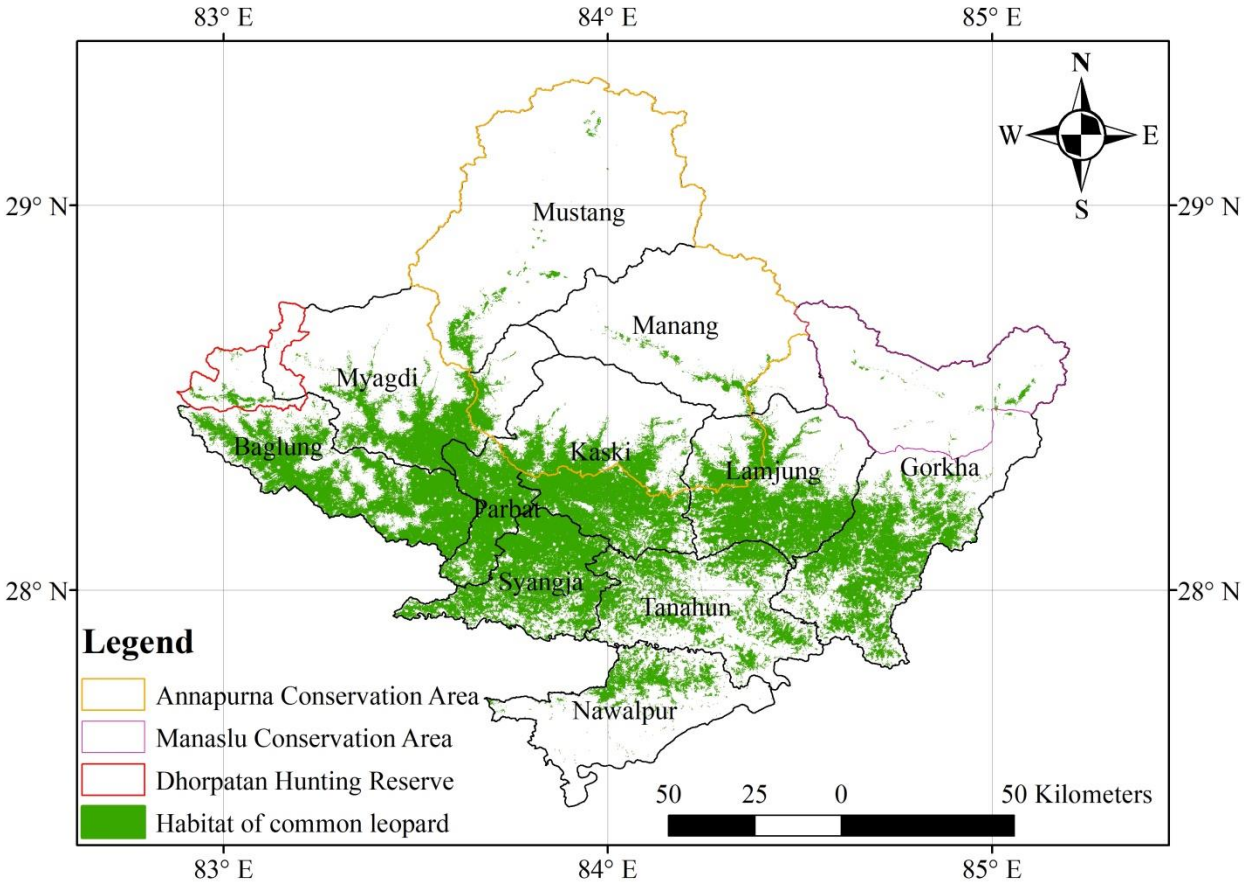


**Figure 5: Habitat of Common leopard**

## 3.3. Habitat of Musk deer

Habitat of musk is identified with the help of MaxEnt software. AUC and TSS of the model are 0.971 and 0.900. The threshold 0.129 was used to calculate the TSS and to convert the

probability habitat suitability map to a suitable/unsuitable binary map. A total 1,179km$^2$ area has beenidentified as a habitat of musk deer. The area inside the Dhorpatan Hunting Reserve, Annapurna Conservation Area and Manaslu Conservation area are identified as the suitable habitat forthis species (**Figure 6**).

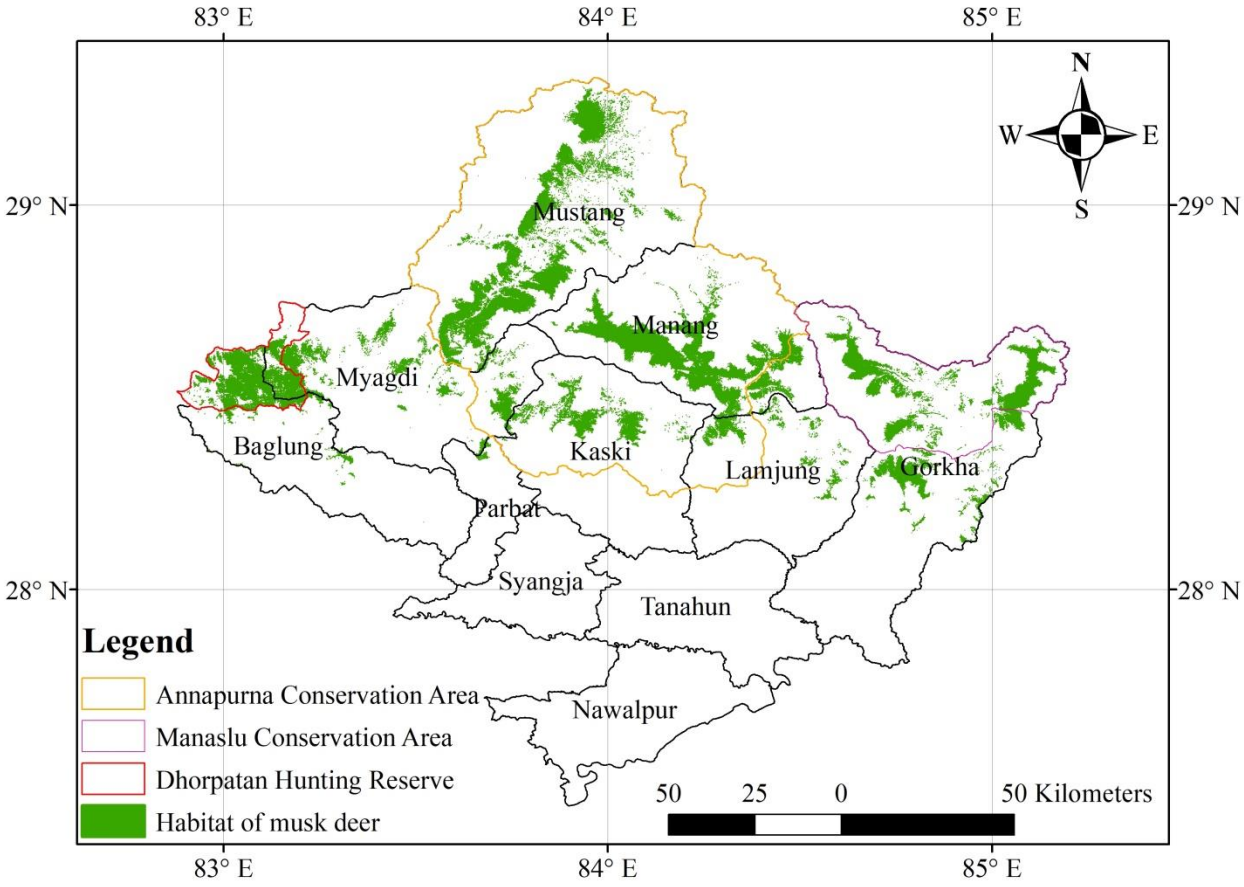


**Figure 6: Habitat of Musk deer**

## 3.4. Habitat of Snow leopard

Habitat of the snow leopard is identified by the help of MaxEnt software. AUC and TSS of the models are 0.941 and 0.788. The threshold 0.148 was used to calculate the TSS and to convert the probability habitat suitability map to a suitable/unsuitable binary map. A total of 2,164 km$^2$ area has beenidentified as a habitat of a snow leopard. The area inside the Dhorpatan Hunting Reserve, Annapurna Conservation Area and Manaslu Conservation area are identified as the suitable habitat forthis species (**Figure 7**).

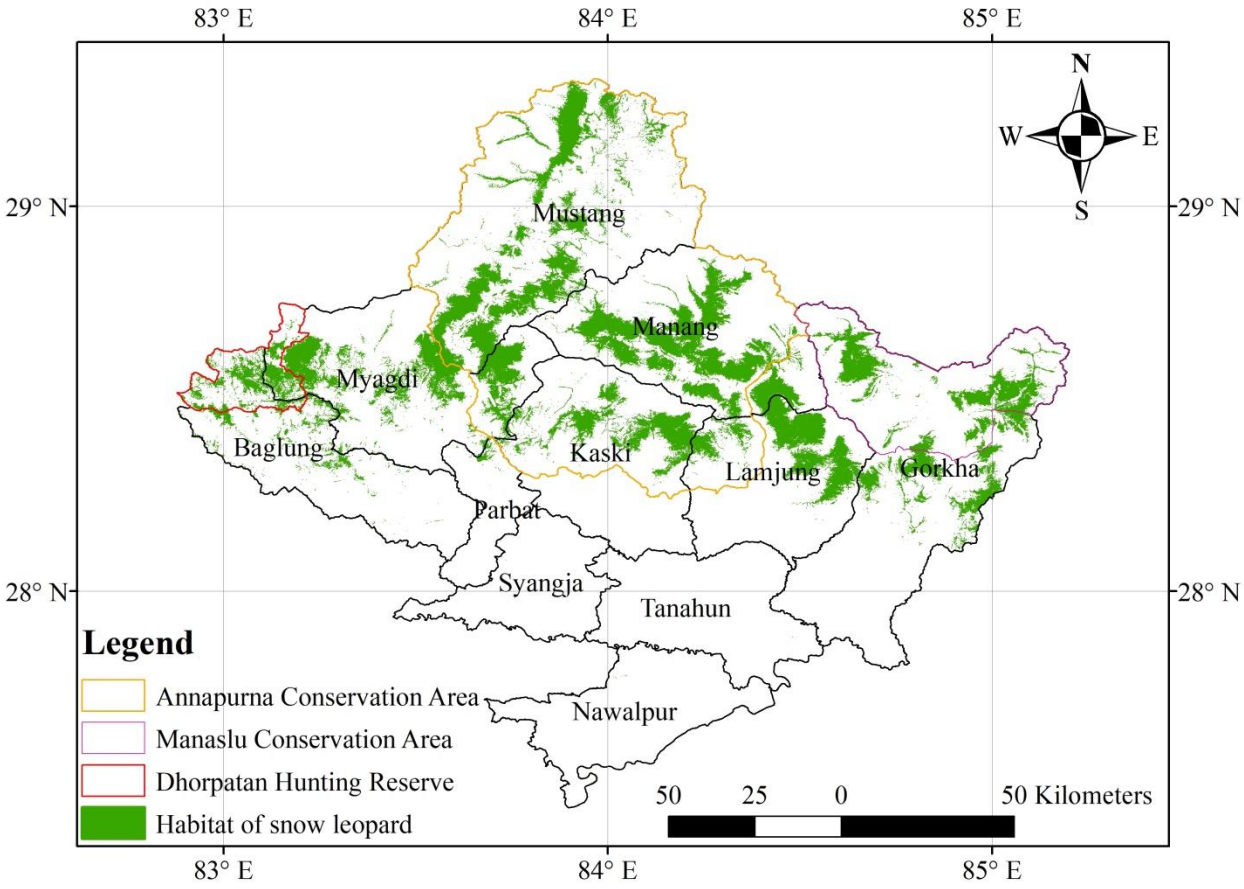


**Figure 7: Habitat of Snow leopard**

## 3.5. Habitat of medicinal plants

Habitat of medicinal plants is identified by the help of MaxEnt software. Here occurrence points of Ban lasun (*A. wallichii*) Chiraito (*Sweteriachiraita*)GuchchiChyau (*Morchellaesculenta*), Kurilo (*Asparagus officinalis*), LauthSalla (*Taxusbaccta*), Nirmasi (*Delphinium denudatum*), Okhar (*Juglansregia*), Paakhanved (*Bergenia ciliate*), Panchaule (*Dactylorhizahatageria*), Satuwa (*Paris polyphylla*), Sungadhwal (*Valerianajatamansi*) and Timur (*Zanthoxylumpiperitum*)were used as presence points of medicinal plants during the modeling. AUC and TSS of the models are 0.891 and 0.737. The threshold 0.163 was used to calculate the TSS and to convert the probability habitat suitabilitymap to a suitable/unsuitable binary map. A total of 3,731km$^2$ area has beenidentified as a suitable habitat of a medicinal plant. The area inside the Dhorpatan Hunting Reserve, Annapurna Conservation Area and Manaslu Conservation area are identified as the suitable habitat of medicinal plants (**Figure 8**). *Syangja,*

*Tanahun*, *Nawalpur*and the lower part of *Parbat, Kaski*, *Lamjung* and *Gorkha*district are not a suitable area for the medicinal plants.

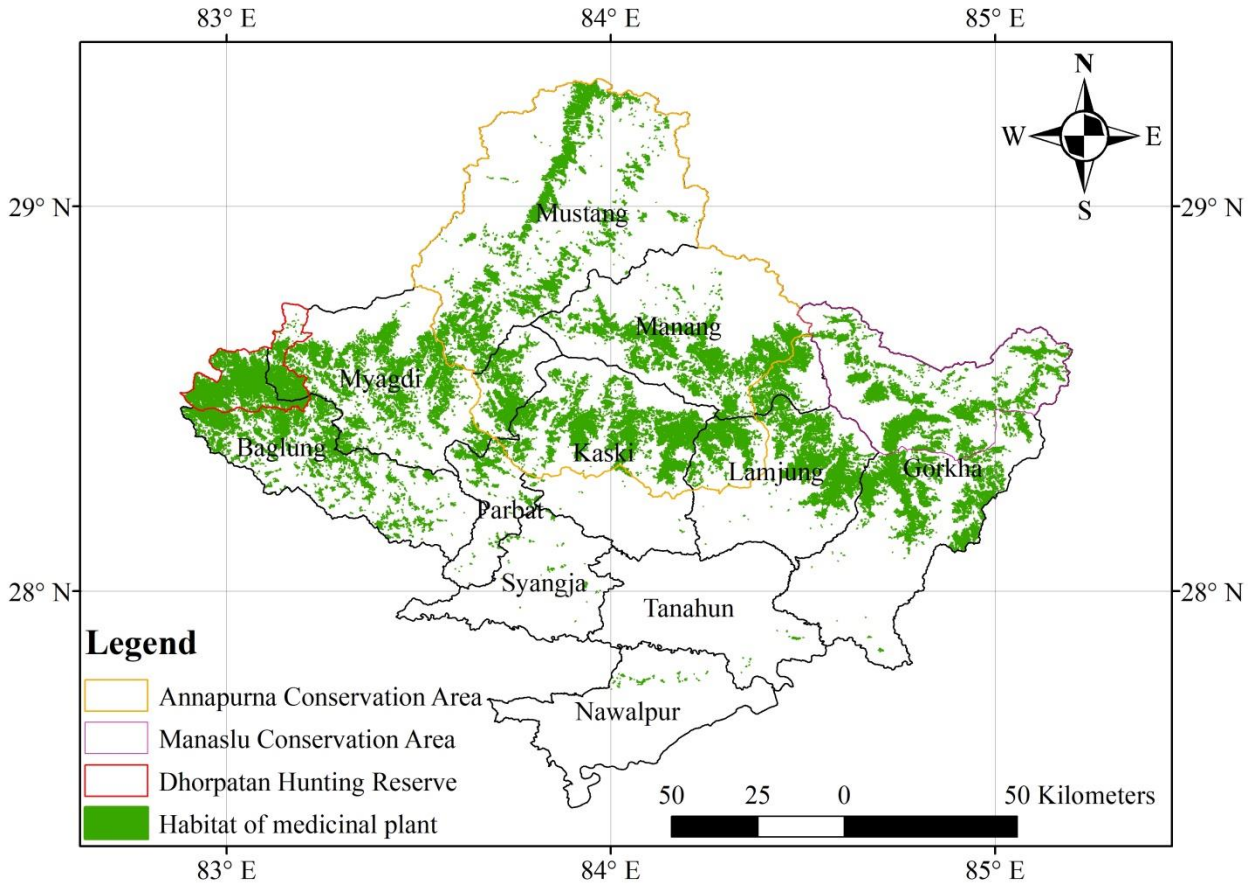


**Figure 8: Habitat of medicinal plants**

## 3.6. Vegetation rich area

Vegetation rich area wasidentified by the help of ArcGIS. In this study forest (Needle leaved close forest Needle leaved open forest, Broad-leaved close forest, and Broad-leaved open forest), shrubland and grasslands wereidentified as vegetation rich areas. The vegetation of agricultural land wasnot identified as a plant biodiversity-rich area because these areas can face human intervention to maximize production resulting in biodiversity loss. A total of 10,139 $km^2$ area has beenidentified as vegetation rich area in the Gandaki Province. The middle part is rich in vegetation in comparison to the upper and lower part of the province (**Figure 9**).

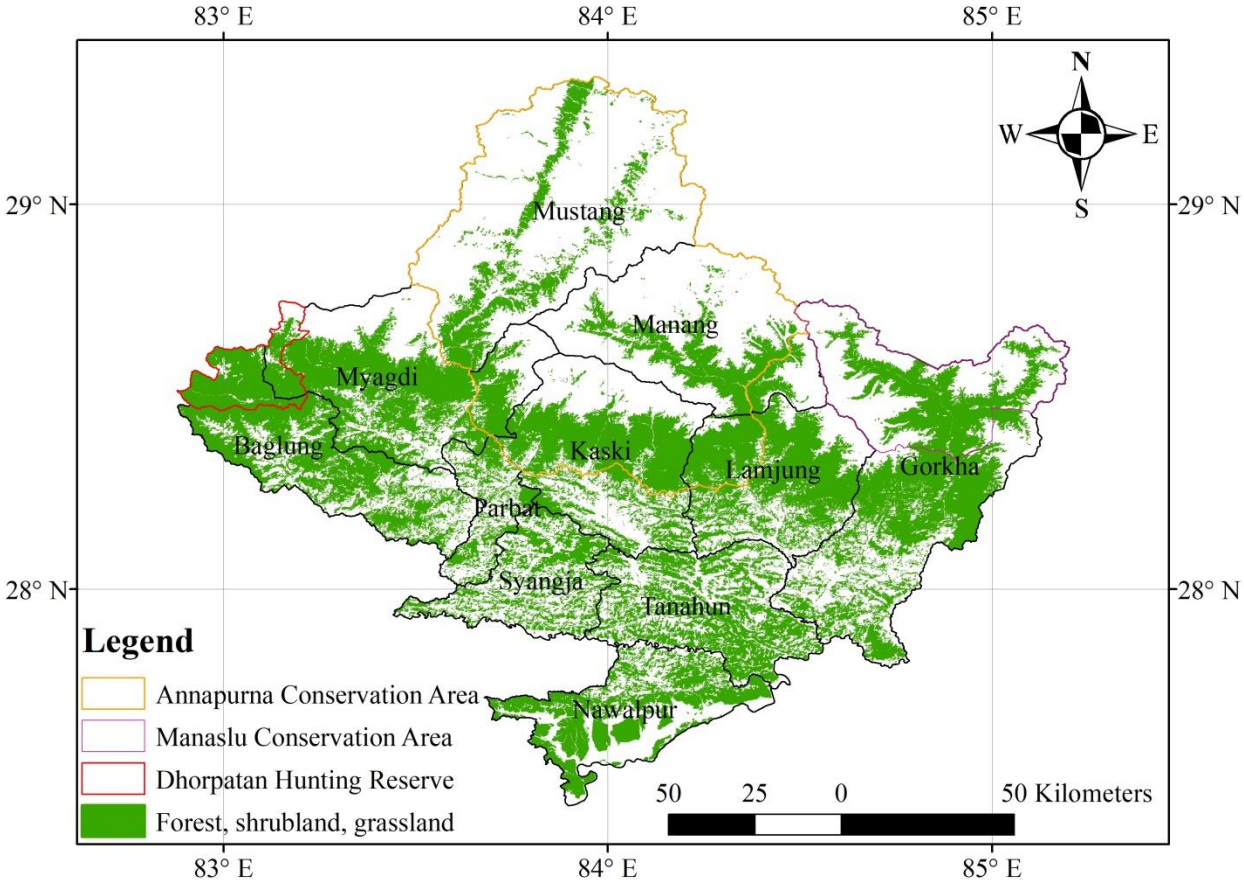


**Figure 9: Vegetation rich area**

## 3.7. Enhanced vegetation index rich area

EVI rich area wasidentified by the help of ArcGIS. The value range of the EVI is -1 to 1. In this study,the area has more than 0 EVI was defined as EVI rich area. EVI of Landsat 8 (2018-2019) was downloaded and mean EVI was calculated with the help of Google Earth Engine. A total of 19,779km$^2$ area has beenidentified as EVI rich area in the Gandaki Province (**Figure 10**).

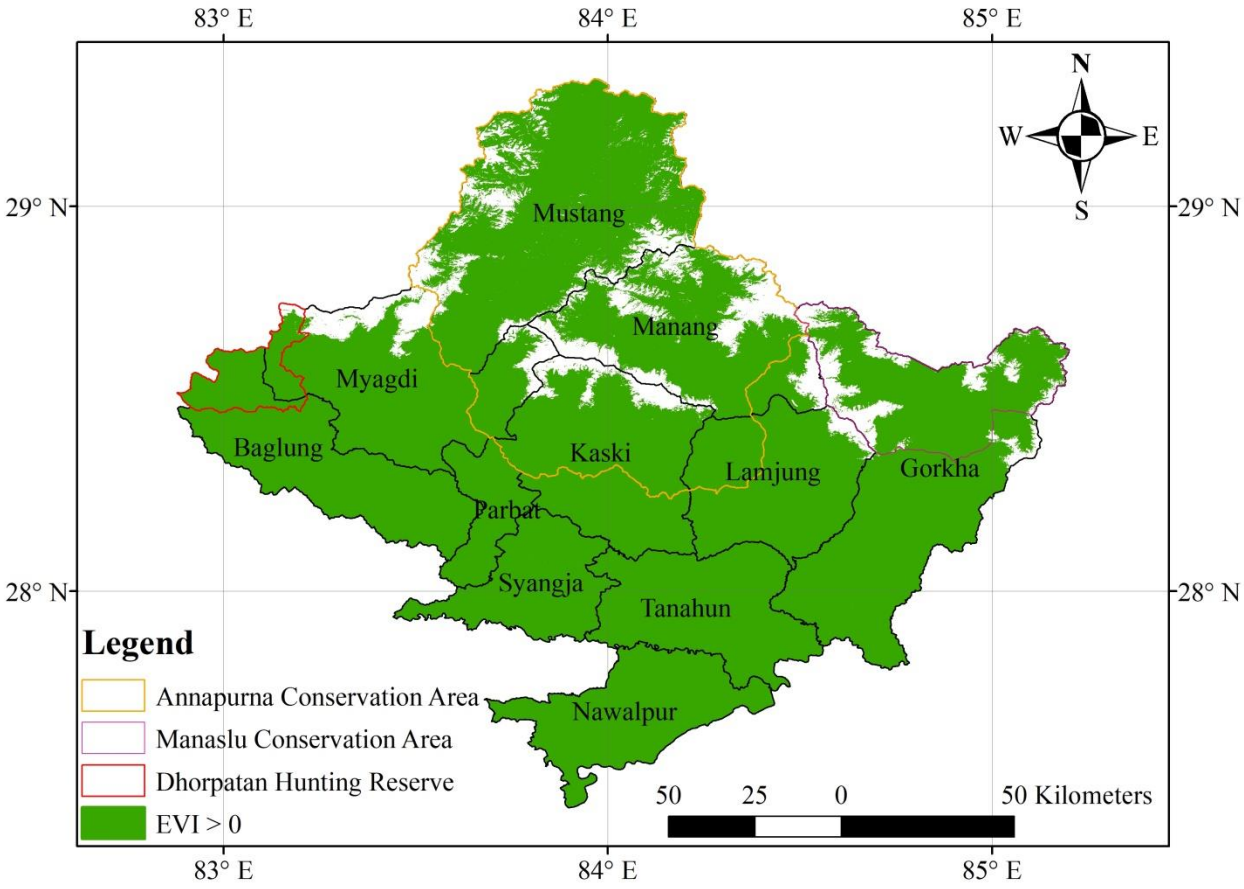


**Figure 10: EVI rich area**

## 3.8. Accuracy of the modeling

The accuracies of all models were found to be good (AUC > 0.8) which shows the robustness of the model accuracies (especially AUC) of habitat modeling of snow leopard and common leopards denote the excellent performance. The accuracies of the other models are showing a moderately useful performance. Accuracies of all models and all replicates are showing in **Table 2**.

Table 2: Accuracies of the modeling

**Asiatic black bear**

| Replicates | Threshold | AUC | TSS |
|---|---|---|---|
| 0 | 0.110 | 0.833 | 0.627 |
| 1 | 0.260 | 0.843 | 0.624 |
| 2 | 0.120 | 0.824 | 0.642 |

| | | | |
|---|---|---|---|
| 3 | 0.200 | 0.868 | 0.682 |
| 4 | 0.140 | 0.768 | 0.447 |
| 5 | 0.430 | 0.891 | 0.672 |
| 6 | 0.110 | 0.878 | 0.663 |
| 7 | 0.200 | 0.796 | 0.512 |
| 8 | 0.100 | 0.839 | 0.632 |
| 9 | 0.280 | 0.855 | 0.672 |
| Average | 0.195 | 0.840 | 0.617 |
| Std | 0.105 | 0.037 | 0.077 |

**Common leopard**

| Replicates | Threshold | AUC | TSS |
|---|---|---|---|
| 0 | 0.380 | 0.897 | 0.702 |
| 1 | 0.240 | 0.870 | 0.610 |
| 2 | 0.240 | 0.855 | 0.586 |
| 3 | 0.270 | 0.883 | 0.642 |
| 4 | 0.190 | 0.854 | 0.592 |
| 5 | 0.140 | 0.854 | 0.575 |
| 6 | 0.280 | 0.879 | 0.624 |
| 7 | 0.190 | 0.867 | 0.605 |
| 8 | 0.210 | 0.895 | 0.688 |
| 9 | 0.130 | 0.859 | 0.638 |
| Average | 0.227 | 0.871 | 0.626 |
| Std | 0.073 | 0.017 | 0.042 |

**Musk deer**

| Replicates | Threshold | AUC | TSS |
|---|---|---|---|
| 0 | 0.040 | 0.970 | 0.880 |
| 1 | 0.150 | 0.976 | 0.904 |
| 2 | 0.100 | 0.959 | 0.854 |
| 3 | 0.220 | 0.979 | 0.944 |
| 4 | 0.140 | 0.966 | 0.866 |

| | | | |
|---|---|---|---|
| 5 | 0.070 | 0.977 | 0.914 |
| 6 | 0.150 | 0.970 | 0.930 |
| 7 | 0.210 | 0.971 | 0.902 |
| 8 | 0.110 | 0.978 | 0.933 |
| 9 | 0.100 | 0.960 | 0.872 |
| Average | 0.129 | 0.971 | 0.900 |
| Std | 0.057 | 0.007 | 0.031 |

**Snow leopard**

| Replicates | Threshold | AUC | TSS |
|---|---|---|---|
| 0 | 0.230 | 0.955 | 0.859 |
| 1 | 0.240 | 0.951 | 0.824 |
| 2 | 0.140 | 0.944 | 0.806 |
| 3 | 0.140 | 0.931 | 0.753 |
| 4 | 0.200 | 0.934 | 0.774 |
| 5 | 0.080 | 0.952 | 0.803 |
| 6 | 0.130 | 0.960 | 0.814 |
| 7 | 0.050 | 0.930 | 0.718 |
| 8 | 0.110 | 0.911 | 0.719 |
| 9 | 0.160 | 0.942 | 0.807 |
| Average | 0.148 | 0.941 | 0.788 |
| Std | 0.062 | 0.015 | 0.046 |

**Medicinal plants**

| Replicates | Threshold | AUC | TSS |
|---|---|---|---|
| 0 | 0.100 | 0.855 | 0.785 |
| 1 | 0.040 | 0.826 | 0.622 |
| 2 | 0.380 | 0.919 | 0.768 |
| 3 | 0.060 | 0.870 | 0.691 |
| 4 | 0.110 | 0.881 | 0.733 |
| 5 | 0.080 | 0.873 | 0.731 |
| 6 | 0.060 | 0.894 | 0.642 |

| | | | |
|---|---|---|---|
| 7 | 0.190 | 0.939 | 0.829 |
| 8 | 0.090 | 0.866 | 0.619 |
| 9 | 0.520 | 0.982 | 0.953 |
| Average | 0.163 | 0.891 | 0.737 |
| Std | 0.160 | 0.045 | 0.104 |

## 3.9. Biodiversity hotspot of Gandaki Province

As defined in the methodology part the biodiversity hotspots were mapped with the help of ArcGIS software. Habitat of a Snow leopard or Common leopard and habitat of Asiatic black bear, Musk deer, medicinal plant and forest or shrubland or grassland with EVI more than 0 was identified as biodiversity hotspots. A total of 198 $km^2$ area was identified as a biodiversity hotspot in Gandaki Province. Most of the patches of the hotspot were inside the protected areas. Hotspots of the western part fall inside the Dhorpatan Hunting Reserve. All hotspot patches of Mustang and Kaski, as well as majority patches of *Myagdi*, *Manang* and *Lamjung* are inside the Annapurna Conservation Area. The majority of hotspot patches of Gorkha district are inside the Manaslu Conservation Area. Only some hotspot patches of *Baglung*, *Myagdi*, *Parbat*, *Lamjung*, *Manang* and *Gorkha* are located outside the protected areas (**Figure 11**). Regionally, mountain regions are rich in biodiversity hotspots due to moderate environmental variables. Distribution of endemic richness (i.e., number of endemic taxa) along was high at mid-elevations in Iran (Noroozi et al., 2018). Similar to that, this study identifies the biodiversity hotspot in the mountain region of the province.

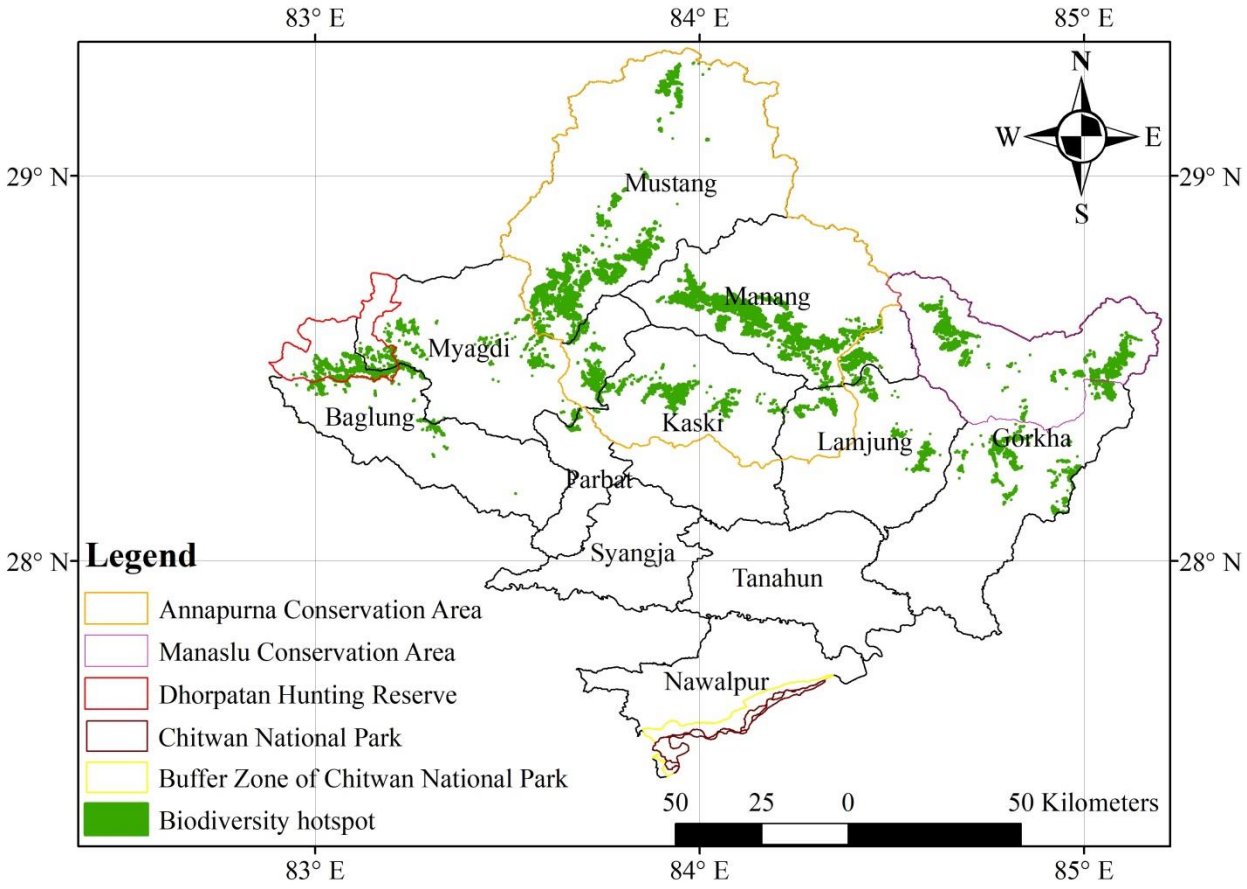


**Figure 11: Biodiversity hotspot in Gandaki Province**

Most of the biodiversity hotspots are in protected areas. Although part of Chitwan National Parks and its buffer zone is located inside the province, this doesn't have sufficient area for the biodiversity hotspot. The aim of the province is to manage the Nawalpur as production forest. So Nawalpur district is not mapped as biodiversity hotspot. Although it is not practical for modeling, we simple assume that are as biodiversity hotspot.

Table 3: Protected area wise biodiversity hotspot

| S.N. | Protected area | Area of Biodiversity hotspot ($km^2$) |
|---|---|---|
| 1 | Annapurna Consecration Area | 145 |
| 2 | Manaslu Conservation Area | 27 |
| 3 | Dhorpatah Hunting Reserve | 3 |

Manag district supports the large amount of the biodiversity hotspot. Patches of biodiversity hot spots located at local levels of Manang and Mustang districts. District wise distribution of biodiversity hotspots of and major species recorded in these areas are described in **Table 4**.

Table 4: District wise biodiversity hotspot

| **Hotspots (HS)** | **Area ($km^2$)** | **District** | **Municipality/Rural Municipality** | **Major Floral and Faunal species** |
|---|---|---|---|---|
| HS2 | 5 | Baglung | Dhorpatan Municipality | Flora: Medicinal plants, *Pinuswallichiana, Juniperusindica* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS3 | 37 | Gorkha | Chum Numri and Dharche Rural Municipality | Flora: Medicinal plants, *QuercusSemicarpifoliaJuniperusindica* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS4 | 12 | Kaski | Annapurna, Maadi and Machhapuchhre Rural Municipality | Flora: Medicinal plants, *QuercusSemicarpifolia Rhododendron spp.* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS5 | 4 | Lamjung | Myarshangdi Rural Municipality | Flora: Medicinal plants, *QuercusSemicarpifoliaJuniperusindica* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS6 | 75 | Manang | All local levels | Flora: Medicinal plants, *Belutautilis, Pinuswallichiana,Juniperusindica* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS7 | 54 | Mustang | All local levels | Flora: Medicinal plants, *QuercusSemicarpifoliaJuniperusindica* Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |

| | | | | |
|---|---|---|---|---|
| HS8 | 10 | Myagdi | Dhaulagiri and Raghuganga Rural Municipality | Flora: Medicinal plants, *QuercusSemicarpifoliaJuniperusindica*<br>Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| HS9 | 1 | Parbat | Modi Rural Municipality | Flora: Medicinal plants, DanpheBhoula<br>Fauna: *Ursusthibetanus, Panthers paradus, Moschuscryasogaster, Ailurusfulgens* |
| Total | 198 | | | |

# 4. CONCLUSIONS

Middle and High mountain region of the Gandaki Province is of high significance for harboring valuable biodiversity hotspots compared to other regions. Majority of the biodiversity hotspots

are found within the protected area. However, areas outside the protected areas are also equally important for conserving biodiversity since biodiversity hotspots are also present in this area. A total of 198 $km^2$ of hotspots stretched from *Gorkha* (Eastern part) to *Baglung* district (Western part) lies in 9 districts (except *Tanahun* and *Nawalpur*) of this Province. It shows that majority of the districts in this region are playing vital role in biodiversity conservation and acting as biodiversity reservoir. Identified biodiversity hotspots are sensitive area for flagship species, important medicinal plants and forest types; hence it needs proper concern on conserving these floral and faunal species to maintain ecosystem diversity and to increase ecosystem resilience.

# 5. RECOMMENDATIONS

This study has identified the habitats of threatened fauna, medicinal plants and biodiversity hotspots in the Gandaki Province. Based on the field visit, literature review and findings, this study provides the following recommendation for the effective conservation of the biodiversity of Gandaki Province.

- Till now, no any legislation has recognized the biodiversity hotspot. Therefore this study recommends creating a sound policy and legislative environment for conserving the identified habitats and biodiversity hotspots for the conservation of multiple species with limited resources.
- Although the government has limited resources, this study recommends to allocate more resources to the identified habitats and biodiversity hotspots as these areas are very important from the biodiversity point of view. By conserving these areas managers can conserve threatened species and their habitat.

- Human-wildlife conflict is a major problem of Nepal and Gandaki Province. After the identification of biodiversity hotspots, it is imperative to identify the human-wildlife conflict hotspot, factor affecting the human-wildlife conflict and mitigation measures of human-wildlife conflict.

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# APPENDICES

Data used for modeling

| S.N. | Species | X | Y |
|---|---|---|---|
| 1 | Asiatic black bear | 84.1000 | 28.2850 |
| 2 | Asiatic black bear | 84.6955 | 28.5467 |
| 3 | Asiatic black bear | 85.0221 | 28.4850 |
| 4 | Asiatic black bear | 84.8784 | 28.5560 |
| 5 | Asiatic black bear | 84.8206 | 28.5184 |
| 6 | Asiatic black bear | 84.7896 | 28.4820 |
| 7 | Asiatic black bear | 83.7347 | 28.1557 |
| 8 | Asiatic black bear | 83.6505 | 28.1109 |
| 9 | Asiatic black bear | 83.7059 | 28.3354 |
| 10 | Asiatic black bear | 83.6576 | 28.3228 |
| 11 | Asiatic black bear | 83.2433 | 28.5131 |
| 12 | Asiatic black bear | 84.1086 | 28.2644 |
| 13 | Asiatic black bear | 84.3573 | 28.5137 |
| 14 | Asiatic black bear | 84.1228 | 28.4259 |
| 15 | Asiatic black bear | 84.0742 | 28.3662 |
| 16 | Asiatic black bear | 84.1020 | 28.2878 |
| 17 | Asiatic black bear | 84.2087 | 28.3567 |
| 18 | Asiatic black bear | 84.1487 | 28.3107 |
| 19 | Asiatic black bear | 84.0958 | 28.3549 |
| 20 | Asiatic black bear | 83.6792 | 28.5180 |
| 21 | Asiatic black bear | 83.7031 | 28.4819 |
| 22 | Asiatic black bear | 83.7206 | 28.4643 |
| 23 | Asiatic black bear | 83.6782 | 28.4171 |
| 24 | Asiatic black bear | 83.8388 | 28.4389 |
| 25 | Asiatic black bear | 83.8129 | 28.4226 |
| 26 | Asiatic black bear | 83.8246 | 28.4176 |
| 27 | Asiatic black bear | 83.8321 | 28.3728 |
| 28 | Asiatic black bear | 83.7535 | 28.3541 |
| 29 | Asiatic black bear | 84.3824 | 28.5538 |
| 30 | Asiatic black bear | 84.3550 | 28.5179 |
| 31 | Asiatic black bear | 83.6595 | 28.6562 |
| 32 | Asiatic black bear | 83.6043 | 28.6973 |
| 33 | Asiatic black bear | 83.6365 | 28.6907 |
| 34 | Asiatic black bear | 83.6310 | 28.6174 |

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|---|---|---|---|
| 35 | Asiatic black bear | 83.9720 | 28.3919 |
| 36 | Asiatic black bear | 83.8896 | 28.4276 |
| 37 | Asiatic black bear | 83.9198 | 28.3606 |
| 38 | Asiatic black bear | 84.3423 | 28.2717 |
| 39 | Asiatic black bear | 84.3196 | 28.2992 |
| 40 | Asiatic black bear | 84.3127 | 28.4081 |
| 41 | Asiatic black bear | 84.3106 | 28.3407 |
| 42 | Asiatic black bear | 84.2943 | 28.2790 |
| 43 | Asiatic black bear | 84.2634 | 28.3263 |
| 44 | Asiatic black bear | 84.2058 | 28.2921 |
| 45 | Asiatic black bear | 84.2593 | 28.2525 |
| 46 | Asiatic black bear | 84.3635 | 28.3019 |
| 47 | Asiatic black bear | 84.3683 | 28.3680 |
| 48 | Asiatic black bear | 84.3660 | 28.3325 |
| 49 | Asiatic black bear | 84.1428 | 28.2610 |
| 50 | Asiatic black bear | 83.5975 | 28.6209 |
| 51 | Asiatic black bear | 83.6294 | 28.6444 |
| 52 | Asiatic black bear | 84.1086 | 28.2644 |
| 53 | Common leopard | 84.0260 | 27.9224 |
| 54 | Common leopard | 84.0600 | 27.8481 |
| 55 | Common leopard | 84.0823 | 28.2017 |
| 56 | Common leopard | 83.7965 | 28.2292 |
| 57 | Common leopard | 83.7908 | 28.2306 |
| 58 | Common leopard | 83.7931 | 28.2283 |
| 59 | Common leopard | 83.7932 | 28.2260 |
| 60 | Common leopard | 83.7959 | 28.2221 |
| 61 | Common leopard | 84.3484 | 28.2415 |
| 62 | Common leopard | 84.5220 | 28.1095 |
| 63 | Common leopard | 84.5184 | 28.1141 |
| 64 | Common leopard | 84.3130 | 28.2629 |
| 65 | Common leopard | 83.8037 | 28.2218 |
| 66 | Common leopard | 83.8002 | 28.2271 |
| 67 | Common leopard | 83.7965 | 28.2292 |
| 68 | Common leopard | 84.1797 | 27.7673 |
| 69 | Common leopard | 83.8523 | 28.1420 |
| 70 | Common leopard | 83.8347 | 28.1508 |
| 71 | Common leopard | 83.8376 | 28.1555 |
| 72 | Common leopard | 83.8383 | 28.1580 |
| 73 | Common leopard | 83.8376 | 28.1610 |

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|---|---|---|---|
| 74 | Common leopard | 83.8312 | 28.1810 |
| 75 | Common leopard | 83.8297 | 28.1880 |
| 76 | Common leopard | 83.8064 | 28.1895 |
| 77 | Common leopard | 83.7763 | 28.1894 |
| 78 | Common leopard | 83.7767 | 28.1935 |
| 79 | Common leopard | 83.7721 | 28.1860 |
| 80 | Common leopard | 83.7781 | 28.1751 |
| 81 | Common leopard | 83.8050 | 28.1765 |
| 82 | Common leopard | 83.8038 | 28.1744 |
| 83 | Common leopard | 83.8438 | 28.1755 |
| 84 | Common leopard | 83.8444 | 28.1705 |
| 85 | Common leopard | 83.8382 | 28.1723 |
| 86 | Common leopard | 83.8971 | 28.1745 |
| 87 | Common leopard | 83.8978 | 28.1747 |
| 88 | Common leopard | 83.8002 | 28.1623 |
| 89 | Common leopard | 83.8003 | 28.1624 |
| 90 | Common leopard | 83.7943 | 28.1983 |
| 91 | Common leopard | 83.7936 | 28.1980 |
| 92 | Common leopard | 83.7988 | 28.2058 |
| 93 | Common leopard | 83.8289 | 28.1597 |
| 94 | Common leopard | 83.8819 | 28.1824 |
| 95 | Common leopard | 83.8790 | 28.1805 |
| 96 | Common leopard | 83.7873 | 28.1975 |
| 97 | Common leopard | 83.7862 | 28.1990 |
| 98 | Common leopard | 83.8689 | 28.1750 |
| 99 | Common leopard | 83.8666 | 28.1749 |
| 100 | Common leopard | 83.7767 | 28.1701 |
| 101 | Common leopard | 83.7724 | 28.1723 |
| 102 | Common leopard | 83.7685 | 28.1681 |
| 103 | Common leopard | 83.7673 | 28.1665 |
| 104 | Common leopard | 83.7668 | 28.1663 |
| 105 | Common leopard | 83.7740 | 28.1657 |
| 106 | Common leopard | 83.7735 | 28.1670 |
| 107 | Common leopard | 83.7818 | 28.1645 |
| 108 | Common leopard | 83.7954 | 28.1621 |
| 109 | Common leopard | 83.7947 | 28.1599 |
| 110 | Common leopard | 83.4487 | 2.8898 |
| 111 | Common leopard | 83.7781 | 28.1751 |
| 112 | Common leopard | 83.7772 | 28.1757 |

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|---|---|---|---|
| 113 | Common leopard | 83.7775 | 28.1772 |
| 114 | Common leopard | 83.7701 | 28.1786 |
| 115 | Common leopard | 83.7694 | 28.1827 |
| 116 | Common leopard | 83.7706 | 28.1833 |
| 117 | Common leopard | 83.7678 | 28.1820 |
| 118 | Common leopard | 83.7721 | 28.1860 |
| 119 | Common leopard | 83.7824 | 28.1916 |
| 120 | Common leopard | 83.7849 | 28.1812 |
| 121 | Common leopard | 83.8443 | 28.1326 |
| 122 | Common leopard | 83.8440 | 28.1317 |
| 123 | Common leopard | 83.8480 | 28.1285 |
| 124 | Common leopard | 83.8408 | 28.1293 |
| 125 | Common leopard | 83.8386 | 28.1328 |
| 126 | Common leopard | 83.8254 | 28.1348 |
| 127 | Common leopard | 83.8246 | 28.1355 |
| 128 | Common leopard | 83.8277 | 28.1362 |
| 129 | Common leopard | 83.7926 | 28.1775 |
| 130 | Common leopard | 83.7926 | 28.1775 |
| 131 | Common leopard | 83.8006 | 28.2660 |
| 132 | Common leopard | 83.8026 | 28.1740 |
| 133 | Common leopard | 83.8052 | 28.1732 |
| 134 | Common leopard | 83.8062 | 28.1733 |
| 135 | Common leopard | 83.8603 | 28.1545 |
| 136 | Common leopard | 83.8523 | 28.1573 |
| 137 | Common leopard | 83.8459 | 28.1610 |
| 138 | Common leopard | 83.8106 | 28.1739 |
| 139 | Common leopard | 83.8104 | 28.1701 |
| 140 | Common leopard | 83.8115 | 28.1662 |
| 141 | Common leopard | 83.8169 | 28.1582 |
| 142 | Common leopard | 83.8170 | 28.1570 |
| 143 | Common leopard | 83.8175 | 28.1566 |
| 144 | Common leopard | 83.8186 | 28.1593 |
| 145 | Common leopard | 83.8298 | 28.1583 |
| 146 | Common leopard | 83.8302 | 28.1583 |
| 147 | Common leopard | 83.8307 | 28.1591 |
| 148 | Common leopard | 83.8352 | 28.1497 |
| 149 | Common leopard | 83.8291 | 28.1889 |
| 150 | Common leopard | 83.8295 | 28.1900 |
| 151 | Common leopard | 83.8292 | 28.1869 |

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|---|---|---|---|
| 152 | Common leopard | 83.8262 | 28.1801 |
| 153 | Common leopard | 83.8243 | 28.1823 |
| 154 | Common leopard | 83.8236 | 28.1843 |
| 155 | Common leopard | 83.8194 | 28.1861 |
| 156 | Common leopard | 83.8019 | 28.1906 |
| 157 | Common leopard | 83.8016 | 28.1903 |
| 158 | Common leopard | 83.8014 | 28.1905 |
| 159 | Common leopard | 83.8011 | 28.1908 |
| 160 | Common leopard | 83.8008 | 28.1909 |
| 161 | Common leopard | 83.7985 | 28.1923 |
| 162 | Common leopard | 83.7988 | 28.1926 |
| 163 | Common leopard | 83.8061 | 28.2011 |
| 164 | Common leopard | 83.7999 | 28.1998 |
| 165 | Common leopard | 83.7988 | 28.1980 |
| 166 | Common leopard | 83.8002 | 28.1862 |
| 167 | Common leopard | 83.7990 | 28.1847 |
| 168 | Common leopard | 83.8000 | 28.1820 |
| 169 | Common leopard | 83.7944 | 28.1925 |
| 170 | Common leopard | 83.7944 | 28.1929 |
| 171 | Common leopard | 83.7940 | 28.1920 |
| 172 | Common leopard | 83.7896 | 28.1973 |
| 173 | Common leopard | 83.7784 | 28.1951 |
| 174 | Common leopard | 83.7877 | 28.1959 |
| 175 | Common leopard | 83.7858 | 28.1867 |
| 176 | Common leopard | 83.7872 | 28.1819 |
| 177 | Common leopard | 83.8836 | 28.1609 |
| 178 | Common leopard | 83.8817 | 28.1524 |
| 179 | Common leopard | 83.1567 | 28.3401 |
| 180 | Common leopard | 82.9870 | 28.4151 |
| 181 | Common leopard | 83.6223 | 28.1799 |
| 182 | Common leopard | 83.6110 | 28.1849 |
| 183 | Common leopard | 83.3651 | 28.5269 |
| 184 | Common leopard | 83.8567 | 28.4567 |
| 185 | Common leopard | 84.5001 | 28.0571 |
| 186 | Common leopard | 84.4427 | 28.5260 |
| 187 | Common leopard | 84.4612 | 28.5219 |
| 188 | Common leopard | 84.4586 | 28.5230 |
| 189 | Common leopard | 84.4107 | 28.5724 |
| 190 | Common leopard | 84.4108 | 28.5730 |

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|---|---|---|---|
| 191 | Common leopard | 84.4741 | 28.6656 |
| 192 | Common leopard | 84.6600 | 28.1395 |
| 193 | Common leopard | 84.5489 | 27.9902 |
| 194 | Common leopard | 84.6277 | 28.0346 |
| 195 | Common leopard | 84.7170 | 28.0794 |
| 196 | Common leopard | 84.6332 | 28.1347 |
| 197 | Common leopard | 83.7326 | 28.1540 |
| 198 | Common leopard | 83.6581 | 28.1596 |
| 199 | Common leopard | 83.6492 | 28.1054 |
| 200 | Common leopard | 83.5936 | 28.0310 |
| 201 | Common leopard | 83.6678 | 28.2328 |
| 202 | Common leopard | 83.7022 | 28.2999 |
| 203 | Common leopard | 83.6945 | 28.3255 |
| 204 | Common leopard | 83.6070 | 28.3850 |
| 205 | Common leopard | 83.7287 | 28.7821 |
| 206 | Common leopard | 84.0750 | 28.3350 |
| 207 | Common leopard | 84.0700 | 28.3100 |
| 208 | Common leopard | 84.1940 | 28.2530 |
| 209 | Common leopard | 83.6434 | 28.6090 |
| 210 | Common leopard | 83.6445 | 28.6100 |
| 211 | Common leopard | 83.6417 | 28.6085 |
| 212 | Common leopard | 83.6455 | 28.6098 |
| 213 | Common leopard | 83.6454 | 28.6087 |
| 214 | Common leopard | 83.6454 | 28.6101 |
| 215 | Common leopard | 83.6454 | 28.6102 |
| 216 | Common leopard | 84.2570 | 27.6629 |
| 217 | Common leopard | 84.0529 | 28.1124 |
| 218 | Common leopard | 83.9526 | 28.2047 |
| 219 | Common leopard | 83.9526 | 28.3852 |
| 220 | Common leopard | 84.0546 | 28.2949 |
| 221 | Common leopard | 83.8679 | 28.3794 |
| 222 | Common leopard | 83.8491 | 28.2223 |
| 223 | Common leopard | 84.1561 | 28.0241 |
| 224 | Common leopard | 84.0544 | 27.9339 |
| 225 | Common leopard | 84.1502 | 27.9390 |
| 226 | Common leopard | 84.4609 | 27.9332 |
| 227 | Common leopard | 84.3596 | 28.0237 |
| 228 | Common leopard | 84.5644 | 28.2938 |
| 229 | Common leopard | 84.5639 | 28.2035 |

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|---|---|---|---|
| 230 | Common leopard | 84.1485 | 28.6405 |
| 231 | Musk deer | 84.1023 | 28.6503 |
| 232 | Musk deer | 84.1031 | 28.6506 |
| 233 | Musk deer | 84.1051 | 28.6523 |
| 234 | Musk deer | 84.1065 | 28.6533 |
| 235 | Musk deer | 84.1084 | 28.6537 |
| 236 | Musk deer | 84.1088 | 28.6544 |
| 237 | Musk deer | 84.1065 | 28.6562 |
| 238 | Musk deer | 84.1061 | 28.6566 |
| 239 | Musk deer | 84.1054 | 28.6559 |
| 240 | Musk deer | 84.1046 | 28.6531 |
| 241 | Musk deer | 84.1037 | 28.6518 |
| 242 | Musk deer | 84.1052 | 28.6468 |
| 243 | Musk deer | 84.1051 | 28.6449 |
| 244 | Musk deer | 84.1056 | 28.6443 |
| 245 | Musk deer | 84.1073 | 28.6448 |
| 246 | Musk deer | 84.1098 | 28.6428 |
| 247 | Musk deer | 84.1115 | 28.6417 |
| 248 | Musk deer | 84.1119 | 28.6419 |
| 249 | Musk deer | 84.1127 | 28.6422 |
| 250 | Musk deer | 84.1162 | 28.6413 |
| 251 | Musk deer | 84.1170 | 28.6434 |
| 252 | Musk deer | 84.1181 | 28.6424 |
| 253 | Musk deer | 84.1199 | 28.6426 |
| 254 | Musk deer | 84.1221 | 28.6441 |
| 255 | Musk deer | 84.1229 | 28.6420 |
| 256 | Musk deer | 84.1260 | 28.6424 |
| 257 | Musk deer | 84.1315 | 28.6450 |
| 258 | Musk deer | 84.1375 | 28.6437 |
| 259 | Musk deer | 84.1367 | 28.6457 |
| 260 | Musk deer | 84.1389 | 28.6471 |
| 261 | Musk deer | 84.1395 | 28.6465 |
| 262 | Musk deer | 84.1398 | 28.6468 |
| 263 | Musk deer | 84.1404 | 28.6466 |
| 264 | Musk deer | 84.1403 | 28.6471 |
| 265 | Musk deer | 84.1403 | 28.6474 |
| 266 | Musk deer | 84.1402 | 28.6479 |
| 267 | Musk deer | 84.1402 | 28.6481 |
| 268 | Musk deer | 84.1405 | 28.6482 |

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|---|---|---|---|
| 269 | Musk deer | 84.1408 | 28.6483 |
| 270 | Musk deer | 84.1405 | 28.6485 |
| 271 | Musk deer | 84.1402 | 28.6488 |
| 272 | Musk deer | 84.1380 | 28.6389 |
| 273 | Musk deer | 84.1372 | 28.6387 |
| 274 | Musk deer | 84.1376 | 28.6378 |
| 275 | Musk deer | 84.1454 | 28.6366 |
| 276 | Musk deer | 84.1368 | 28.6358 |
| 277 | Musk deer | 84.1360 | 28.6345 |
| 278 | Musk deer | 84.1361 | 28.6312 |
| 279 | Musk deer | 84.1377 | 28.6273 |
| 280 | Musk deer | 84.1402 | 28.6256 |
| 281 | Musk deer | 84.1423 | 28.6230 |
| 282 | Musk deer | 84.1461 | 28.6216 |
| 283 | Musk deer | 84.1486 | 28.6192 |
| 284 | Musk deer | 84.4716 | 28.6110 |
| 285 | Musk deer | 84.4729 | 28.6105 |
| 286 | Musk deer | 84.4725 | 28.6117 |
| 287 | Musk deer | 84.4725 | 28.6139 |
| 288 | Musk deer | 84.4727 | 28.6147 |
| 289 | Musk deer | 84.4704 | 28.6155 |
| 290 | Musk deer | 84.4729 | 28.6168 |
| 291 | Musk deer | 84.4737 | 28.6181 |
| 292 | Musk deer | 84.4649 | 28.6212 |
| 293 | Musk deer | 84.4734 | 28.6244 |
| 294 | Musk deer | 84.4685 | 28.6483 |
| 295 | Musk deer | 84.4678 | 28.6504 |
| 296 | Musk deer | 84.4672 | 28.6512 |
| 297 | Musk deer | 84.4667 | 28.6524 |
| 298 | Musk deer | 84.4669 | 28.6551 |
| 299 | Musk deer | 84.4677 | 28.6559 |
| 300 | Musk deer | 84.4726 | 28.6261 |
| 301 | Musk deer | 84.4701 | 28.6234 |
| 302 | Musk deer | 84.4705 | 28.6222 |
| 303 | Musk deer | 84.4702 | 28.6205 |
| 304 | Musk deer | 84.1432 | 28.6028 |
| 305 | Musk deer | 84.1422 | 28.6030 |
| 306 | Musk deer | 84.1415 | 28.6024 |
| 307 | Musk deer | 84.1406 | 28.6024 |

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| 308 | Musk deer | 84.1397 | 28.6024 |
| 309 | Musk deer | 84.1432 | 28.6025 |
| 310 | Musk deer | 84.1412 | 28.6024 |
| 311 | Musk deer | 84.1403 | 28.6024 |
| 312 | Musk deer | 84.1393 | 28.6024 |
| 313 | Musk deer | 84.1777 | 28.5956 |
| 314 | Musk deer | 84.1851 | 28.5954 |
| 315 | Musk deer | 84.1850 | 28.5963 |
| 316 | Musk deer | 84.1841 | 28.5967 |
| 317 | Musk deer | 84.1858 | 28.5987 |
| 318 | Musk deer | 84.1852 | 28.5994 |
| 319 | Musk deer | 84.1034 | 28.6226 |
| 320 | Musk deer | 84.1037 | 28.6238 |
| 321 | Musk deer | 84.1008 | 28.6243 |
| 322 | Musk deer | 84.0999 | 28.6243 |
| 323 | Musk deer | 84.0998 | 28.6243 |
| 324 | Musk deer | 84.0978 | 28.6251 |
| 325 | Musk deer | 84.0981 | 28.6301 |
| 326 | Musk deer | 84.0953 | 28.6299 |
| 327 | Musk deer | 84.1501 | 28.6384 |
| 328 | Musk deer | 84.1496 | 28.6377 |
| 329 | Musk deer | 84.1491 | 28.6362 |
| 330 | Musk deer | 84.1436 | 28.6336 |
| 331 | Musk deer | 84.1437 | 28.6341 |
| 332 | Musk deer | 84.1446 | 28.6346 |
| 333 | Musk deer | 89.9916 | 28.6799 |
| 334 | Musk deer | 89.9912 | 28.6802 |
| 335 | Musk deer | 89.9932 | 28.6798 |
| 336 | Musk deer | 84.3527 | 28.5695 |
| 337 | Musk deer | 84.3515 | 28.5687 |
| 338 | Musk deer | 83.1890 | 28.5601 |
| 339 | Musk deer | 83.1848 | 28.5602 |
| 340 | Musk deer | 83.1839 | 28.5579 |
| 341 | Musk deer | 83.1853 | 28.5574 |
| 342 | Musk deer | 83.1864 | 28.5570 |
| 343 | Musk deer | 83.1875 | 28.5563 |
| 344 | Musk deer | 83.1899 | 28.5556 |
| 345 | Musk deer | 83.1900 | 28.5555 |
| 346 | Musk deer | 83.1898 | 28.5554 |

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| 347 | Musk deer | 83.1901 | 28.5559 |
| 348 | Musk deer | 83.1905 | 28.5559 |
| 349 | Musk deer | 83.1834 | 28.5579 |
| 350 | Musk deer | 83.1913 | 28.5544 |
| 351 | Musk deer | 83.2041 | 28.5531 |
| 352 | Musk deer | 83.2060 | 28.5523 |
| 353 | Musk deer | 83.2061 | 28.5523 |
| 354 | Musk deer | 83.2068 | 28.5519 |
| 355 | Musk deer | 82.9375 | 28.5349 |
| 356 | Musk deer | 82.9350 | 28.5459 |
| 357 | Musk deer | 82.9345 | 28.5495 |
| 358 | Musk deer | 82.9351 | 28.5490 |
| 359 | Musk deer | 82.9351 | 28.5490 |
| 360 | Musk deer | 82.9362 | 28.5485 |
| 361 | Musk deer | 82.9362 | 28.5469 |
| 362 | Musk deer | 82.9358 | 28.5462 |
| 363 | Musk deer | 82.9362 | 28.5476 |
| 364 | Musk deer | 83.9922 | 28.6641 |
| 365 | Musk deer | 84.0528 | 28.6397 |
| 366 | Musk deer | 84.0004 | 28.6639 |
| 367 | Musk deer | 84.0532 | 28.6411 |
| 368 | Musk deer | 83.9811 | 28.6613 |
| 369 | Musk deer | 83.9394 | 28.6698 |
| 370 | Musk deer | 83.9356 | 28.6742 |
| 371 | Musk deer | 83.0552 | 28.6003 |
| 372 | Musk deer | 83.0429 | 28.5925 |
| 373 | Musk deer | 83.0438 | 28.5920 |
| 374 | Musk deer | 83.8033 | 28.7909 |
| 375 | Musk deer | 84.8116 | 28.5097 |
| 376 | Musk deer | 84.6735 | 28.5700 |
| 377 | Musk deer | 85.2422 | 28.6419 |
| 378 | Musk deer | 85.2303 | 28.6456 |
| 379 | Musk deer | 85.2303 | 28.6456 |
| 380 | Musk deer | 85.3192 | 28.7342 |
| 381 | Musk deer | 83.7870 | 28.9626 |
| 382 | Musk deer | 84.1570 | 28.6017 |
| 383 | Musk deer | 84.1435 | 28.6072 |
| 384 | Musk deer | 84.1466 | 28.6352 |
| 385 | Musk deer | 84.1012 | 28.6242 |

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| 386 | Musk deer | 84.0548 | 28.6400 |
| 387 | Musk deer | 84.0326 | 28.6412 |
| 388 | Musk deer | 83.8623 | 28.4642 |
| 389 | Musk deer | 83.9733 | 28.6633 |
| 390 | Musk deer | 83.9582 | 28.6678 |
| 391 | Musk deer | 84.2114 | 28.5505 |
| 392 | Musk deer | 84.1785 | 28.5720 |
| 393 | Musk deer | 84.2423 | 28.5438 |
| 394 | Musk deer | 84.1762 | 28.5963 |
| 395 | Musk deer | 83.8033 | 28.7908 |
| 396 | Musk deer | 83.8133 | 28.7818 |
| 397 | Musk deer | 83.7840 | 28.7851 |
| 398 | Musk deer | 83.7664 | 28.7767 |
| 399 | Snow leopard | 83.9801 | 28.7731 |
| 400 | Snow leopard | 83.9397 | 28.7389 |
| 401 | Snow leopard | 83.9778 | 28.7332 |
| 402 | Snow leopard | 83.9842 | 28.7443 |
| 403 | Snow leopard | 83.9924 | 28.7074 |
| 404 | Snow leopard | 83.9849 | 28.6801 |
| 405 | Snow leopard | 84.0131 | 28.6456 |
| 406 | Snow leopard | 84.0327 | 28.6832 |
| 407 | Snow leopard | 84.0326 | 28.6819 |
| 408 | Snow leopard | 83.9699 | 28.6872 |
| 409 | Snow leopard | 83.8432 | 28.7086 |
| 410 | Snow leopard | 84.1493 | 28.6508 |
| 411 | Snow leopard | 84.2650 | 28.7234 |
| 412 | Snow leopard | 84.2754 | 28.7772 |
| 413 | Snow leopard | 84.2518 | 28.7791 |
| 414 | Snow leopard | 84.2662 | 28.7656 |
| 415 | Snow leopard | 84.2587 | 28.7533 |
| 416 | Snow leopard | 83.7963 | 28.7673 |
| 417 | Snow leopard | 83.8536 | 28.7924 |
| 418 | Snow leopard | 83.8713 | 28.8570 |
| 419 | Snow leopard | 83.6705 | 28.8359 |
| 420 | Snow leopard | 83.9110 | 28.9024 |
| 421 | Snow leopard | 83.9008 | 29.2843 |
| 422 | Snow leopard | 81.9358 | 29.1859 |
| 423 | Snow leopard | 82.9358 | 29.1859 |
| 424 | Snow leopard | 82.9431 | 29.1938 |

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| 425 | Snow leopard | 29.1859 | 29.1859 |
| 426 | Snow leopard | 82.9431 | 29.1937 |
| 427 | Snow leopard | 82.9421 | 29.1931 |
| 428 | Snow leopard | 82.9430 | 29.1933 |
| 429 | Snow leopard | 82.9431 | 29.1938 |
| 430 | Snow leopard | 82.8643 | 29.1495 |
| 431 | Snow leopard | 82.8224 | 29.1439 |
| 432 | Snow leopard | 82.2090 | 29.1447 |
| 433 | Snow leopard | 82.8338 | 29.1420 |
| 434 | Snow leopard | 82.8251 | 29.1439 |
| 435 | Snow leopard | 82.8215 | 29.1439 |
| 436 | Snow leopard | 82.8206 | 29.1430 |
| 437 | Snow leopard | 82.5520 | 29.6445 |
| 438 | Snow leopard | 82.8721 | 29.1505 |
| 439 | Snow leopard | 82.0845 | 29.1400 |
| 440 | Snow leopard | 82.8257 | 29.1428 |
| 441 | Snow leopard | 82.8239 | 29.1428 |
| 442 | Snow leopard | 82.8205 | 29.1429 |
| 443 | Snow leopard | 82.7843 | 29.1346 |
| 444 | Snow leopard | 82.8596 | 29.1443 |
| 445 | Snow leopard | 82.8251 | 29.1428 |
| 446 | Snow leopard | 82.8251 | 29.1440 |
| 447 | Snow leopard | 82.8205 | 29.1429 |
| 448 | Snow leopard | 83.7657 | 28.8979 |
| 449 | Snow leopard | 84.4716 | 28.6672 |
| 450 | Snow leopard | 84.4729 | 28.6686 |
| 451 | Snow leopard | 84.3556 | 28.5598 |
| 452 | Snow leopard | 84.3556 | 28.5614 |
| 453 | Snow leopard | 84.3625 | 28.5809 |
| 454 | Snow leopard | 84.4573 | 28.5191 |
| 455 | Snow leopard | 84.4738 | 28.5127 |
| 456 | Snow leopard | 84.4693 | 28.5158 |
| 457 | Snow leopard | 84.4790 | 28.5097 |
| 458 | Snow leopard | 84.4787 | 28.5015 |
| 459 | Snow leopard | 84.4840 | 28.4961 |
| 460 | Snow leopard | 84.4864 | 28.4936 |
| 461 | Snow leopard | 84.4486 | 28.5279 |
| 462 | Snow leopard | 84.4745 | 28.5138 |
| 463 | Snow leopard | 84.4716 | 28.6672 |

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| 464 | Snow leopard | 84.4729 | 28.6686 |
| 465 | Snow leopard | 84.3551 | 28.5706 |
| 466 | Snow leopard | 84.3559 | 28.5691 |
| 467 | Snow leopard | 84.3567 | 28.5722 |
| 468 | Snow leopard | 84.3544 | 28.5720 |
| 469 | Snow leopard | 84.3546 | 28.5680 |
| 470 | Snow leopard | 84.3551 | 28.5671 |
| 471 | Snow leopard | 84.3554 | 28.5659 |
| 472 | Snow leopard | 84.3558 | 28.5642 |
| 473 | Snow leopard | 84.3544 | 28.5617 |
| 474 | Snow leopard | 84.3551 | 28.5594 |
| 475 | Snow leopard | 84.3557 | 28.5598 |
| 476 | Snow leopard | 84.3560 | 28.5631 |
| 477 | Snow leopard | 84.3568 | 28.5635 |
| 478 | Snow leopard | 84.3574 | 28.5644 |
| 479 | Snow leopard | 84.3576 | 28.5655 |
| 480 | Snow leopard | 84.3569 | 28.5674 |
| 481 | Snow leopard | 84.3597 | 28.5781 |
| 482 | Snow leopard | 84.3606 | 28.5789 |
| 483 | Snow leopard | 84.3622 | 28.5799 |
| 484 | Snow leopard | 84.3617 | 28.5807 |
| 485 | Snow leopard | 84.3617 | 28.5813 |
| 486 | Snow leopard | 84.3621 | 28.5818 |
| 487 | Snow leopard | 84.3636 | 28.5827 |
| 488 | Snow leopard | 84.3683 | 28.5852 |
| 489 | Snow leopard | 84.3673 | 28.5845 |
| 490 | Snow leopard | 84.4209 | 28.5916 |
| 491 | Snow leopard | 84.4202 | 28.5939 |
| 492 | Snow leopard | 84.4257 | 28.5962 |
| 493 | Snow leopard | 84.4156 | 28.5858 |
| 494 | Snow leopard | 84.4157 | 28.5865 |
| 495 | Snow leopard | 84.4159 | 28.5870 |
| 496 | Snow leopard | 84.4161 | 28.5873 |
| 497 | Snow leopard | 84.4185 | 28.5888 |
| 498 | Snow leopard | 84.4198 | 28.5878 |
| 499 | Snow leopard | 84.4214 | 28.5906 |
| 500 | Snow leopard | 84.4487 | 28.5973 |
| 501 | Snow leopard | 84.4718 | 28.6254 |
| 502 | Snow leopard | 84.3542 | 28.5698 |

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| 503 | Snow leopard | 84.3535 | 28.5696 |
| 504 | Snow leopard | 84.3530 | 28.5695 |
| 505 | Snow leopard | 84.3527 | 28.5695 |
| 506 | Snow leopard | 84.3522 | 28.5691 |
| 507 | Snow leopard | 84.3517 | 28.5688 |
| 508 | Snow leopard | 84.3515 | 28.5687 |
| 509 | Snow leopard | 84.3510 | 28.5681 |
| 510 | Snow leopard | 84.3545 | 28.5688 |
| 511 | Snow leopard | 84.3549 | 28.5685 |
| 512 | Snow leopard | 84.3548 | 28.5691 |
| 513 | Snow leopard | 84.3561 | 28.5701 |
| 514 | Snow leopard | 84.3572 | 28.5701 |
| 515 | Snow leopard | 84.3578 | 28.5706 |
| 516 | Snow leopard | 84.3584 | 28.5720 |
| 517 | Snow leopard | 84.3592 | 28.5759 |
| 518 | Snow leopard | 84.3591 | 28.5773 |
| 519 | Snow leopard | 84.3575 | 28.5760 |
| 520 | Snow leopard | 84.3611 | 28.5785 |
| 521 | Snow leopard | 84.3619 | 28.5794 |
| 522 | Snow leopard | 84.3625 | 28.5807 |
| 523 | Snow leopard | 84.3630 | 28.5822 |
| 524 | Snow leopard | 84.3660 | 28.5831 |
| 525 | Snow leopard | 84.3677 | 28.5835 |
| 526 | Snow leopard | 84.3521 | 28.5663 |
| 527 | Snow leopard | 84.3707 | 28.5129 |
| 528 | Snow leopard | 84.4013 | 28.5217 |
| 529 | Snow leopard | 84.4250 | 28.5270 |
| 530 | Snow leopard | 84.4282 | 28.5277 |
| 531 | Snow leopard | 84.4313 | 28.5280 |
| 532 | Snow leopard | 84.4390 | 28.5279 |
| 533 | Snow leopard | 84.4385 | 28.5277 |
| 534 | Snow leopard | 84.4593 | 28.5215 |
| 535 | Snow leopard | 84.4604 | 28.5228 |
| 536 | Snow leopard | 84.4600 | 28.5232 |
| 537 | Snow leopard | 84.4753 | 28.4987 |
| 538 | Snow leopard | 84.4800 | 28.5087 |
| 539 | Snow leopard | 84.4771 | 28.5109 |
| 540 | Snow leopard | 84.4813 | 28.5058 |
| 541 | Snow leopard | 84.4778 | 28.4955 |

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| 542 | Snow leopard | 84.4754 | 28.4966 |
| 543 | Snow leopard | 84.4827 | 28.5072 |
| 544 | Snow leopard | 84.4783 | 28.5030 |
| 545 | Snow leopard | 84.4748 | 28.5019 |
| 546 | Snow leopard | 84.4747 | 28.5126 |
| 547 | Snow leopard | 84.4730 | 28.5138 |
| 548 | Snow leopard | 84.4495 | 28.5266 |
| 549 | Snow leopard | 84.4507 | 28.5265 |
| 550 | Snow leopard | 84.3983 | 28.5217 |
| 551 | Snow leopard | 84.4276 | 28.5274 |
| 552 | Snow leopard | 84.4258 | 28.5275 |
| 553 | Snow leopard | 84.4380 | 28.5275 |
| 554 | Snow leopard | 84.4295 | 28.5275 |
| 555 | Snow leopard | 84.4587 | 28.5215 |
| 556 | Snow leopard | 84.4584 | 28.5206 |
| 557 | Snow leopard | 84.4576 | 28.5200 |
| 558 | Snow leopard | 84.4579 | 28.5181 |
| 559 | Snow leopard | 84.4583 | 28.5173 |
| 560 | Snow leopard | 84.4592 | 28.5187 |
| 561 | Snow leopard | 84.4718 | 28.5140 |
| 562 | Snow leopard | 84.4751 | 28.5115 |
| 563 | Snow leopard | 84.4790 | 28.5054 |
| 564 | Snow leopard | 84.4827 | 28.5059 |
| 565 | Snow leopard | 84.4798 | 28.5061 |
| 566 | Snow leopard | 84.4803 | 28.4988 |
| 567 | Snow leopard | 84.4815 | 28.4983 |
| 568 | Snow leopard | 84.4824 | 28.4974 |
| 569 | Snow leopard | 84.4831 | 28.4968 |
| 570 | Snow leopard | 84.4838 | 28.4953 |
| 571 | Snow leopard | 84.4856 | 28.4944 |
| 572 | Snow leopard | 84.4689 | 28.5156 |
| 573 | Snow leopard | 84.4488 | 28.5273 |
| 574 | Snow leopard | 83.6224 | 28.7406 |
| 575 | Snow leopard | 83.6440 | 28.6753 |
| 576 | Snow leopard | 83.6078 | 28.6585 |
| 577 | Snow leopard | 83.6232 | 28.6656 |
| 578 | Snow leopard | 83.6271 | 28.6674 |
| 579 | Snow leopard | 83.5939 | 28.6809 |
| 580 | Snow leopard | 85.2303 | 28.6456 |

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| 581 | Snow leopard | 85.2314 | 28.6456 |
| 582 | Snow leopard | 85.2319 | 28.7839 |
| 583 | Ban lasun | 84.3707 | 28.5073 |
| 584 | Ban lasun | 84.3727 | 28.5068 |
| 585 | Ban lasun | 84.3769 | 28.5041 |
| 586 | Ban lasun | 84.3827 | 28.5046 |
| 587 | Ban lasun | 84.3849 | 28.5078 |
| 588 | Ban lasun | 84.3851 | 28.5074 |
| 589 | Ban lasun | 84.3852 | 28.5070 |
| 590 | Ban lasun | 84.3856 | 28.5070 |
| 591 | Ban lasun | 84.3856 | 28.5068 |
| 592 | Ban lasun | 84.3853 | 28.5064 |
| 593 | Ban lasun | 84.3846 | 28.5067 |
| 594 | Ban lasun | 84.3834 | 28.5062 |
| 595 | Ban lasun | 84.3835 | 28.5061 |
| 596 | Ban lasun | 84.3837 | 28.5069 |
| 597 | Ban lasun | 84.3849 | 28.5077 |
| 598 | Ban lasun | 84.3850 | 28.5077 |
| 599 | Ban lasun | 84.3851 | 28.5077 |
| 600 | Ban lasun | 84.3851 | 28.5075 |
| 601 | Ban lasun | 84.3851 | 28.5072 |
| 602 | Ban lasun | 84.3854 | 28.5068 |
| 603 | Ban lasun | 84.3854 | 28.5065 |
| 604 | Ban lasun | 84.3853 | 28.5065 |
| 605 | Ban lasun | 84.3852 | 28.5064 |
| 606 | Ban lasun | 84.3851 | 28.5063 |
| 607 | Ban lasun | 84.3849 | 28.5063 |
| 608 | Ban lasun | 84.3846 | 28.5063 |
| 609 | Ban lasun | 84.3788 | 28.5033 |
| 610 | Ban lasun | 84.3785 | 28.5033 |
| 611 | Ban lasun | 84.3783 | 28.5034 |
| 612 | Chiraito | 84.3667 | 28.5127 |
| 613 | Chiraito | 84.3671 | 28.5130 |
| 614 | Chiraito | 84.3674 | 28.5129 |
| 615 | Chiraito | 84.3675 | 28.5126 |
| 616 | Chiraito | 84.3690 | 28.5119 |
| 617 | Chiraito | 84.3692 | 28.5110 |
| 618 | Chiraito | 84.3695 | 28.5113 |
| 619 | Chiraito | 84.3708 | 28.5087 |

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| 620 | Chiraito | 84.3764 | 28.4708 |
| 621 | Chiraito | 84.3788 | 28.4698 |
| 622 | Chiraito | 84.3789 | 28.4698 |
| 623 | Chiraito | 84.3789 | 28.4698 |
| 624 | Chiraito | 84.3799 | 28.4700 |
| 625 | Chiraito | 84.3800 | 28.4703 |
| 626 | Chiraito | 84.3801 | 28.4705 |
| 627 | Chiraito | 84.3804 | 28.4705 |
| 628 | Chiraito | 84.3810 | 28.4704 |
| 629 | Chiraito | 84.3819 | 28.4709 |
| 630 | Chiraito | 84.3818 | 28.4717 |
| 631 | Chiraito | 84.3818 | 28.4707 |
| 632 | Chiraito | 84.3819 | 28.4707 |
| 633 | Chiraito | 84.3820 | 28.4707 |
| 634 | Chiraito | 84.3814 | 28.4700 |
| 635 | Chiraito | 84.3811 | 28.4700 |
| 636 | Chiraito | 84.3751 | 28.5394 |
| 637 | Chiraito | 84.3732 | 28.5372 |
| 638 | Chiraito | 84.3728 | 28.5366 |
| 639 | Chiraito | 84.3722 | 28.5360 |
| 640 | Chiraito | 84.3717 | 28.5357 |
| 641 | Chiraito | 84.3708 | 28.5354 |
| 642 | Chiraito | 84.3708 | 28.5363 |
| 643 | Chiraito | 84.3756 | 28.5396 |
| 644 | Chiraito | 84.3740 | 28.5383 |
| 645 | Chiraito | 84.3701 | 28.5367 |
| 646 | Chiraito | 84.3699 | 28.5363 |
| 647 | chiraito | 84.3614 | 28.5128 |
| 648 | chiraito | 84.3612 | 28.5113 |
| 649 | chiraito | 84.3622 | 28.5104 |
| 650 | chiraito | 84.3620 | 28.5102 |
| 651 | Chiraito | 84.3619 | 28.5083 |
| 652 | Chiraito | 84.4089 | 28.5604 |
| 653 | Chiraito | 84.3978 | 28.5607 |
| 654 | Chiraito | 84.3967 | 28.5602 |
| 655 | Chiraito | 84.3840 | 28.5660 |
| 656 | Chiraito | 84.3943 | 28.5559 |
| 657 | Chiraito | 84.4076 | 28.5724 |
| 658 | Gucchi mushroom | 84.3731 | 28.5371 |

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| 659 | Gucchi mushroom | 84.3674 | 28.5331 |
| 660 | Gucchi mushroom | 84.3669 | 28.5328 |
| 661 | Gucchi mushroom | 84.3630 | 28.5253 |
| 662 | Gucchi mushroom | 84.3598 | 28.5242 |
| 663 | Gucchi mushroom | 84.3598 | 28.5236 |
| 664 | Guchhi mushroom | 84.3709 | 28.5082 |
| 665 | Guchhi mushroom | 84.3807 | 28.5023 |
| 666 | Guchhi mushroom | 84.3806 | 28.5033 |
| 667 | Guchhi mushroom | 84.3854 | 28.5066 |
| 668 | Guchhi Mushroom | 84.3732 | 28.5373 |
| 669 | Guchhi Mushroom | 84.3723 | 28.5361 |
| 670 | Guchhi mushroom | 84.4084 | 28.5700 |
| 671 | Guchhi mushroom | 84.4005 | 28.5616 |
| 672 | Guchhi mushroom | 84.3967 | 28.5602 |
| 673 | Guchhi mushroom | 84.4107 | 28.5721 |
| 674 | Kurilo | 84.3764 | 28.4708 |
| 675 | Kurilo | 84.3768 | 28.4712 |
| 676 | Kurilo | 84.3776 | 28.4708 |
| 677 | Kurilo | 84.3779 | 28.4708 |
| 678 | Kurilo | 84.3788 | 28.4698 |
| 679 | Kurilo | 84.3813 | 28.4709 |
| 680 | Kurilo | 84.3816 | 28.4714 |
| 681 | Kurilo | 84.3818 | 28.4710 |
| 682 | Kurilo | 84.3818 | 28.4705 |
| 683 | Kurilo | 84.3817 | 28.4703 |
| 684 | Kurilo | 84.3718 | 28.5368 |
| 685 | Kurilo | 84.3727 | 28.5371 |
| 686 | Kurilo | 84.3700 | 28.5350 |
| 687 | Kurilo | 84.3660 | 28.5318 |
| 688 | Kutki | 84.4609 | 28.5224 |
| 689 | Kutki | 84.4667 | 28.5168 |
| 690 | Loth salla | 84.3678 | 28.5123 |
| 691 | Loth salla | 84.3680 | 28.5123 |
| 692 | Loth salla | 84.3702 | 28.5075 |
| 693 | Loth salla | 84.3769 | 28.5123 |
| 694 | Loth salla | 84.4082 | 28.5696 |
| 695 | Loth salla | 84.3938 | 28.5560 |
| 696 | Loth salla | 84.4102 | 28.5730 |
| 697 | Nirmansi | 84.3847 | 28.5067 |

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| 698 | Nirmasi | 84.3751 | 28.5059 |
| 699 | Nirmasi | 84.3768 | 28.5043 |
| 700 | Nirmasi | 84.3826 | 28.5045 |
| 701 | Nirmasi | 84.3834 | 28.5060 |
| 702 | Nirmasi | 84.3846 | 28.5064 |
| 703 | Nirmasi | 84.3845 | 28.5065 |
| 704 | Nirmasi | 84.3768 | 28.5037 |
| 705 | Nirmasi | 85.3997 | 28.5189 |
| 706 | Nirmasi | 84.3846 | 28.5077 |
| 707 | Nirmasi | 84.3847 | 28.5078 |
| 708 | Nirmasi | 84.3849 | 28.5077 |
| 709 | Nirmasi | 84.3851 | 28.5071 |
| 710 | Nirmasi | 84.3854 | 28.5069 |
| 711 | Nirmasi | 84.3854 | 28.5067 |
| 712 | Nirmasi | 84.3849 | 28.5063 |
| 713 | Nirmasi | 84.3844 | 28.5064 |
| 714 | Nirmasi | 84.3833 | 28.5000 |
| 715 | Nirmasi | 84.3791 | 28.5033 |
| 716 | Nirmasi | 84.3790 | 28.5034 |
| 717 | Okhar | 84.3657 | 28.5124 |
| 718 | Okhar | 84.3659 | 28.5121 |
| 719 | Okhar | 84.3675 | 28.5131 |
| 720 | Okhar | 84.3690 | 28.5124 |
| 721 | Okhar | 84.3656 | 28.5126 |
| 722 | Okhar | 84.3730 | 28.5376 |
| 723 | Okhar | 84.3728 | 28.5364 |
| 724 | Okhar | 84.3716 | 28.5357 |
| 725 | Okhar | 84.3716 | 28.5357 |
| 726 | Okhar | 84.3697 | 28.5359 |
| 727 | Okhar | 84.3625 | 28.5244 |
| 728 | okhar | 84.4074 | 28.5668 |
| 729 | Okhar | 84.4065 | 28.5657 |
| 730 | Okhar | 84.4085 | 28.5655 |
| 731 | Okhar | 84.4007 | 28.5619 |
| 732 | Okhar | 84.4005 | 28.5619 |
| 733 | Okhar | 84.4005 | 28.5617 |
| 734 | Okhar | 84.3994 | 28.5608 |
| 735 | Okhar | 84.3987 | 28.5607 |
| 736 | Okhar | 84.3977 | 28.5606 |

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|---|---|---|---|
| 737 | Okhar | 84.3832 | 28.5600 |
| 738 | Okhar | 84.3948 | 28.5564 |
| 739 | okhar | 84.4081 | 28.5684 |
| 740 | Okhar | 84.4107 | 28.5718 |
| 741 | Paakhanved | 84.3662 | 28.5119 |
| 742 | Paakhanved | 84.3667 | 28.5118 |
| 743 | Paakhanved | 84.3668 | 28.5122 |
| 744 | Paakhanved | 84.3683 | 28.5122 |
| 745 | Paakhanved | 84.3695 | 28.5116 |
| 746 | Paakhanved | 84.3697 | 28.5110 |
| 747 | Paakhanved | 84.3657 | 28.5127 |
| 748 | Paakhanved | 84.3808 | 28.5023 |
| 749 | Paakhanved | 84.3762 | 28.4708 |
| 750 | Paakhanved | 84.3764 | 28.4708 |
| 751 | paakhanved | 84.3729 | 28.5367 |
| 752 | paakhanved | 84.3725 | 28.5362 |
| 753 | Pakhanved | 84.3748 | 28.5386 |
| 754 | Pakhanved | 84.3715 | 28.5369 |
| 755 | Pakhanved | 84.3618 | 28.5265 |
| 756 | Panchaule | 84.3840 | 28.5073 |
| 757 | Panchaule | 84.3848 | 28.5075 |
| 758 | Panchaule | 84.4693 | 28.6616 |
| 759 | Panchaule | 84.3576 | 28.5658 |
| 760 | Panchaule | 84.3622 | 28.5798 |
| 761 | Panchaule | 84.4775 | 28.5106 |
| 762 | Panchaule | 84.4675 | 28.6512 |
| 763 | Panchaule | 84.4741 | 28.6629 |
| 764 | Panchaule | 84.4686 | 28.6585 |
| 765 | Panchaule | 84.4743 | 28.6634 |
| 766 | Satuwa | 84.3669 | 28.5117 |
| 767 | Satuwa | 84.3693 | 28.5118 |
| 768 | Satuwa | 84.3703 | 28.5107 |
| 769 | Satuwa | 84.3708 | 28.5101 |
| 770 | Satuwa | 84.3833 | 28.5062 |
| 771 | Satuwa | 84.3779 | 28.5039 |
| 772 | Satuwa | 84.3772 | 28.5042 |
| 773 | Satuwa | 84.3787 | 28.5030 |
| 774 | Satuwa | 84.3793 | 28.5033 |
| 775 | Satuwa | 84.3852 | 28.5070 |

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|---|---|---|---|
| 776 | Satuwa | 84.3852 | 28.5070 |
| 777 | Satuwa | 84.3853 | 28.5070 |
| 778 | Satuwa | 84.3855 | 28.5069 |
| 779 | Satuwa | 84.3854 | 28.5066 |
| 780 | Satuwa | 84.3837 | 28.5064 |
| 781 | Satuwa | 84.3833 | 28.5059 |
| 782 | Satuwa | 84.3817 | 28.5022 |
| 783 | Satuwa | 84.3791 | 28.5034 |
| 784 | Satuwa | 84.3805 | 28.4706 |
| 785 | Satuwa | 84.3810 | 28.4705 |
| 786 | Satuwa | 84.3812 | 28.4710 |
| 787 | Satuwa | 84.3825 | 28.4711 |
| 788 | Satuwa | 84.3817 | 28.4783 |
| 789 | Satuwa | 84.3821 | 28.4713 |
| 790 | Satuwa | 84.3822 | 28.4711 |
| 791 | Satuwa | 84.3820 | 28.4708 |
| 792 | Satuwa | 84.3819 | 28.4707 |
| 793 | Satuwa | 84.3819 | 28.4705 |
| 794 | Satuwa | 84.3818 | 28.4701 |
| 795 | Satuwa | 84.3813 | 28.4699 |
| 796 | Satuwa | 84.3809 | 28.4697 |
| 797 | Satuwa | 84.3805 | 28.4695 |
| 798 | Satuwa | 84.3809 | 28.4705 |
| 799 | Satuwa | 84.3813 | 28.4707 |
| 800 | Satuwa | 84.3814 | 28.4712 |
| 801 | Satuwa | 84.3817 | 28.4715 |
| 802 | Satuwa | 84.3818 | 28.4714 |
| 803 | Satuwa | 84.3817 | 28.4712 |
| 804 | Satuwa | 84.3817 | 28.4711 |
| 805 | Satuwa | 84.3817 | 28.4710 |
| 806 | Satuwa | 84.3820 | 28.4707 |
| 807 | Satuwa | 84.3819 | 28.4705 |
| 808 | Satuwa | 84.3817 | 28.4705 |
| 809 | Satuwa | 84.3817 | 28.4702 |
| 810 | Satuwa | 84.3818 | 28.4701 |
| 811 | Satuwa | 84.3820 | 28.4701 |
| 812 | Satuwa | 84.3814 | 28.4789 |
| 813 | Satuwa | 84.3816 | 28.4700 |
| 814 | Satuwa | 84.3813 | 28.4700 |

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| 815 | Satuwa | 84.3806 | 28.4701 |
| 816 | Satuwa | 84.3735 | 28.5370 |
| 817 | Satuwa | 84.3730 | 28.5368 |
| 818 | Satuwa | 84.3728 | 28.5365 |
| 819 | Satuwa | 84.3729 | 28.5364 |
| 820 | Satuwa | 84.3719 | 28.5367 |
| 821 | Satuwa | 84.3718 | 28.5368 |
| 822 | Satuwa | 84.3717 | 28.5367 |
| 823 | Satuwa | 84.3715 | 28.5368 |
| 824 | Satuwa | 84.3679 | 28.5334 |
| 825 | Satuwa | 84.3596 | 28.5225 |
| 826 | Satuwa | 84.3599 | 28.5219 |
| 827 | Satuwa | 84.3601 | 28.5219 |
| 828 | Satuwa | 84.4079 | 28.5690 |
| 829 | Satuwa | 84.4079 | 28.5683 |
| 830 | Satuwa | 84.4074 | 28.5669 |
| 831 | Satuwa | 84.4068 | 28.5662 |
| 832 | Satuwa | 84.4050 | 28.5644 |
| 833 | Satuwa | 84.4047 | 28.5645 |
| 834 | Satuwa | 84.4029 | 28.5636 |
| 835 | Satuwa | 84.4025 | 28.5635 |
| 836 | Satuwa | 84.4022 | 28.5635 |
| 837 | Satuwa | 84.4004 | 28.5615 |
| 838 | Satuwa | 84.3928 | 28.5614 |
| 839 | Satuwa | 84.3930 | 28.5609 |
| 840 | Satuwa | 84.3941 | 28.5559 |
| 841 | Satuwa | 84.4101 | 28.5740 |
| 842 | Satuwa | 84.4100 | 28.5735 |
| 843 | Satuwa | 84.4105 | 28.5716 |
| 844 | Siltimur | 84.3686 | 28.5338 |
| 845 | Siltimur | 84.3631 | 28.5275 |
| 846 | Sugandhawal | 84.3708 | 28.5103 |
| 847 | Sugandhawal | 84.3709 | 28.5102 |
| 848 | Sugandhawal | 84.3701 | 28.5102 |
| 849 | Sugandhawal | 84.3708 | 28.5096 |
| 850 | Sugandhawal | 84.3710 | 28.5092 |
| 851 | Sugandhawal | 84.3710 | 28.5075 |
| 852 | Sugandhawal | 84.3721 | 28.5368 |
| 853 | Sugandhawal | 84.3626 | 28.5264 |

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|---|---|---|---|
| 854 | Sugandhawal | 84.4034 | 28.5646 |
| 855 | Sugandhawal | 84.4035 | 28.5639 |
| 856 | Sugandhawal | 84.4035 | 28.5638 |
| 857 | Sugandhawal | 84.3987 | 28.5607 |
| 858 | Sugandhawal | 84.4103 | 28.5729 |
| 859 | Sughandawal | 84.3727 | 28.5365 |
| 860 | Sughandawal | 84.3728 | 28.5364 |
| 861 | Sughandawal | 84.3693 | 28.5346 |
| 862 | Sugandhawal | 84.4035 | 84.4035 |
| 863 | Sugandhawal | 84.3987 | 84.3987 |
| 864 | Sugandhawal | 84.4103 | 84.4103 |
| 865 | Sughandawal | 84.3727 | 84.3727 |
| 866 | Sughandawal | 84.3728 | 84.3728 |
| 867 | Sughandawal | 84.3693 | 84.3693 |
| 868 | Timur | 84.3727 | 84.3727 |
| 869 | Timur | 84.3727 | 84.3727 |
| 870 | Timur | 84.3724 | 84.3724 |
| 871 | Timur | 84.3895 | 84.3895 |
| 872 | Timur | 84.3939 | 84.3939 |
| 873 | Timur | 84.3938 | 84.3938 |
| 874 | Timur | 84.3934 | 84.3934 |
| 875 | Timur | 84.3727 | 28.5365 |
| 876 | Timur | 84.3727 | 28.5366 |
| 877 | Timur | 84.3724 | 28.5362 |
| 878 | Timur | 84.3895 | 28.5661 |
| 879 | Timur | 84.3939 | 28.5559 |
| 880 | Timur | 84.3938 | 28.5557 |
| 881 | Timur | 84.3934 | 28.5556 |