Participatory Forest Management Plan
Guro-Juglot
2022-2031

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&
Forest, Parks and Wildlife Department
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Participatory Forest Management Plan (PFMP)

Guro-Juglot

Endorsement

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Disclaimer:
This Participatory Forest Management Plan is not a funding commitment from GB Forest, Parks and Wildlife Department. It is a proposal to be considered for future implementation of REDD+ Programme if funds are committed by the GB government. The success of this plan contingent to the commitment of all stakeholders involved in implementation of this plan.

وضاحت

جنگلات کے شراکتی انتظام کا یہ منصوبہ گلگت بلتستان کے جنگلات، جنگلی حیات اور ماحولیات کے محکمے کی جانب سے مالی وسائل کی فراہمی کا وعدہ نہیں، بلکہ ایک مجوزہ لائحہ عمل ہے جس میں مستقبل میں ریڈ پلس پروگرام پر عمل درآمد کے لیے غور کیا جائے گا، اگر گلگت بلتستان کی حکومت مالی وسائل کی فراہمی کا انتظام کرتی ہے۔ منصوبے کی کامیابی اس منصوبے میں شامل تمام فریقین کے عزم پر منحصر ہے۔

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Abbreviation

AGB	Above Ground Carbon
BGB	Below Ground Carbon
ANR	Assisted Natural Regeneration
CKNP	Central Karakoram National Park
Forest Department	Forest, Parks and Wildlife Department
FCPF	Forest Carbon Partnership Facility
GIS	Geographic Information System
GOP	Government of Pakistan
KKH	Karakoram Highway
LPG	Liquid Petroleum Gas
MW	Mega Watt
MoCC	Ministry of Climate Change
NCCP	National Climate Change Policy
NTFP	Non-Timber Forest Product
PFMP	Participatory Forest Management Plan
PFRA	Participatory Forest Resource Assessment
PSDP	Public Sector Development Programme
REDD+	Reducing Emissions form Deforestation and Forest Degradation
TFCC	Planning Commission Task Force on Climate Change
Ton/ha	Ton per hectare
WCSDO	Wildlife Conservation and Sustainable Development Organization
10 BTTP	10 Billion Tree Tsunami Programme

Executive Summary

Guro-Jaglot forest in Gilgit District is one of the three sites selected by the Forest, Parks and Wildlife Department in consultation with key stakeholders as a pilot site to demonstrate implementation of REDD+. This is part of a larger project being implemented by the Ministry of Climate Change, Government of Pakistan, and the Provincial Forest departments in which a total of 15 Participatory Forest Management Plans are being developed for REDD+ implementation in all six entities of Pakistan.

The Government of Pakistan has joined global efforts to address deforestation and forest degradation to mitigate climate change, and its impact by initiating REDD+ activities. REDD+ has three phases: i. readiness, ii. demonstration through implementation, and iii. result-based payments. The first two phases when combined are known as the readiness phase. Pakistan has developed a National REDD+ Strategy in 2021. Whereas the Gilgit-Baltistan Forests Parks and Wildlife department has developed a Subnational / Provincial REDD+ Action Plan. This action plan is a decentralised framework for GB to proceed with REDD+ implementation. Preparation of Participatory Forest Management Plans is an important step to implement this action plan by integrating and implementing REDD+ activities in forest management in various socio-ecological systems.

The local stakeholders were engaged in preparation of this Participatory Forest Management Plan. The plan will guide the implementation of REDD+ by projecting business as usual and reduced emission scenarios derived from detailed participatory assessment of socio-economic circumstances, ecological condition, and challenges (drivers), and assessment of the forest resource which have been described in this plan. The plan also presents stakeholders' analysis with their roles and obligations use rights of forest dependent communities, conflict resolution and benefit-sharing mechanisms. This information is crucial for successful implementation of REDD+.

The analysis of forest cover revealed that since 2010 the Guro Juglot Forest is decreasing at the rate of -16.08 hectares per year, emitting 4904 tonnes CO_2 eq annually. The plan has proposed actions to restore and enhance forest cover through collaborative forest management efforts of the stakeholders. The suggested restoration efforts will contribute to sink and store carbon in the selected site. The initial period of the plan will be 10 years; however, the plan will be a living document and open for annual reviews.

This plan has proposed distribution of carbon and non-carbon benefits accrued by the implementation of plan according to which 60% benefits will go to the Government, and 40% will go to the customary right holders and users. These benefits will only be distributed if the targets are achieved. The plan provides scenarios to reduce or increase benefits so that the stakeholders can enjoy results-based payment and benefits. The success of this plan is, therefore, contingent to the commitment of all the stakeholders involved. A specific and definitive distribution of benefits in case of REDD+ programme is yet to be developed by the government, which will form basis for sharing of benefits in the case of private forests. This proposed ratio will be finalized or confirmed only after finalizing AJK based benefit sharing mechanism.

The initial period of this plan will be 10 years; however, the plan will be a living document and open for annual reviews. A budget forecast to implement activities mentioned is also provided in this plan. The major focus of the plan will be on enhancing forest cover by reforestation and regeneration of forest blanks and reducing the demand for fuel wood from the forest through promotion of energy efficiency and alternate sources of energy.

The implementation of activities described in the plan will be guided by annual operational plans to be developed by the provincial FD in consultation with the relevant stakeholders. The plan will be implemented by village and district committees to be notified by the provincial FD in consultation with the relevant stakeholders.

خلاصہ

گلگت بلتستان کے ضلع گلگت میں واقع گورو۔جگلوٹ کا جنگل محکمۂ جنگلات، جنگلی حیات اور ماحولیات کی جانب سے منتخب کردہ اُن تین مقامات میں سے ایک ہے جہاں ایک پائلٹ سائٹ کے طور پر اہم فریقین سے مشاورت کے ساتھ ریڈ پلس کے نفاذ کا عملی مظاہرہ کیا جائے گا۔ یہ ایک بڑے منصوبے کا حصہ ہے جو وزارتِ موسمیاتی تبدیلی، حکومتِ پاکستان اور صوبائی محکمۂ جنگلات کے ذریعے لاگو کیا جا رہا ہے جس میں پاکستان کے تمام چھ علاقوں میں ریڈ پلس پر عمل درآمد کی غرض سے مجموعی طور پر جنگلات کے شراکتی انتظام کے لیے پندرہ منصوبے بنائے جا رہے ہیں۔

حکومتِ پاکستان نے جنگلات کی کٹائی اور تنزلی سے نمٹنے اور موسمیاتی تبدیلی کے اثرات کم کرنے کے لیے ریڈ پلس سرگرمیوں کا آغاز کر کے عالمی کوششوں میں شمولیت اختیار کی ہے ۔ریڈ پلس کے تین مراحل ہیں۔(i) تیاری (ii) عمل درآمد کے ذریعے مظاہرہ، اور (iii) نتائج پر مبنی ادائیگیاں۔ پہلے دو مراحل کو مشترکہ طور پر ریڈ پلس کی تیاری کا مرحلہ کہا جاتا ہے۔ پاکستان نے ریڈ پلس کی تیاری کی ضروریات کو پورا کرنے کے لیے خاطر خواہ پیش رفت کی ہے۔ پاکستان نے 2021ء میں ایک قومی ریڈ پلس حکمتِ عملی تیار کی ہے ۔جب کہ گلگت بلتستان کے جنگلات، جنگلی حیات اور ماحولیات کے محکمے نے صوبائی سطح پر ایک جامع ریڈ پلس ایکشن پلان تیار کیا ہے۔ گلگت بلتستان میں ریڈ پلس پر عمل درآمد کو آگے بڑھانے کے لیے یہ ایکشن پلان ایک صوبائی فریم ورک ہے۔ مختلف سماجی ماحولیاتی نظاموں میں جنگل کے انتظام کے لیے ریڈ پلس سرگرمیوں کو مربوط اور لاگو کر کے جنگلات کے شراکتی انتظام کے منصوبوں کی تیاری اس ایکشن پلان پر عمل درآمد کے لیے ایک اہم قدم ہے۔

مقامی فریقین نے جنگلات کے شراکتی انتظام کے منصوبے کی تیاری میں حصہ لیا۔ ریڈ پلس پر عمل درآمد میں رہ نمائی کے لیے اس منصوبے کے تحت دو مختلف منظر ناموں یعنی موجودہ حالات اور اخراج میں کمی کا اندازہ لگایا جائے گا۔ اس مقصد کے لیے سماجی اقتصادی حالات کے تفصیلی شراکتی تجزیے، ماحولیاتی صورتِ حال اور چیلنجز اور منصوبے میں واضح کردہ جنگلاتی وسائل کا جائزہ لیا جائے گا۔ یہ منصوبہ فریقین کے کردار اور ذمّے داریوں کے ساتھ اُن کے تجزیے، جنگلات پر انحصار کرنے والی لوگوں کے حقوق کے استعمال، تنازعات کے حل اور مشترک فوائد کے حصول کا طریقۂ کار بھی پیش کرتا ہے۔ ریڈ پلس پر کامیاب عمل درآمد اور شراکتی سرگرمیوں کی تفصیلات کا تعیّن کرنے کے لیے یہ معلومات ضروری ہیں۔

جنگل کے رقبے کے تجزیے سے پتا چلتا ہے کہ 2010ء کے بعد سے گورو۔جگلوٹ جنگل میں 16.08 ہیکٹر سالانہ کی شرح سے کمی ہو رہی ہے جس سے سالانہ 4,904 ٹن کاربن ڈائی آکسائڈ کا اخراج عمل میں آ رہا ہے۔ جنگلات کے شراکتی انتظام کا اس منصوبے میں شامل اقدامات کے عملی اطلاق سے نہ صرف ان نقصانات میں کمی آئیگی بلکہ فریقین کے مشترکہ جنگلات کے انتظامی اقدامات سے جنگلات کے وسائل میں مزید اضافہ ہوگا۔

مجوزہ منصوبے کے مطابق اس منصوبے پر عمل درآمد سے حاصل ہونے والے کاربن اور نان کاربن محصولات میں سے 60 فی صد حکومت کو حاصل ہوں گے، جبکہ 40 فی صد جنگل کے استعمال کے حقوق رکھنے والے صارفین کو ملیں گے۔ یہ فوائد صرف اہداف حاصل ہونے کی صورت میں تقسیم کیے جائیں گے اس لیے یہ منصوبہ فوائد میں کمی یا اضافے کا منظر نامہ پیش کرتا ہے تاکہ فریقین نتائج پر مبنی ادائیگی اور فوائد سے مستفید ہو سکیں۔ لہٰذا اِس منصوبے کی کامیابی اس میں شامل تمام فریقین کے عزم پر منحصر ہے۔

حکومت کی طرف سے ریڈ پلس پروگرام کے معاملے میں فوائد کی ایک مخصوص اور قطعی تقسیم فی الحال تیار نہیں ہوئی ہے جو جنگلات کے سلسلے میں فوائد کے اشتراک کی بنیاد بنائے گی ۔مشترک فوائد پر مبنی گلگت بلتستان کے طریقۂ کار کے طے ہونے کے بعد ہی اس مجوزہ تناسب کو حتمی شکل دی جائے گی یا اس کی تصدیق کی جائے گی۔

اس منصوبے کی ابتدائی مدّت دس سال ہوگی تاہم یہ منصوبہ ایک زندہ دستاویز ہوگا اور سالانہ جائزے کے لیے پیش ہوگا۔ اس منصوبے میں مذکورہ سرگرمیوں پر عمل درآمد کے لیے رہ نمائی متعلقہ فریقین کی مشاورت سے صوبائی محکمۂ جنگلات کی طرف سے تیار کیے جانے والے سالانہ آپریشنل منصوبوں کی مدد سے کی جائے گی۔ اس منصوبے کو گاؤں اور ضلعی کمیٹیوں کے ذریعے لاگو کیا جائے گا اور اس کے بارے میں متعلقہ فریقین کی مشاورت سے صوبائی محکمۂ جنگلات کے ذریعے مطلع کیا جائے گا۔

1 Introduction

1.1 The Context of PFMP

Pakistan has been implementing REDD+ activities since 2010 to mitigate climate change through reduced carbon emissions from the forestry sector. The Government of Pakistan (GoP), Ministry of Climate Change (MoCC) is implementing a REED+ readiness programme funded by the Forest Carbon Partnership Facility (FCPF) of the World Bank. This Participatory Forest Management Plan (PFMP) is to demonstrate integration and implementation of REDD+ activities in forest management in various socio-ecological systems

The PFMPs translate REDD+ concepts and processes at practical level considering complex socio-economic conditions, burden of rights and concessions, as well as obligations of partners in the forest. This is the reason that in addition to forest stock assessment, the preparation of PFMPs for REDD+ sites require a detailed assessment of the roles and rights of stakeholders in forest management and revenues so that trade-offs become clearer for redressal and communities are not deprived of their legitimate access to forest for their livelihoods. The core thrust of PFMPs in REDD+ perspective is to find contextually relevant options to address drivers of deforestation and forest degradation to mitigate global climate change. REDD+ also provides mechanisms for the enhancement, measurement, and trade of carbon.

This PFMP provides information including description of the site, GIS supported forest stock assessment, socio-economic situation, analysis of stakeholders with their interests and influences, emissions reduction scenarios, future interventions with estimated budget and implementation mechanism and key challenges for implementation. The activities that will maintain forest as carbon pool have been exclusively explained in this plan giving a lead and support role to stakeholders, as well as the expected outputs. It is expected that the implementation of the PFMP will enable the stakeholders of Guro-Juglot forest to increase and maintain the carbon stock sequestered in the forest, which they could trade in shape of “carbon credits” in the national and international market in foreseeable future.

The PFMP will thus act as a road map for implementation, monitoring, reporting and verification of resources improvement, and distribution of benefits among stakeholders. An estimation of budget to finance activities that reverse deforestation and forest degradation has is given (**Table 9**). Increase in provision of electricity or alternate sources of fuelwood for domestic use particularly cooking and space heating will help conservation of forests that the Guro-Juglot community uses.

1.2 Objectives of PFMP

In line with the global and national objectives and priorities (see section 1.4), the following specific objectives for conducting the PFMP in Guro-Juglot Forest are as follows:

1. To enhance carbon stocks in the forest while addressing drivers of deforestation and forest degradation by involving forest stakeholders.
2. To introduce participatory forest management by engaging all the stakeholders in the forest management.
3. To shift focus of forest management from Protection to Carbon sequestration, ecosystem services, and biodiversity conservation;
4. To build capacity of community activists and staff of FD for successful implementation of REDD+ in GB taking Guro-Juglot forest as a pilot for learning.

1.3 Methodology

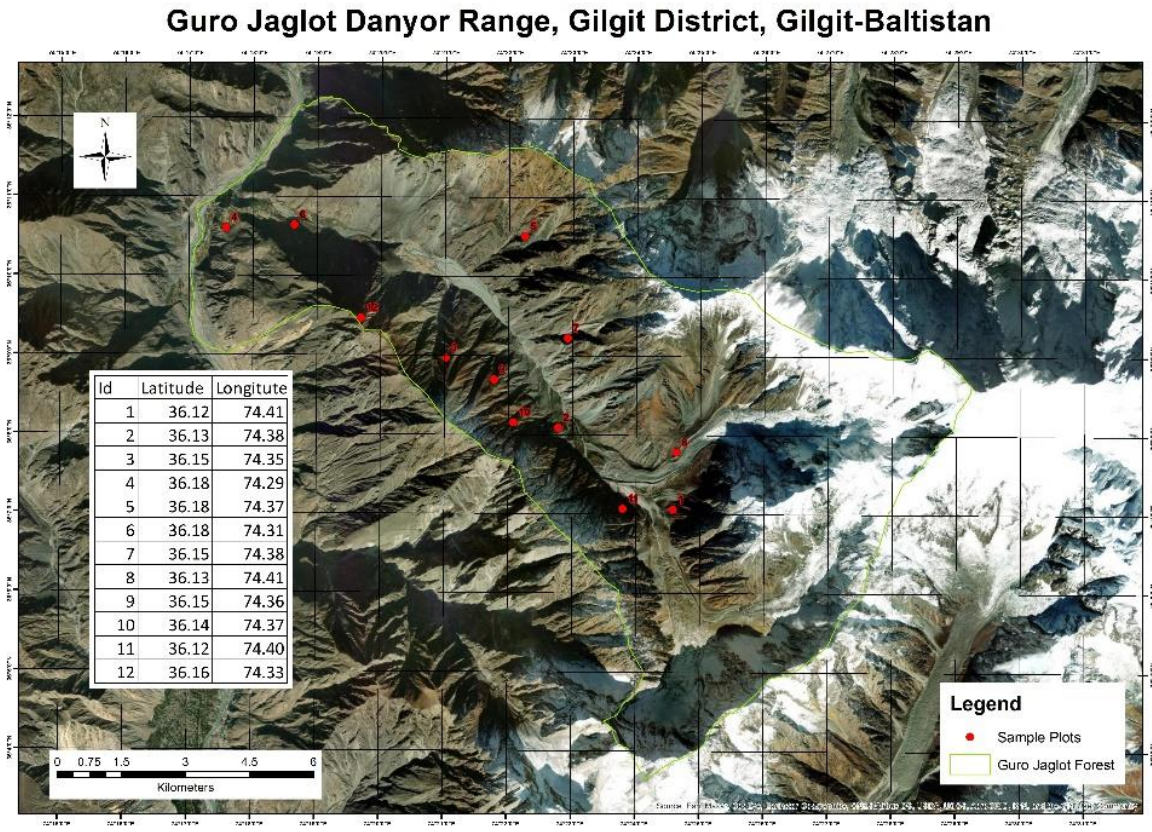
A multi-disciplinary team consisting of two Participatory Forest Management experts, a sociologist, a GIS specialist, two Range Forest Officers, two Forest Guards and three community representatives (nominated by the community) collected data for preparation of the management plan.

The overall methodology for preparation of the plan has been guided by PFMP Manual (version 1.0, 2021) for practitioners prepared under Forest Carbon Partnership Facility (FPCF) of the Ministry of Climate Change (MOCC), Islamabad. A multi-layered methodology was adapted for the preparation of PFMP, which includes the following steps:

i. Selection of site in light of the REDD+ guidelines and procedure. Guro-Juglot was one of the three potential sites selected for preparation of PFMP.
ii. Participatory data collection. Local community of Guro-Juglot participated in providing socio-economic data and sharing details on forest-community interaction., They also participated in collecting forest resource assessment data. They also participated in identifying forest management activities and implementation mechanism. Under the Free Prior Informed Consent (FPIC), the community was briefed on relevant concepts, causes and effects of activities. They participated in identifying drivers of deforestation and forest degradation and demand of timber and firewood. The solutions to problems and demands of community were translated into interventions in prioritised order and listed. The exercise was conducted through PRA using spot observations, Focused Group discussion, mapping, semi structure interviews, transect walk and ranking.
iii. Participator Forest Inventory was conducted to collect data from 9 sample plots selected in Guro Juglot Forests. The location of sample plots is provided in following map (**Figure 1**). The sample plots were chosen through stratified random sampling among each forest stratum. The soil, topography, water availability, and status of vegetation vary spatially within a land-use category and the overall area proposed for the site. Trees, biomass stock, and growth rate are not distributed uniformly in a site. Therefore, a sampling design is followed for locating the sample plots in each of the selected forest strata. The location of sampling plots could determine the biomass stock or growth rate estimates. Based on forest type and forest density, three forest stratum (>70%, 40%-70%, 10%-40% tree canopy cover) were formed to carry out the systematic stratified sample on the map.
iv. Sample points were nested circular plots of 17.84 m, 5.64 m, and 0.56 m radius. All living trees and standing dead woods with DBH above 5cm, and stumps were measured from the full plot of 17.84 meters (~1000 m^2). Fallen trees and stumps, dead wood with diameter above 5cm were also recorded from the plot. The plot included two subplots; 5.64 meters (~100 m^2) for collecting data of seedlings and shrubs and 0.56-meter plots (~1 m^2) for data on litter, leaves, grasses, etc. From a plot of 5.64 m, all seedlings were counted, and shrubs were cut down and fresh weight of the sample was recorded. This sample was clipped and collected in the bags to find out oven dried biomass in the lab. The above-ground non-tree biomass including leaves, litter, grasses, etc. collected from 0.56 m radius sub-plot and weighed. Soil organic carbon values were taken from the national forest inventory, carried out in 2018. The data from these samples was analysed for estimation of carbon stock. The coordinates of each sample plot were noted, and fixed-point photos were taken during the inventory
v. Data analysis and development of PFMP: The data were analysed, GIS map prepared and put together in the form of PFMP with a 10-year perspective including an annual forestry operational plan. The plan was reviewed individually, jointly and sent to experts for peer review.
vi. The plan was sent for endorsement by the GB Forest Department and relevant community.

The team collected data from the sample sites as well as for the entire forest during inventory in the sample plots, a transact walk and discussions with the community and forest officials. The location of sample plots is provided in **Figure 1.**

Figure 1. Location map of sample Plots



1.4 Policy Alignment

The objectives of this local PFMP are aligned with the following provincial, national, and global policies/strategies/commitments related to REDD+.

1.4.1 Global Commitment

"Reducing Emissions from Deforestation and forest Degradation, plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks (REDD+), is an essential part of the global efforts to mitigate climate change" (FAO, 2021). The REDD+ is a framework created by Conference of Parties (CoP) of UNFCCC to incentivise developing countries either to reduce emissions of Green House Gases (GHGs) or to increase sink of CO_2 in forest lands (UNFCC, 2021).

1.4.2 National Policies/commitments

Pakistan is an active member of the international negotiation forum on climate change and making efforts to reduce emissions suiting to the priorities of its citizens (GCISC, 2018). The Government of Pakistan in its Nationally Determined Contribution (NDC) report of has indicated the county is commitment to reduce 15% of its projected emissions with national level resources by 2030. Pakistan has also committed to reduce additional 35% of emission through energy transition by 2030, if international grants finance US$ 101 billion to implement energy transition (GoP, 2021). The energy transition plan of Pakistan includes production of energy from renewable sources, ban on imported coal, and promotion of electric vehicles (ibid).

The National Climate Change Policy (NCCP) of 2012 under Section 4.4 on Forestry Sector states that the climate change is likely to have multi-faceted adverse effects on the ecosystem, particularly on the already vulnerable forestry sector in Pakistan. Mitigations in the forestry sector entail restoration of Pakistan's forests through

sustainable forest management, with particular focus on how these are affected by climate change. This will not only benefit state forests but also the forests dependent communities and the whole society in general. The most likely impacts of climate change will be decreased productivity, changes in species composition, reduced forest area, unfavourable conditions for biodiversity, higher flood risks and the like, as portrayed in the Planning Commission Task Force on Climate Change (TFCC) Report (GoP, 2010). In the light of this realization, the Forest Policy of Pakistan 2015 provides legal basis to Federal Government in provisioning of support required to Provinces and other Territories in their efforts in combating deforestation, increase in forest cover, and meeting obligations (GoP, 2015).

1.4.3 Provincial Policies/commitments

The climate change policy of Gilgit-Baltistan acknowledges the role of forests in mitigation and adaption and most particularly to improve resilience of communities and their livelihoods in future scenarios of changes in local climate (GB-EPA 2017 p 28-33). The activities mentioned in this PFMP forest of Guro-Juglot valley align well with the actions suggested in the climate change policy of Gilgit-Baltistan for managing forest and pastures.

2 Participatory Forest Management Planning

The data and information gathered during PFMP survey through, participatory planning with communities were analysed, results compiled, and interventions identified **(Annex 3, data)**.

The results are presented in this chapter.

2.1 Ecology

2.1.1 Location

Guro-Juglot is located in Union Council Danyore of District Gilgit at the left bank of Hunza-Nagar River and at a distance of 45 km from Gilgit. The total forest area selected for demonstration of REDD+ is about 11889.35 hectares located at Longitude 74.38E and 36.15N latitude (**Fig 2**). The forest patches are located somewhere between 3-5 km uphill on the NE of the village. The major land cover of the area is barren rocks followed by snow cover grazing lands and forests. The areas close to habitations in the valleys consist of farm forests/orchards and croplands

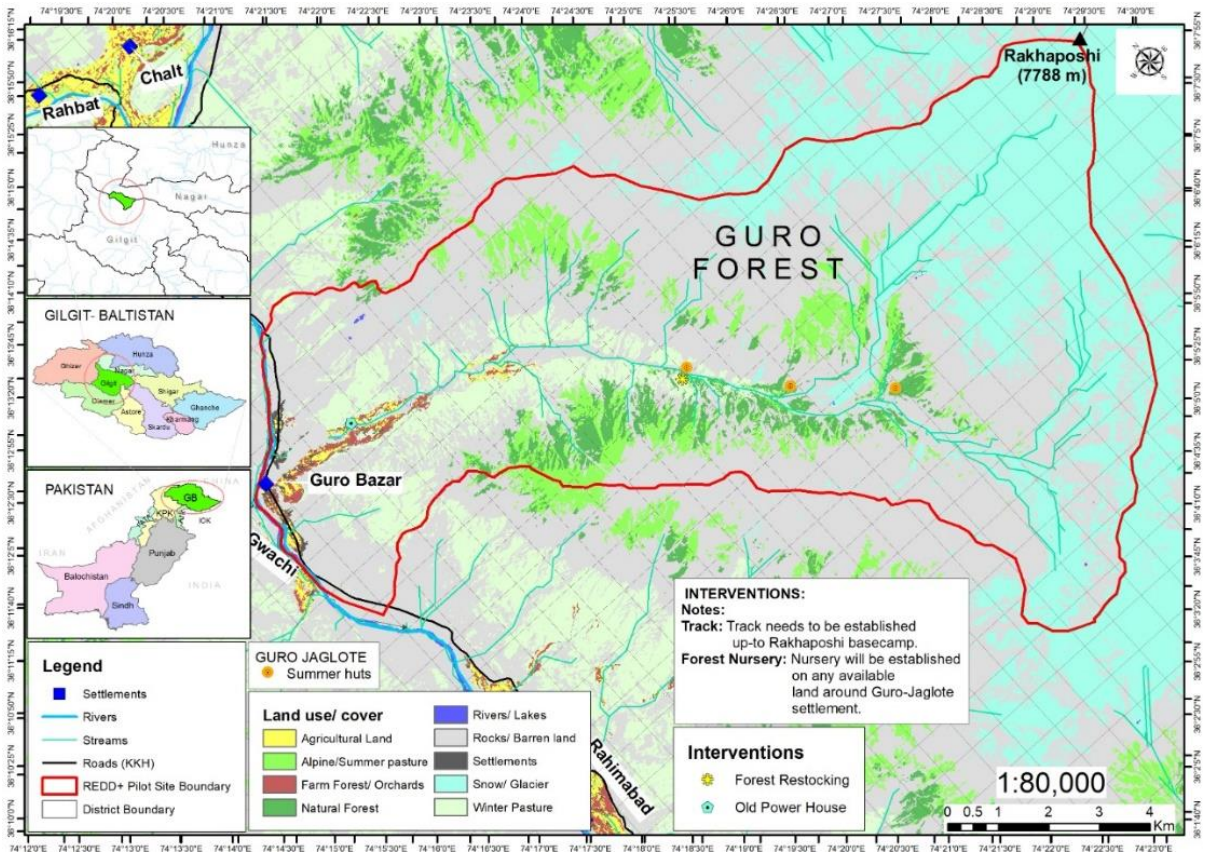


Figure 2: Land Use and Location map of Guro-Juglot Forest

2.1.2 Site description

Guro-Juglot is a high-altitude forest and falls under dry temperate zone with winter snowfall harsh winter. The higher reaches of the forests comprise glacial reserves which make these forests an important hydrological asset for GB and the rest of the country. The location of forests is close to the road which opens avenues for tourism and other opportunities. At the same time, however, the threat of forest exploitation for cash is also valid. Forest falls in the legal category of Protected Forest (PF). The protected forests are managed and

controlled by the GB Forest Department. However, the local communities have rights and concession in the PF which includes collection of deadwood and grasses and grazing of livestock.

2.1.3 Vegetation type

The forest of has mixed and pure stands comprised of Kail (*Pinus wallichiana),* Spruce *(Picea smithiana)* and Juniper (*Juniperus Spp)* located at an elevation range of 1629-7507 masl.

Along the timber line, small patches of birch (*Betula utilis)*, and juniper (*Juniperous excelsa*) are sparsely growing while species of willow and poplar at lower elevation particularly along streams and rivers. The forest of Guro-Juglot and other forests in District Gilgit have been under pressure for long due to increased urbanizations in Gilgit (capital city of Gilgit-Baltistan), resulting in increased demand for timber and firewood from the adjacent forests.

Ecologically, the entire area falls in dry temperate region of the Karakoram mountain range. The lower altitude of Guro-Juglot falls in double crop zone, with short but severe winter with temperature below -10◦C. In summer, temperature rise to 40◦C at lower altitude. The pastures and patches of forest are located at higher altitude when receive snow fall throughout winter. The Guro-Juglot glacier is located on the Northern ridge of the valley. There are a number of treks on high altitudes which connect Guro-Juglot with neighbouring villages (Nilt, and Gulmat) of District Nagar, and Rahimabad in District Hunza as well as the base camp of famous Rakaposhi base camp.

2.2 Socio-economic Conditions

2.2.1 The village and the people

The village has 225 households and approximately 2000 individuals. The village is last village of District Gilgit on KKH- the road leading to China through District Nagar and Hunza. The entire population speak Shina languages which is one of the major languages spoken in Gilgit-Baltistan.

2.2.2 Health and Education

The literacy data of the population is not available, but according to the local sources approximately 50% of the males and 35% of the females are literate. There is a basic health unit in the village, but in case of emergencies people go to Danyore or to the District headquarter hospital in Gilgit in case of emergencies. The village has a three-megawatt hydropower which generates two megawatts of electricity which is supplied to neighbouring villages of District Hunza, Nagar and Gilgit.

2.2.3 Sources of livelihoods and dependence on forest resource

The community of Guro-Juglot is a sedentary population of agro-pastoralists who all have equal rights and concessions regarding access and use forest resources. There are 15 pastures in Guro-Juglot which are used for grazing of livestock by community (CKNP, 2011). The local livestock comprises of yaks (5-10), cows (500), sheep (1000) and goats (3000) CKNP (2011). In the past 5 years, their dependency on agro pastoralism has decreased with increased flow of tourists. The local people have established small businesses including hotel, restaurants, and grocery shops to cater services for tourists who pass through their village. The local population is increasingly shifting their livelihood from agriculture and animal husbandry to business, therefore their dependency on natural resources is decreasing.

Although improvement in local economy has been observed in the past 5 years due to increased tourist flow, a large majority of the population rely on forest and pasture for their livelihoods. In absence of economical and sustainable substitutes for fuelwood and timber, the households use fuelwood for space heating and cooking. The Liquid Petroleum Gas (LPG) is considered a substitute of fuelwood but only few households can afford paying for LPG as a suppliant for cooking. Even these household can't afford using LPG for heating. Prices of LPG are high compared to rest of the country due to high transportation cost to Gilgit-Baltistan.

A study conducted in 2003 estimated per capita per annum local wood consumption in Gilgit Baltistan as 1.395 m^3 (Ministry of Environment, 2003) Khan et al., 2009) estimated per capita fuelwood consumption was approximately 12,079 kg (12.079 m^3) per annum for Bunji village located in District Astore. Ullah et al. (2021) estimated 593 kilogram (0.593 m^3) of timber every month in 7 Basho villages in Skardu district. Since these villages fall in similar ecological zone, this data was used to assess the total quantity of timber used in Guro-Juglot (**Table 1**).

Table 1. Per annum wood consumption in Guro-Juglot

B	Villages	Households	Population	Per annum wood consumption (cubic meters)		
				Fuel wood	Timber	Total
1	Guro-Juglot	225	2,000	2,717.78	1,601.10	4,318.88

A hydroelectricity power plant in Guro-Juglot has the capacity to generate 4MW electricity, but it is producing 2MW. Electricity from this facility is provided to Guro-Juglot and other neighbouring villages and Gilgit town. Electricity is only provided for lightening and not for heating and cooking. The production of hydropower drastically decreases during autumn-winter due to shortage of water. Abrupt power cut and load-shedding is also common during summer due to maintenance of hydropower plant and the channel. If electricity generated at Guru is provided to the local population as a priority for heating and cooking, pressure on the forest will drastically reduce.

2.2.4 Stakeholder Analysis

The stakeholder analysis (**Annex 2**) was conducted to acquire information about major actors, and their interest and influence on forest resources utilization, management, or restoration. The interest and influence explored through stakeholder analysis indicate who is doing what in managing forest and who has the legal rights in the forest. The stakeholders identified were categorized as primary and secondary based on the level of their participation and partnership in social, technical, financial, and legal aspects of forest management and REDD+.

The Community and its institutions

The community of Guro-Juglot is and an important stakeholder and provides voluntary assistance to the Forest Department in events of forest fire and providing information to Forest Department about forest offences. The community has also formed a local organization under title Wildlife Conservation and Sustainable Development Organization (WCSDO) to protect the forests. In the past some locals have harvested timber and firewood illegally for extra income. In recent years the community with the support of the Forest Department has successfully controlled illegal harvesting.

Traditional Jirga: The local Jirga system is one of the epic body of decision making consists of members (Motabars1) and a head of Jirga. The member and the head are nominated by different Qoams(clans) as their representatives. The head of the Jirga is selected through consensus or majority votes of the Motabars. The Jirga makes decisions pertaining to all communal matters of the village. This includes conflict resolution. If the jirga is not able to resolve any conflict, the parties may seek support of religious leaders or take the case to the formal judicial system. It is important to note that seeking intervention of the jirga for conflict resolution is not mandatory. Most cases which involve conflict on communal resources however are resolved through the jirga.

WCSDO: The WCSDO is working on conservation and development of natural resources since 2012. The elected members of the WCSDO work voluntarily to control illegal cutting and transportation of timber and firewood. However, the authority to confiscated illegal wood and arrest offenders rests with the Forest Department which has established a check post on KKH near the village and appointed staff for watch and

[1] Trusted, respected and active individuals of the community sitting in the *Jirga* as members

ward inside the forest. Apart from Forest Guards and Game Watchers appointed by Forest Department, the community members have appointed *Nighbans*[2] who get paid from the Assisted Natural Regeneration (ANR) project by the Forest Department. The *Nighbans* are contract based employees whose services will be terminated at the end of the ANR. The major role of *Nighbans* is to protect the natural regeneration in the enclosure established under ANR.

The Forest Department

The FD is the custodian of the Government Protected Forest. The head office of the department is in Gilgit. The REDD+ Cell and offices of the DFO and Conservator of forest responsible for Guro-Juglot and other forest areas in Giligt district are also based in Gilgit. The department has a Range Forest Officer (RFO) and several Forest Guards posted in Guro-Juglot to protect the forest.

Ministry of Climate Change

The forest is a provincial subject and the provincial governments are responsible to mange forests and make policies and rules as per the need of the provinces. The Federal Government represented by the Ministry of Climate Change (MoCC) provide vital guidance, experience sharing opportunities and international linkages to the provinces especially on REDD+. The Federal Government also signs international conventions related to environment. United Nations Framework Convention on Climate Change is an example. These obligations are then communicated to the provinces as actual actions on ground for fulfilling these obligations are taken in the provinces. The MoCC therefore is an important stakeholder in forest management in the provinces.

Other stakeholders

The Revenue Department (government agency tasked as custodian of land) and security agencies which intervene only if called by relevant authorities are other stakeholders. Protection of forest is however not their core area of responsibility; these actors therefore fall in the category of marginal players in the matrixes.

2.2.5 Stakeholder Interest and Influence

The stakeholders and their roles identified were further analysed by using the influence-interest matrix to explore their type and level of influence and interest in forest management and carbon pools (**Table 2**). This matrix helps in understanding the actual influence and interests and may help identifying the need for increasing the involvement of specific stakeholders. It was found that the FD and local community with irrigated land inside the forest are the major players with greater interest in forest management. The major players in forest management are those having major interests and influence on using and protecting carbon pools. The stakeholders themselves may not be aware of this since the concepts are new. They may need awareness raising about this, especially of the importance and benefits of management of carbon pools.

The MoCC falls in the category of neglected players. It is because the MoCC has a high interest, but until now little influence on local forest management and carbon pools on ground. This may change in the future with increasing REDD+ initiatives supported on by the MoCC in the provinces which would also involves their role in distribution any income from sale of carbon.

The Revenue Department and law enforcement agencies also occasionally contribute to forest protection when called in events of disputes and forest offenses, but since the protection of forest is not their core area of responsibility they fall in the category of marginal players in the matrixes.

[2] Nighaban are appointed by FD to protect natural regeneration in enclosures

Table 2. Interest influence matrix on Forest Management and Carbon Pools

INTEREST	**Neglected players:** Need special attention to safeguard their interests	**Major players:** Need to be fully involved
HIGH **Score 2 and 3**	Law & Enforcement Agencies MoCC	Forest Department; due to their direct role in protection and management of forest. Local community: The local community is consists of forest user group which has rights and concessions in the forest 10 BTTP; with the given mandate to plants millions of tree in Gilgit-Baltistan. WCSDO; A community based organization due to its role in conservation and coordination with organizations working in the area for conservation
	Marginal players: Low Priority, Do not put too much energy	**Controllers:** Source of risk, Need for careful monitoring, and Management
LOW **Score 0 and 1**	Tourist, Mining, CKNP	Revenue Department
	INFLUENCE Low Score 0 and 1	INFLUENCE High Score 2 and 3

2.3 Analysis of drivers of deforestation, forest degradation and barriers to enhancement

Globally the anthropogenic activities that result in deforestation and forest degradation are accounted for 17–25% of annual GHG emissions causing global warming (Le Quéré et al., 2015). The Reductions in Emissions from Deforestation and Forest Degradation (REDD) is an international policy negotiated in 2005 under the United National Framework convention on Climate Change (UNFCC) to mitigate climate change and its impacts. The extension of REDD+ in REDD policies is to create financial benefits for forest owners for enhancement and storage of carbon in forest sinks by controlling drivers of deforestation and forest degradation. The analysis of the drivers of deforestation and forest degradation is therefore considered an essential component to understand the current trends and take essential steps to manage forest in ways that contribute towards climate change mitigation, and restoration of ecosystems services (Kissinger et al., 2012).

The excessive use of forest in the past which included harvest by the government to supply wood for government uses outside Guro-Juglot and local uses resulted in severe deforestation. The Government has now put a ban on harvesting except for local uses with permission.

In the light of the discussions and data gathered during preparation of PFMP, **the following drivers of deforestation and forest degradation** were identified:

Drivers of Deforestation

i. Large scale harvesting by the government in the past to supply timber and fuelwood for uses outside the valley
ii. Harvesting by the local community for local uses and illegal sale for cash incom

Drivers of Forest Degradation

i. Extraction of timber and fuelwood for local uses from a degraded forest. Heating during long winters in addition to cooking need enormous quantities of fuelwood
ii. Small scale illegal harvesting of wood to sell for cash income in the absence of alternate sources of livelihood and income
iii. Grazing of animals resulting in damages to naturally regenerating areas

Barriers to forest restoration

i. Non-availability of alternate sources of energy especially for heating and cooking
ii. Uncontrolled grazing Livestock grazing is a major barrier to forest restoration.
iii. Lack of recognition of community's role in forest management

2.4 Carbon stock assessment in Guro-Juglot

This section provides detailed description of the results based on analysis of data collected from selected sample plots (**Figure 1**) in Guro-Juglot forest. The forest carbon stock is also calculated in individual trees/ species level (**Annex 3**), and in different pools (above, below ground and in soil) at sample plots. The quantity of carbon stock in the sample plots over the past 10 years (in absence of REDD+), and in the future 10 years in REDD+ scenario is also presented.

2.5 Plot level Carbon Stock Estimation

Based on the field data carbon stock (tons per hectares) for Above Ground Carbon (AGB) and Below Ground Carbon (BGB) was worked out using the standard sets for particular tree species, tree DBH and height, and dry biomass of shrubs and litter. The tree species level carbon stock is given in **Annex 3**. The estimated plot level carbon stock is given in **table 3**. The estimated stock of carbon per hectares (ha) was then used to estimate the total carbon stock in the selected forest site of Guro-Juglot.

Table 3. Plot level Above Ground and Below Ground carbon stock

Plot No.	Average AGC (tonnes/ha)	Average BGC (tonnes/ha)
1	26.30515501	6.576288753
2	2.025714509	0.506428627
3	1.354776001	0.338694
4	2.211402597	0.552850649
5	2.76774397	0.691935992
6	1.398325452	0.349581363
7	1.983754672	0.495938668
8	1.494879396	0.373719849
9	3.628576896	0.907144224
10	2.417850353	0.604462588
Average	3.41850034	0.854625085

2.6 Forest Cover Assessment

The historical trend of changes in forest cover is an important barometer to understand the impact of the management practices and use of forest. Therefore, changes in forest cover over a period of 10 years (2011-2021) was assessed using Landsat multispectral 30m spatial resolution satellite images on the path (149) and row (36) and Google Earth Engine Cloud Computing platform for the classification of forest cover by applying Random Forest Machine Learning Algorithm. The analysis indicates that the forest cover in Guro-Juglot has decreased by 160.8 ha in the past 10 years. The average rate of changes over the past ten years remained at 16.08 ha (**Table 4**). The major driver of deforestation was found to be the increasing biotic pressure in the past decade, mainly due to over harvesting by right holder community of Guro-Juglot and illegal cutting by local offenders.

Table 4. Forest cover assessment (2010-2021)

No	Landsat Satellite Sensor	Landsat data acquisition	Forest Cover (ha)
1	Landsat-5	21-Jun-2011	730.71
2	Landsat-8	09-Jun-2021	569.88
Changes in forest cover in last 10 years			-160.83
Per year change in Forest cover per			-16.083

Table 5 provides **three scenarios** of forest cover in the coming ten years that can be followed:

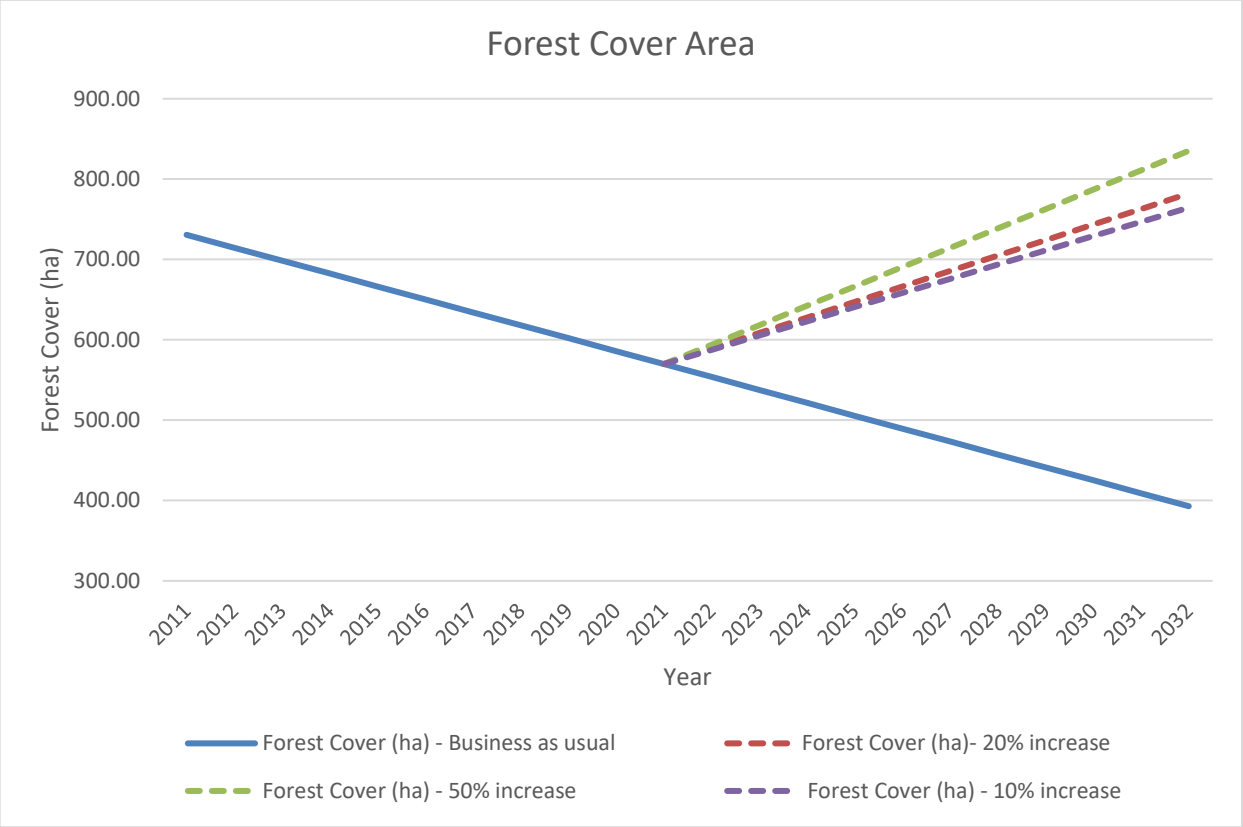
1. Adding 10% more forest cover in addition to reversing the current average annual reduction of 16.08 ha.
2. Adding 20% more forest cover in addition to reversing the current average annual reduction of 16.08 ha.
3. Adding 50% more forest cover in addition to reversing the current average annual reduction of 16.08 ha.

The above scenarios mean that for the forest cover to recover from the current annual loss of 16.08 ha (as observed in the last 10 years) and enhancing it by 10%, 8 ha of forest cover per annum would be required to be added, which will increase the forest cover to 12,396 ha instead of 12,303 ha in the business as usual scenario. Similarly, in 20% and 50% scenarios an annual increase in forest cover would be 9 ha and 10 ha per annum which will extend the forest cover to 12,401 ha and 12,414 ha respectively.

Table 5: Forest Cover (ha) Scenarios based on trend in the past 10 years

Rate of change per year	-16.08	1.61	3.22	8.04
Year	**Forest Cover - Business as usual**	**Forest Cover - 10% increase**	**Forest Cover - 20% increase**	**Forest Cover - 50% increase**
2011	730.71			
2012	714.63			
2013	698.54			
2014	682.46			
2015	666.38			
2016	650.30			
2017	634.21			
2018	618.13			
2019	602.05			
2020	585.96			
2021	569.88	569.88	569.88	569.88
2022	553.80	587.57	589.18	594.00
2023	537.71	605.26	608.48	618.13
2024	521.63	622.95	627.78	642.25
2025	505.55	640.65	647.08	666.38
2026	489.47	658.34	666.38	690.50
2027	473.38	676.03	685.68	714.63
2028	457.30	693.72	704.98	738.75
2029	441.22	711.41	724.28	762.88
2030	425.13	729.10	743.58	787.00
2031	409.05	746.79	762.88	811.13
2032	392.97	764.48	782.18	835.25

These scenarios are presented visually in **Figure 3** (Forest cover Scenarios)



2.7 Total Carbon stocks estimation

The field data and biomass collected from 10 samples was used to calculate Above Ground Biomass (AGB) using locally developed algometric equations (Forest inventory 2018) based on the forest cover in 2011 and 2021 (**Table 6**). The amount of carbon trapped in 5 carbon pools (above ground biomass, below ground biomass, soil organic carbon, deadwood and litter on forest floor). Here, the five carbon pools have been grouped into three carbon pools (above ground, below ground and soil).

In Guro-Juglot forest, the cumulative carbon stock in three carbon pools (above, below and soil) was estimated to as 60,764.09 tonnes of Organic Carbon (Corg) back in 2011 which reduced to 47,389.85 tonnes in 2021. This reduction was due to decrease in forest cover from 730.71 ha in 2011 to 569.88 ha by year 2021 (see figure 4 and **table 6**).

Figure 4: Forest Cover Maps used for Change Analysis

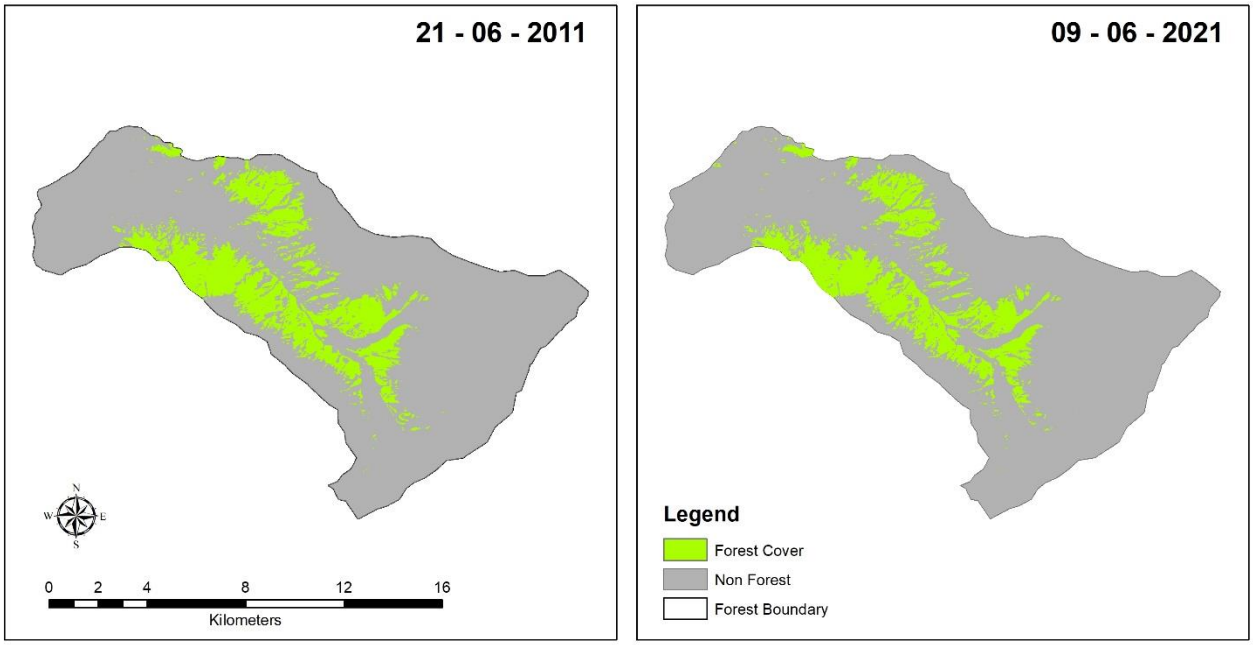


Table 6. Carbon stock estimation (2011-2021)

Carbon pool	Mean carbon stock (ton C stock per hectare)	Forest Cover (ha)	Total stock (ton C stock)	CO_2 (tonnes CO_2 eq)
2011 (2011-Jun-21)				
Above	3.42	730.71	2,497.93	
Below	0.85		624.48	
Litter	0.58		425.42	
Deadwood	18.95		13,848.62	
Soil*	59.35		43,367.64	
Cumulative			60,764.09	222,801.7
2021 (2021-Jun-09)				
Above	3.42	569.88	1,948.13	
Below	0.85		487.03	
Litter	0.58		331.78	
Deadwood	18.95		10,800.52	
Soil	59.35		33,822.38	
Cumulative			47,389.85	173,762.8
Rate of change per year				
2021-2011		**- 16.08**	**- 1,337.42**	**4,904**

***** Soil Carbon Value taken from NRO Inventory

2.7.1 CO_2 emissions reduction Scenarios for deforestation

This section presents the future CO_2 emissions reduction scenarios applying 10%, 20% and 50% reduction to current emissions rate over the past 10 years due to deforestation (As per definition of forest adopted by Pakistan for REDD+).

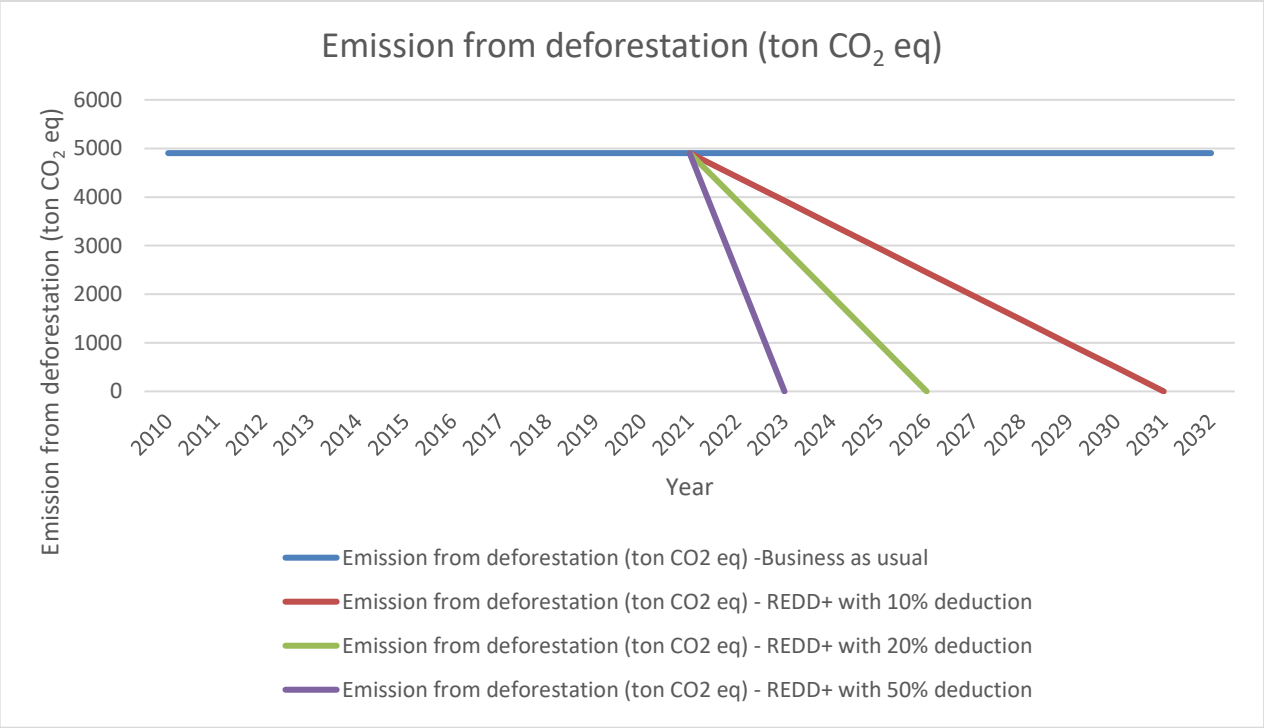
Table 7: Deforestation Emissions trend and Different Emissions reduction scenarios

Rate of change per year	4904	-490	-981	-2452
Year	Emission from deforestation (tonnes CO_2 eq) -Business as usual	Emission from deforestation (tonnes CO_2 eq) - REDD+ with 10% reduction	Emission from deforestation (tonnes CO_2 eq) - REDD+ with 20% reduction	Emission from deforestation (tonnes CO_2 eq) - REDD+ with 50% reduction
2010	4904			
2011	4904			
2012	4904			
2013	4904			
2014	4904			
2015	4904			
2016	4904			
2017	4904			
2018	4904			
2019	4904			
2020	4904			
2021	4904	4904	4904	4904
2022	4904	4413	3923	2452
2023	4904	3923	2942	0
2024	4904	3433	1962	
2025	4904	2942	981	

Rate of change per year	4904	-490	-981	-2452
Year	**Emission from deforestation (tonnes CO_2 eq) -Business as usual**	**Emission from deforestation (tonnes CO_2 eq) - REDD+ with 10% reduction**	**Emission from deforestation (tonnes CO_2 eq) - REDD+ with 20% reduction**	**Emission from deforestation (tonnes CO_2 eq) - REDD+ with 50% reduction**
2026	4904	2452	0	
2027	4904	1962		
2028	4904	1471		
2029	4904	981		
2030	4904	490		
2031	4904	0		
2032	4904			

The above table shows that under REDD+ implementation if the deforestation trend is reversed at a rate of 10% then the forest will stop CO_2 emissions due to deforestation by the 10th year, if the deforestation rate is reduced by 20% then the deforestation will be controlled by the 5th year and at 50% reduction the CO_2 emissions because of deforestation can be set aside by the end of 2nd year as shown in the figure 5 below.

Figure 5: Emissions reduction scenarios - Deforestation



2.7.2 CO_2 Emissions Trend – forest degradation

Fuelwood and Timber consumption for the pilot site was estimated based on population of the area, population growth rate and per capita fuelwood and timber consumption statistics collected during the field survey. The total population of the pilot site in 2017 was 2000 with a growth rate of 2.74 per annum. The fuelwood and timber consumption per capita per annum was calculated as 1.36 m^3 and 0.8 m^3, respectively. Based on this data emissions from forest degradation are calculated and presented in the Table 8.

Table 8: Forest Degradation Emissions trend

Year	Population	Fuelwood Consumption (FC) (m^3/year)	Timber Consumption (TC) (m3/year)	Fuelwood Emissions[3] (FC*D*BEF2*CF*44/12) (tonnes CO_2 eq)	Timber Emission (TC*D*BEF2*CF*44/12) (tonnes CO_2 eq)	Emission from Forest Degradation (tonnes CO_2 eq) -Business as usual
2011	1693	2302	1354	2574	1514	4087
2012	1741	2367	1392	2646	1557	4203
2013	1790	2434	1432	2721	1600	4321
2014	1840	2502	1472	2797	1645	4443
2015	1892	2573	1514	2876	1692	4568
2016	1945	2645	1556	2957	1739	4697
2017	2000	2720	1600	3040	1788	4829
2018	2055	2795	1644	3124	1837	4961
2019	2111	2871	1689	3209	1888	5097
2020	2169	2950	1735	3297	1940	5237
2021	2228	3031	1783	3388	1993	5380
2022	2289	3114	1832	3480	2047	5528
2023	2352	3199	1882	3576	2103	5679
2024	2417	3287	1933	3674	2161	5835
2025	2483	3377	1986	3774	2220	5995
2026	2551	3469	2041	3878	2281	6159
2027	2621	3564	2097	3984	2344	6328
2028	2693	3662	2154	4093	2408	6501
2029	2766	3762	2213	4205	2474	6679
2030	2842	3865	2274	4321	2542	6862
2031	2920	3971	2336	4439	2611	7050
2032	3000	4080	2400	4561	2683	7243

[3] Wood Density (D)

Abies pindrow	*0.42*
Betula utilis	*0.5*
Juniperous Spp.	*0.504*
Picea smithiana	*0.43*
Pinus wallichiana	*0.43*
Average	*0.46*

Biomass Expansion Factor: BEF2 1.35 (IPCC Table 3A.1.10)

CF = carbon fraction of dry matter 0.5

2.7.3 Net Emissions from Deforestation and Forest Degradation

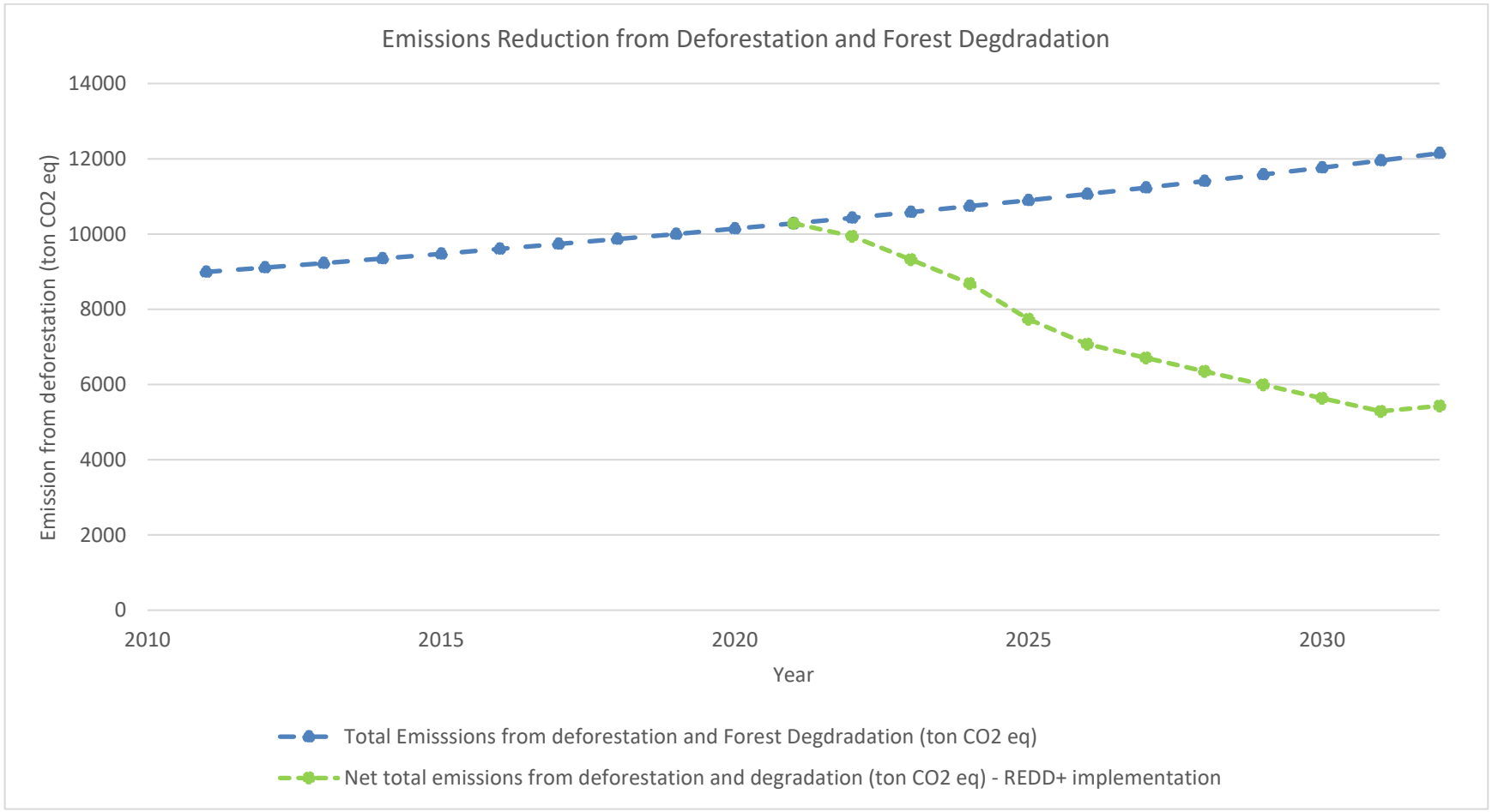
The table 9 below provides a net CO_2 sequestration scenario based on 10% forest cover enhancement in addition to addressing existing negative trend and reducing emissions from forest degradation in an incremental manner annually from 5% to 25% with REDD+ activity. In this scenario, the net emissions from the forest will continue declining till 2031 due to cumulative effect of increasing forest cover and reduction in forest degradation due to REDD+ implementation but will again start climbing due to increase in population resulting in increase in demand for fuel and local use timber. Since the deforestation rate is high due to extraction of illegal timber for sale by the local communities along with firewood pressure on forest due to extreme and long winters a concerted effort to address the livelihoods and fuelwood needs of the local communities will have to be addressed if the forest cover is to be restored and carbon sink is to be improved.

Table 9: Sequestration Scenario from Forest Enhancement and Reducing degradation

Rate of change per year	4904					-490	
Year	**Emission from deforestation (ton CO_2 eq) - Business as usual**	**Emission from Forest Degradation (ton CO2 eq) - Business as usual**	**Total Emissions from deforestation and Forest Degradation (ton CO2 eq)**	**5-25% Reduction in Degradation emissions**	**Net emissions from degradation**	**Emission from deforestation (ton CO_2 eq) - REDD+ with 10% reduction**	**Net total emissions from deforestation and degradation (ton CO2 eq) - REDD+ implementation**
2011	4904	4087	8991				
2012	4904	4203	9106				
2013	4904	4321	9225				
2014	4904	4443	9347				
2015	4904	4568	9472				
2016	4904	4697	9600				
2017	4904	4829	9733				
2018	4904	4961	9865				
2019	4904	5097	10001				
2020	4904	5237	10141				
2021	4904	5380	10284			4904	10284
2022	4904	5528	10432		5528	4413	9941
2023	4904	5679	10583	284	5395	3923	9318

Rate of change per year	4904					-490	
Year	Emission from deforestation (ton CO_2 eq) - Business as usual	Emission from Forest Degradation (ton CO2 eq) - Business as usual	Total Emissions from deforestation and Forest Degradation (ton CO2 eq)	5-25% Reduction in Degradation emissions	Net emissions from degradation	Emission from deforestation (ton CO_2 eq) - REDD+ with 10% reduction	Net total emissions from deforestation and degradation (ton CO2 eq) - REDD+ implementation
2024	4904	5835	10739	583	5251	3433	8684
2025	4904	5995	10899	1199	4796	2942	7738
2026	4904	6159	11063	1540	4619	2452	7071
2027	4904	6328	11232	1582	4746	1962	6707
2028	4904	6501	11405	1625	4876	1471	6347
2029	4904	6679	11583	1670	5009	981	5990
2030	4904	6862	11766	1716	5147	490	5637
2031	4904	7050	11954	1763	5288	0	5288
2032	4904	7243	12147	1811	5433		5433

Figure 6: Sequestration scenarios – Forest Enhancement and Reduced degradation



3 Proposed Interventions and Budget

The interventions proposed are based on the participatory forest inventory, socio-economic data, drivers of deforestation, and analysis of stakeholders. The analysis ascertained that in order to achieve effective results for sustainable forest management and incremental Carbon sequestration, the activities required under this PFMP need to cater to the larger watershed and related issues in the entire range of forest resources. The following long, medium and short term interventions (**Table 10 & 11**) with an estimated budget are, therefore, suggested for managing Guro-Juglot Forest as a REDD+ pilot site:

Table 10. Proposed interventions to control Drivers of Deforestation and Forest degradation

	Drivers/Barriers	**Activities to curb major drivers and barriers**	**Verifiable indicators**	**Means of verification**
1	**Deforestation**			
1.1	Large scale harvesting by the government in the past for uses outside the valley	Continue current ban	No new notification to remove ban on harvesting and no harvesting by the government for uses outside the valley	FD notifications/records
		Engage community organization in forest management	MoUs signed/notification indicating community formal community role in forest management	Reports, records
			No. of community Forest Guards/game watchers recruited and trained	Report, records,
		Plantation of forest areas where mother trees are not available	No. of plants planted	FD/community records
		Establish area enclosures for regeneration	No. of enclosure and total areas enclosed for grazing control to promote natural regeneration	FD/Forest records/progress report
1.2	Small scale illegal timber harvesting to sell for cash income in the absence of alternate sources of income	Construction of roads and bridges to promote tourism and increase access to forest for planting and promotion of tourism	No. of bridges constructed Road constructed in Km No. of Tourist facilities developed and manage by locals	FD/community records/case studies,
			% increase in employment due to better access through bridges to new sites.	Case studies and report

	Drivers/Barriers	Activities to curb major drivers and barriers	Verifiable indicators	Means of verification
		Provide trainings to local community in hospitality and tourism management.	No. of community members received trainings in tourism management/NTFP processing/handicrafts.	FD/community records/training report
2	**Degradation**			
2.1	Extraction of timber and fuelwood for local uses for. heating during long winters	Undertake energy plantations	No. of plants distributed by the FD to the community No. of plants planted by the community	FD/community records/case studies
		Provision of electricity as alternate source of fuelwood	Installation of 2-megawatt hydro station % Households reporting increased supply of electricity	PWD/FD/community records,PC1,PCII
		Introduction of fuel-efficient technologies	25% households using fuel efficient technologies	FD/community records/case studies
3	**Major barriers to enhance forest**			
3.1	Livestock grazing is a major barrier to forest restoration.	Controlled grazing in areas allocated for natural regeneration	Total area (hectare) enclosed for restricted grazing	FD/community records/resolutions
3.2	Non-availability of saplings for reforestation	Establish forest nursery to produce sapling	Forest nurseries established No. of plants produced annually in forest nursery	FD/community records
		Sowing in blank areas	Total area (hectare) sown for regeneration of natural forest	FD/community records/field visit reports

Figure 7: Percentage of Budget allocation for proposed interventions

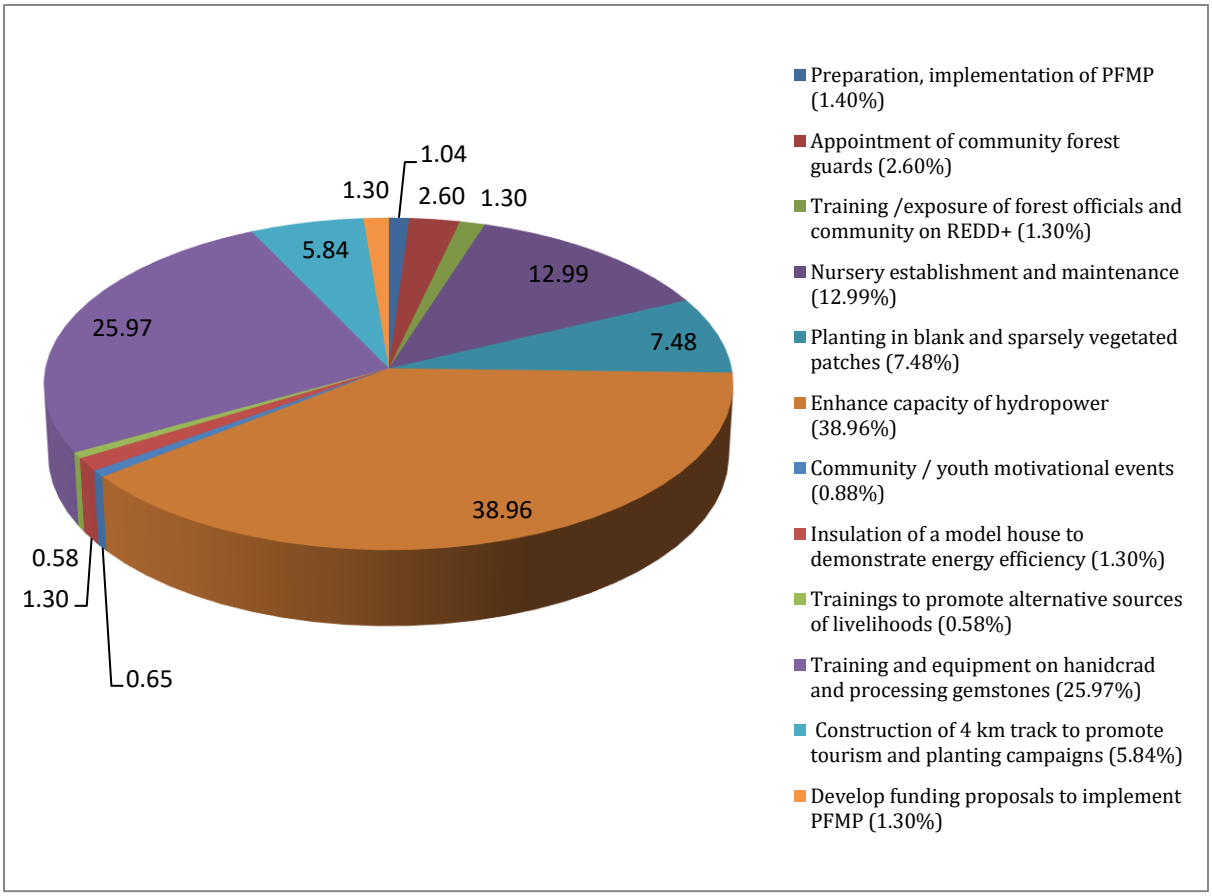


Table 11. Indicative operational plan and budget of the PFMP for 10 years (See explanation in the last para under introduction)

				Short Term			Medium Term				Long Term				
S.N.	**Activity**	**Unit**	**Unit cost**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total units**	Total budget
1	Preparation, implementation and follow up of PFMP in collaboration with stakeholders.	Meetings	50,000	3	1	1	1	3	1	1	1	1	3	16	800,000
2	Notification of REDD+ forums	Notification	0	1										1	0
3	Appointment of community forest guards	Guard	50,000	4	4	4	4	4	4	4	4	4	4	480	2,400,0000
4	Training /exposure of forest officials and community in accordance with their role in REDD+	Training exposure	200,000	1	2	2								5	1,000,000
5	Purchase and planting in empty spaces	plant	80		20,000									20,000	1,600,000
6	Nursery establishment and maintenance	Plant	40			20,000	20,000	20,000	20,000	20,000	20,000			120,000	4,800,000
7	Planting in blank and sparsely vegetated patches	Plants	40				20,000	20,000	20,000	20,000	20,000	20,000		120,000	4,800,000
8	Area enclosures for regeneration	Hectare	0			300				300				600	0
9	Sowing in blank areas	Hectare	50,000		20	20	20	20	20					100	5,000,000
10	Enhance capacity of existing hydropower plant to supply electricity to Guro-Juglot as a priority as alternative source of fuel wood	Power plant	30,000,000				1							1	30,000,000
11	Community / youth motivational events	Events	25,000	2	2	2	2	2	2	2	2	2	2	20	500,000
12	Trainings to promote alternative sources of livelihoods (e.g., hospitality and NTFP)	Training	150,000			1	1	1						3	450,000
13	Training and equipment to community on development of handicrafts and extraction and processing of gemstones	Training	10,000,000			1	1							2	20,000,000
14	Construction of 4 km track to promote tourism and planting campaigns	km	4,000,000			4								4	4,000,000
15	Develop funding proposals to generate funding for PFMP activities	Proposals	1,000,000		1									1	1,000,000
	Total														**9,7950,000**

4 Implementation Mechanism for the PFMP

4.1 Resources for activities

The Forest Department as custodian of the forest and having linkages with national and international funding sources will take a lead in this activity. The key stakeholders identified in this plan, especially the Forest Department and the WCSDO and local *Jirga* of Guro-Julgot will jointly take lead role in managing resources for implementation of activities identified in this plan. The Forest Department will submit proposals for potential funding sources including to the Ministry of Climate Change, Public Sector Development Programme (PSDP), international donors and private sector investors.

4.2 Suggested institutional mechanism for implementation of activities

The Forest Department in consultation with the community will decide on formation/notification of suitable institutional mechanism for implementation of this plan. It is suggested that village and district level REDD+ implementation committees notified by the Forest Department will oversee implementation of activities. The notifications will include description of responsibilities of Forest Department, the respective communities, and any other relevant stakeholders.

VRIC: In consultation with the community the Forest Department may notify two committees. A Village REDD+ Implementation Committee and the District REDD+ Implementation Committee. The village REDD+ implementation Committee (VRIC) Guro-Juglot may consist of representative from the community and the Forest Department. The community will nominate representatives for the VRIC to represent them. The representatives of the community will be responsible to ensure and harness community support for the implementation of activities. The Forest Department will assign duties of a Rang Forest Officer to represent the department in the VRIC. The VRIC may be Co-chaired by a community member nominated by the community and the RFO.

DRIC: The VRIC will be supported by a District level REDD+ Implementation Committee (DRIC) chaired by the Deputy Commissioner and consisting of Divisional Forest Officer, REDD+ Focal Person and two members nominated by the Guro-Juglot community including the Chair of the VRIC. The responsibility of the DRIC will be to monitor progress on implementation of activities and harnessing support from the relevant actors including the government departments.

4.3 Benefit Distribution Mechanism

The implementation of the REDD+ interventions package and other support activities will increase the volume of carbon stock in the forest. The increase in carbon stock in the forest pool measured by variable means and the trade of carbon will generate substantial income for the stakeholders of Guro-Juglot Forest in due course of time. The income earned by trading carbon stock will be distributed in proportions as per the use rights held by stakeholders. The carbon and non-carbon benefits will increase the value of standing trees compared to cut trees for other uses.

Since the community will be reducing harvest of fuel wood, restrict grazing for encouraging regeneration and voluntarily participate in restocking of forest, they will expect a major share from results-based payments from reduced carbon emissions. An example is the 80:20 benefit sharing mechanism between the community and the FD from trophy hunting programme in Gilgit-Baltistan.

However, a specific distribution of benefits in case of REDD+ programme is yet to be developed by the Forest Department which will form basis for sharing of benefits in the case of Guro-Juglot Forest.

For protected forests, the current benefit sharing mechanism is suggested to be replicated at 60:40 basis where 40% is the benefit for the communities (carbon and non-carbon benefit sharing).

A specific and definitive distribution of benefits in case of REDD+ programme is yet to be developed by the FD which will form basis for sharing of benefits in the case of private forests. These proposed ratio will be finalized or confirmed only after finalizing GB based benefit sharing mechanism.

5 Conflict and grievance redressal mechanism

5.1 Conflict within the community

Traditionally, local *jirga* resolves conflicts within the community and the decisions taken are acceptable for the parties. Under REDD+ redressal, it is suggested that the same *jirga* may take lead role to resolve conflicts arising among the community regarding implementation of REDD+ activities. The structure and function of *jirga* system has been described in earlier section in this document.

5.2 Conflict between the two Hamlets or sub-groups

The WCSDO with the help of *jirgas* will settle any disputes arising within community or sub-groups due to implementation of REDD+. Any unsettled disputes will be referred to the DRIC. If conflicts are still not resolved, the matter will be taken up to the court of the formal judicial system.

5.3 Community's grievance towards the Forest Department

The REDD+ is a new mechanism for communities as well as for the Forest Department, therefore both partners (Community and the Forest Department) might be facing some conflict of interest in due course of time. In case of any such grievances arises, these will be dealt through the grievance redressal mechanism developed under the REDD+ obligation. This mechanism is also reflected well in Provincial REDD+ Action Plan for Gilgit-Baltistan.

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I. Stakeholder group (names)	Communities of Guro-Juglot Forest
2. General information Location of stakeholder groups (e.g., different villages/hamlets in and outside forest area) and names and indicate on map if possible	See Figure 2 for location Goru-Jaglot village.
3. Social organization in the forest area	
A. Traditional organizations (e.g., jirga)	
Organization (name; purpose; membership)	Local Jirga. Jirga is a traditional organization comprising of local elders for managing communal matters (e.g., irrigation system, grazing controls, paths, collection of communal fees) and conflict resolution
B. Formal organization (e.g., social; welfare organization or village development committee	
Organization (name; purpose; membership)	WCSDO is a local organization formed by local communities to protect forest. The registration of WCSDO with Forest Department is in process.
Organization (name; purpose; membership)	Disaster Management Committee which manages operation related to disasters.
4. Use of forest and forest area (for what are you using the forest area?)	
Timber for personal use like house construction, etc. (where; locate on the map)	Yes. From the accessible areas and where marked by the FD once the user is given permission by the FG. Occasional illegal harvesting may take place both for local use and for sale
Timber for commercial selling (where; locate on the map)	No. In the past people have sold timber illegally. Now this practice is discouraged and commercial sale of timber is seldom
Firewood (where; locate on the map)	Yes. As the forest is drastically reduced, firwood is now not readily available and is collected from the accessible areas from deep within the forest
Grazing (where; locate on the map)	Yes. All over the forest and in the rangeland around the forest
Grass cutting (where; locate on the map	NO.
Other products, e.g., mushroom, pine nuts, pine needles, vegetables, stones, minerals, medicinal plants (where; locate on the map)	Yes. Mushrooms, medicinal plants from all over the forest
Forest areas related daily labour/employment (employed by whom; for what?)	The forest FD pays to daily labour hired for planting or services provided by locals for transportation of saplings and tool.
Tourism (what; where; locate on the map)	Tourist mainly passes through the KKH road near the village but outside the forest and may stop for services at the facilities by the roadside. So far there is no tourist activity within the Guro-Juglot forest. Potential of tourism exist in along the Guro-Juglot stream which runs through the middles of the forest
Hunting/Fishing	Trophy hunting, illegal hunting of birds (Ram chuckor)

What would it mean if you had no access to these forest products? (Any alternatives? Threat to livelihood?)	Dead fallen by permission of committee according to need, popular plantation, mining, Tourism Business, 10 BTTP opportunities, ANR, Enhancement of social forestry, skill development.
5. Rights and concessions in forest area	
Do you have formal, legal, or traditional, customary rights on forest products (use)? Which ones? If documented rights, where?	Legal: As per the Forest Act 1927 Traditional/Customary unless restricted by the FD in a areas set aside for regeneration.
Timber (shares)	Yes: with the permission of the Forest department for local use from an area marked by the FD
Fodder: grass cutting/grazing	Yes. Legally as per the Forest Act 1927 and also a traditional/customary right unless restricted by the FD in an area set aside for regeneration
Firewood	Yes. As per the Forest Act 1927 and also a traditional/customary right unless restricted by the FD in an area set aside for regeneration
Other products:	Yes: NTFPs a legal right as per Forest Act 1927 and also a traditional/customary right unless restricted by the FD in an area set aside for forest regeneration
6. Conflicts / disputes	
On different land uses: Describe nature of conflict, between which groups and put location on map if possible	There are no private land in the forest area therefore there is no such land dispute regarding the land in the forest of Guro juglote. Besides, grazing is banned on ANR sites.
Do they have effect on forest management? And how?	Since there are no disputes in the forest land, it will contribute to implementation of joint forest management activities under REDD+ and 10BTTP.
On social issues: Describe nature of conflict, between which groups and put location on map if possible	Some of the members who harvest wood illegally for sale can be a source of conflict.
Do they have effect on forest management? And How?	None The larger community seems committed to conservation of forest, they will be able to contain such conflict with the support of the FD
Existing Conflict resolution mechanisms: - traditional (e.g., jirga) - formal (court)	Local *Jirga*. FD, Revenue Department. Formal Justice System
7. Other Forest Management Projects	
Are there any other Forest Management Projects in the area? If so, which projects? What are their activities?	AKRSP has supported the community for establishment of irrigated plantations. AKRSP is supporting the community on construction of flood protection works. The 10BTAP is supporting the community to raise irrigated plantations and regeneration of forest. These activities would reduce pressure on natural forest in the near future.

STAKEHOLDER	INTEREST in Forest		INFLUENCE on Forest	
	Type of interest	Level of interest*	Type of influence	Level of influence *
Forest Parks and Wildlife and Department (FPWED)	Sustainable management of forest resources and avoid forest degradation as legal representative of the Government	3	Legal controller: decision on use, protection, and improvement of forest resources. Ban on timber extraction	3
Community	Grazing, harvesting timber, fuel wood, NTFP, Water	3	Local use and control of forest benefits; De facto control to stop any illegal harvesting of timber and grazing by outsiders in areas near their irrigated lands and settlements	2
Law & Enforcement Agencies	Law enforcement when called by the relevant authorities	0	None	1
Mining	Forest path used for transporting products	0	None	0
WCSDO	Protect forest and other biodiversity for social, cultural and economic benefits of the area	3	Participation in activities related to management of forest and biodiversity.	2
CKNP	Conservation of biodiversity including forest.	1	Part of Forest department, noted above for the Forest department	1
Illegal harvesters (Insiders who have rights in the forest)	Enhance their earning through illegal trade of timber and firewood.	2	Over-exercising rights in forest, resultantly creating conflicts within the community and between the forest department and the community	2
Graziers	The grazers are interested more in pastures, but they also use forest while stay on higher elevations during summer season with livestock. They also bring dead wood collected in their summer camps.	2	Cause damage to seedlings and reducing forest cover It also causes conflict between the communities – those having more livestock and those have less or no livestock.	2
Revenue Department	None	0	Land monitoring and related dispute management	2
Ministry of Climate Change	Sustainable management of forest resources and avoid forest degradation	2	Indirect influence through policies and (international) lobby	1

*Scale	Level of interest	level of influence
0	None	Negligible or ignored
1	Little	Little
2	Significant	Significant
3	High/vital for existence	Controller

Plot No.	Latitude	Longitude	Tree ID	Species Name (Local Name)	Tree Specie (Scientific Name)	DBH (cm)	Tree height (m)	Dry AGB (kg)	AGB (ton/ha)	AGC (ton/ha)	BGC (ton/ha)
1	36.15015	74.37022	1	Fir	*Abies pindrow*	73.66	11.9	762.77	7.63	3.58	0.90
1	36.15015	74.37022	2	Fir	*Abies pindrow*	76.2	9.9	694.13	6.94	3.26	0.82
1	36.15015	74.37022	3	Juniper	*Juniperous Spp.*	53.34	8.6	427	4.27	2.01	0.50
1	36.15015	74.37022	4	Juniper	*Juniperous Spp.*	50.8	3.7	393	3.93	1.85	0.46
1	36.15015	74.37022	5	Fir	*Abies pindrow*	76.2	7.8	572.05	5.72	2.69	0.67
1	36.15015	74.37022	6	Spruce	*Picea smithiana*	243.84	30.5	16,906	169.06	79.46	19.86
1	36.15015	74.37022	7	Spruce	*Picea smithiana*	213.36	31.6	13,893	138.93	65.30	16.32
1	36.15015	74.37022	8	Spruce	*Picea smithiana*	213.36	32.1	14,080	140.80	66.17	16.54
1	36.15015	74.37022	9	Spruce	*Picea smithiana*	231.14	30.2	15,312	153.12	71.97	17.99
1	36.15015	74.37022	10	Spruce	*Picea smithiana*	215.9	32.8	14,630	146.30	68.76	17.19
1	36.15015	74.37022	11	Spruce	*Picea smithiana*	53.34	7.5	392	3.92	1.84	0.46
1	36.15015	74.37022	12	Spruce	*Picea smithiana*	15.24	2.5	19	0.19	0.09	0.02
1	36.15015	74.37022	13	Spruce	*Picea smithiana*	22.86	3.6	50	0.50	0.24	0.06
1	36.15015	74.37022	14	Spruce	*Picea smithiana*	53.34	3.9	225	2.25	1.06	0.26
2	36.14819	74.37384	1	Kail	*Pinus wallichiana*	64	11.6	822	8.22	3.86	0.97
2	36.14819	74.37384	2	Juniper	*Juniperous Spp.*	30.4	5.5	164	1.64	0.77	0.19
2	36.14819	74.37384	3	Kail	*Pinus wallichiana*	60.9	12.3	793	7.93	3.73	0.93
2	36.14819	74.37384	4	Kail	*Pinus wallichiana*	48.7	14.4	615	6.15	2.89	0.72
2	36.14819	74.37384	5	Kail	*Pinus wallichiana*	64	14.6	1,006	10.06	4.73	1.18
2	36.14819	74.37384	6	Kail	*Pinus wallichiana*	64	12.5	877	8.77	4.12	1.03
2	36.14819	74.37384	7	Kail	*Pinus wallichiana*	20.3	7	70	0.70	0.33	0.08
2	36.14819	74.37384	8	Juniper	*Juniperous Spp.*	20.3	5	82	0.82	0.39	0.10
2	36.14819	74.37384	9	Juniper	*Juniperous Spp.*	17.7	2	65	0.65	0.31	0.08
2	36.14819	74.37384	10	Kail	*Pinus wallichiana*	22.8	13.2	150	1.50	0.70	0.18
2	36.14819	74.37384	11	Kail	*Pinus wallichiana*	57.9	14.5	838	8.38	3.94	0.99
2	36.14819	74.37384	12	Kail	*Pinus wallichiana*	64	14.5	1,000	10.00	4.70	1.17
2	36.14819	74.37384	13	Kail	*Pinus wallichiana*	54.8	11.8	635	6.35	2.98	0.75
2	36.14819	74.37384	14	Kail	*Pinus wallichiana*	51.8	4.9	265	2.65	1.25	0.31
2	36.14819	74.37384	15	Kail	*Pinus wallichiana*	42.6	10.6	371	3.71	1.74	0.44
2	36.14819	74.37384	16	Kail	*Pinus wallichiana*	54.8	6.4	371	3.71	1.74	0.44
2	36.14819	74.37384	17	Kail	*Pinus wallichiana*	76.2	6.4	662	6.62	3.11	0.78
2	36.14819	74.37384	18	Kail	*Pinus wallichiana*	57.9	13.6	792	7.92	3.72	0.93
2	36.14819	74.37384	19	Kail	*Pinus wallichiana*	54.86	13.3	707	7.07	3.32	0.83

Plot No.	Latitude	Longitude	Tree ID	Species Name (Local Name)	Tree Specie (Scientific Name)	DBH (cm)	Tree height (m)	Dry AGB (kg)	AGB (ton/ha)	AGC (ton/ha)	BGC (ton/ha)
2	36.14819	74.37384	20	Kail	*Pinus wallichiana*	57.9	12.7	746	7.46	3.51	0.88
2	36.14819	74.37384	21	Kail	*Pinus wallichiana*	51.8	10.7	527	5.27	2.48	0.62
2	36.14819	74.37384	22	Kail	*Pinus wallichiana*	30.4	10.7	207	2.07	0.97	0.24
2	36.14819	74.37384	23	Kail	*Pinus wallichiana*	42.6	8.6	309	3.09	1.45	0.36
2	36.14819	74.37384	24	Kail	*Pinus wallichiana*	42.6	9.2	327	3.27	1.54	0.38
2	36.14819	74.37384	25	Kail	*Pinus wallichiana*	39.6	9.1	285	2.85	1.34	0.34
2	36.14819	74.37384	26	Kail	*Pinus wallichiana*	45.7	8.1	331	3.31	1.56	0.39
2	36.14819	74.37384	27	Kail	*Pinus wallichiana*	54.8	7.9	446	4.46	2.10	0.52
2	36.14819	74.37384	28	Kail	*Pinus wallichiana*	64	7.9	586	5.86	2.75	0.69
2	36.14819	74.37384	29	Kail	*Pinus wallichiana*	51.8	8.4	426	4.26	2.00	0.50
2	36.14819	74.37384	30	Kail	*Pinus wallichiana*	48.7	12.2	531	5.31	2.50	0.62
2	36.14819	74.37384	31	Kail	*Pinus wallichiana*	42.6	12.2	420	4.20	1.97	0.49
2	36.14819	74.37384	32	Kail	*Pinus wallichiana*	58.7	9.7	603	6.03	2.83	0.71
2	36.14819	74.37384	33	Juniper	*Juniperous Spp.*	22.8	5	100	1.00	0.47	0.12
2	36.14819	74.37384	34	Juniper	*Juniperous Spp.*	51.8	7.7	406	4.06	1.91	0.48
2	36.14819	74.37384	35	Kail	*Pinus wallichiana*	57.9	11	657	6.57	3.09	0.77
2	36.14819	74.37384	36	Kail	*Pinus wallichiana*	54.8	11.3	611	6.11	2.87	0.72
2	36.14819	74.37384	37	Kail	*Pinus wallichiana*	42.6	9.5	337	3.37	1.58	0.40
2	36.14819	74.37384	38	Kail	*Pinus wallichiana*	45.7	9.5	381	3.81	1.79	0.45
2	36.14819	74.37384	39	Spruce	*Picea smithiana*	27.4	3	58	0.58	0.27	0.07
2	36.14819	74.37384	40	Kail	*Pinus wallichiana*	27.4	3	56	0.56	0.26	0.07
2	36.14819	74.37384	41	Spruce	*Picea smithiana*	30.4	2.9	68	0.68	0.32	0.08
2	36.14819	74.37384	42	Kail	*Pinus wallichiana*	45.7	10.9	430	4.30	2.02	0.51
2	36.14819	74.37384	43	Kail	*Pinus wallichiana*	45.7	10.4	413	4.13	1.94	0.48
2	36.14819	74.37384	44	Kail	*Pinus wallichiana*	45.7	10.4	413	4.13	1.94	0.48
2	36.14819	74.37384	45	Juniper	*Juniperous Spp.*	36.5	6.8	224	2.24	1.05	0.26
2	36.14819	74.37384	46	Juniper	*Juniperous Spp.*	12.7	5.6	37	0.37	0.17	0.04
2	36.14819	74.37384	47	Juniper	*Juniperous Spp.*	12.7	5.8	37	0.37	0.17	0.04
3	36.1426	74.37738	1	Spruce	*Picea smithiana*	58.8	9.1	545	5.45	2.56	0.64
3	36.1426	74.37738	2	Kail	*Pinus wallichiana*	58.8	11.5	702	7.02	3.30	0.83
3	36.1426	74.37738	3	Spruce	*Picea smithiana*	48.7	12	501	5.01	2.35	0.59
3	36.1426	74.37738	4	Spruce	*Picea smithiana*	36.5	14	350	3.50	1.64	0.41
3	36.1426	74.37738	5	Spruce	*Picea smithiana*	33.5	6.9	166	1.66	0.78	0.20
3	36.1426	74.37738	6	Spruce	*Picea smithiana*	36.5	7.6	209	2.09	0.98	0.25
3	36.1426	74.37738	7	Spruce	*Picea smithiana*	33.5	6.1	150	1.50	0.70	0.18

Plot No.	Latitude	Longitude	Tree ID	Species Name (Local Name)	Tree Specie (Scientific Name)	DBH (cm)	Tree height (m)	Dry AGB (kg)	AGB (ton/ha)	AGC (ton/ha)	BGC (ton/ha)
3	36.1426	74.37738	8	Spruce	*Picea smithiana*	17.78	5	43	0.43	0.20	0.05
3	36.1426	74.37738	9	Spruce	*Picea smithiana*	57.9	6.1	378	3.78	1.78	0.44
3	36.1426	74.37738	10	Kail	*Pinus wallichiana*	33.5	2.5	68	0.68	0.32	0.08
3	36.1426	74.37738	11	Spruce	*Picea smithiana*	21.3	5	59	0.59	0.28	0.07
4	36.14034	74.38004	1	Kail	*Pinus wallichiana*	76.2	11.2	1,083	10.83	5.09	1.27
4	36.14034	74.38004	2	Spruce	*Picea smithiana*	73.66	13.3	1,101	11.01	5.17	1.29
4	36.14034	74.38004	3	Kail	*Pinus wallichiana*	43.18	7.8	290	2.90	1.36	0.34
4	36.14034	74.38004	4	Spruce	*Picea smithiana*	73.66	17	1,356	13.56	6.37	1.59
4	36.14034	74.38004	5	Spruce	*Picea smithiana*	48.26	13.9	558	5.58	2.62	0.66
4	36.14034	74.38004	6	Spruce	*Picea smithiana*	35.56	7	186	1.86	0.87	0.22
4	36.14034	74.38004	7	Spruce	*Picea smithiana*	73.66	13.9	1,143	11.43	5.37	1.34
4	36.14034	74.38004	8	Spruce	*Picea smithiana*	43.18	8.4	302	3.02	1.42	0.35
4	36.14034	74.38004	9	Kail	*Pinus wallichiana*	71.12	14.5	1,204	12.04	5.66	1.41
4	36.14034	74.38004	10	Kail	*Pinus wallichiana*	71.12	9.9	861	8.61	4.04	1.01
4	36.14034	74.38004	11	Spruce	*Picea smithiana*	38.1	6.4	194	1.94	0.91	0.23
4	36.14034	74.38004	12	Spruce	*Picea smithiana*	33.02	3	80	0.80	0.38	0.09
4	36.14034	74.38004	13	Spruce	*Picea smithiana*	17.78	6.7	55	0.55	0.26	0.07
4	36.14034	74.38004	14	Kail	*Pinus wallichiana*	35.56	7.2	192	1.92	0.90	0.23
4	36.14034	74.38004	15	Kail	*Pinus wallichiana*	40.64	3.7	135	1.35	0.64	0.16
4	36.14034	74.38004	16	Spruce	*Picea smithiana*	17.78	3.7	34	0.34	0.16	0.04
4	36.14034	74.38004	17	Spruce	*Picea smithiana*	15.24	3.8	26	0.26	0.12	0.03
4	36.14034	74.38004	18	Spruce	*Picea smithiana*	15.24	8.5	52	0.52	0.25	0.06
4	36.14034	74.38004	19	Spruce	*Picea smithiana*	68.58	6.9	559	5.59	2.63	0.66
4	36.14034	74.38004	20	Kail	*Pinus wallichiana*	38.1	12.1	342	3.42	1.61	0.40
4	36.14034	74.38004	21	Juniper	*Juniperous Spp.*	22.86	4.2	101	1.01	0.47	0.12
4	36.14034	74.38004	22	Spruce	*Picea smithiana*	22.86	3.8	52	0.52	0.25	0.06
4	36.14034	74.38004	23	Juniper	*Juniperous Spp.*	15.24	3.7	51	0.51	0.24	0.06
4	36.14034	74.38004	24	Kail	*Pinus wallichiana*	63.5	9.9	705	7.05	3.31	0.83
4	36.14034	74.38004	25	Spruce	*Picea smithiana*	60.96	5.9	401	4.01	1.89	0.47
4	36.14034	74.38004	26	Kail	*Pinus wallichiana*	68.58	13.1	1,033	10.33	4.85	1.21
4	36.14034	74.38004	27	Spruce	*Picea smithiana*	68.58	11.2	843	8.43	3.96	0.99
4	36.14034	74.38004	28	Spruce	*Picea smithiana*	22.86	3.9	54	0.54	0.25	0.06
4	36.14034	74.38004	29	Spruce	*Picea smithiana*	22.86	3.4	48	0.48	0.22	0.06
4	36.14034	74.38004	30	Spruce	*Picea smithiana*	38.1	7.2	214	2.14	1.01	0.25
4	36.14034	74.38004	31	Spruce	*Picea smithiana*	71.12	11.2	897	8.97	4.22	1.05

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4	36.14034	74.38004	32	Spruce	*Picea smithiana*	60.96	13.9	829	8.29	3.90	0.97
4	36.14034	74.38004	33	Spruce	*Picea smithiana*	73.66	13.7	1,129	11.29	5.31	1.33
4	36.14034	74.38004	34	Spruce	*Picea smithiana*	43.18	8.6	308	3.08	1.45	0.36
4	36.14034	74.38004	35	Kail	*Pinus wallichiana*	50.8	11.9	560	5.60	2.63	0.66
4	36.14034	74.38004	36	Kail	*Pinus wallichiana*	66.04	12.1	901	9.01	4.24	1.06
4	36.14034	74.38004	37	Spruce	*Picea smithiana*	50.8	12.3	549	5.49	2.58	0.65
4	36.14034	74.38004	39	Juniper	*Juniperous Spp.*	33.02	5.9	189	1.89	0.89	0.22
4	36.14034	74.38004	40	Juniper	*Juniperous Spp.*	22.86	4.3	101	1.01	0.47	0.12
4	36.14034	74.38004	41	Kail	*Pinus wallichiana*	33.02	4.1	103	1.03	0.48	0.12
5	36.13684	74.382073	1	Kail	*Pinus wallichiana*	68.58	10	814	8.14	3.83	0.96
5	36.13684	74.382073	2	Kail	*Pinus wallichiana*	71.12	11.9	1,012	10.12	4.76	1.19
5	36.13684	74.382073	3	Kail	*Pinus wallichiana*	68.58	12.2	970	9.70	4.56	1.14
5	36.13684	74.382073	4	Spruce	*Picea smithiana*	43.18	6.3	237	2.37	1.11	0.28
5	36.13684	74.382073	5	Spruce	*Picea smithiana*	68.58	13.3	975	9.75	4.58	1.15
5	36.13684	74.382073	6	Spruce	*Picea smithiana*	63.5	12.3	801	8.01	3.77	0.94
5	36.13684	74.382073	7	Spruce	*Picea smithiana*	43.18	11.9	405	4.05	1.91	0.48
5	36.13684	74.382073	8	Spruce	*Picea smithiana*	38.1	10.3	290	2.90	1.36	0.34
5	36.13684	74.382073	9	Spruce	*Picea smithiana*	35.56	7.9	206	2.06	0.97	0.24
5	36.13684	74.382073	10	Kail	*Pinus wallichiana*	66.04	10.8	815	8.15	3.83	0.96
5	36.13684	74.382073	11	Spruce	*Picea smithiana*	22.86	6.1	78	0.78	0.37	0.09
5	36.13684	74.382073	12	Spruce	*Picea smithiana*	38.1	5.3	165	1.65	0.78	0.19
5	36.13684	74.382073	13	Kail	*Pinus wallichiana*	76.2	12	1,151	11.51	5.41	1.35
5	36.13684	74.382073	14	Spruce	*Picea smithiana*	48.26	7.3	324	3.24	1.52	0.38
6	36.13403	74.38416	1	Spruce	*Picea smithiana*	50.8	10.4	476	4.76	2.24	0.56
6	36.13403	74.38416	2	Spruce	*Picea smithiana*	40.64	10.1	318	3.18	1.50	0.37
6	36.13403	74.38416	3	Spruce	*Picea smithiana*	22.86	8.4	103	1.03	0.48	0.12
6	36.13403	74.38416	4	Spruce	*Picea smithiana*	20.32	8.2	82	0.82	0.39	0.10
6	36.13403	74.38416	5	Spruce	*Picea smithiana*	17.78	6.4	53	0.53	0.25	0.06
6	36.13403	74.38416	6	Spruce	*Picea smithiana*	22.86	8.2	101	1.01	0.47	0.12
6	36.13403	74.38416	7	Spruce	*Picea smithiana*	33.02	7.9	182	1.82	0.85	0.21
6	36.13403	74.38416	8	Spruce	*Picea smithiana*	12.7	3.5	18	0.18	0.08	0.02
6	36.13403	74.38416	9	Spruce	*Picea smithiana*	35.56	9.7	245	2.45	1.15	0.29
6	36.13403	74.38416	10	Spruce	*Picea smithiana*	33.02	7.2	168	1.68	0.79	0.20
6	36.13403	74.38416	11	Juniper	*Juniperous Spp.*	12.7	5.9	37	0.37	0.17	0.04
6	36.13403	74.38416	12	Kail	*Pinus wallichiana*	22.86	5.6	71	0.71	0.33	0.08

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6	36.13403	74.38416	13	Kail	*Pinus wallichiana*	76.2	11	1,066	10.66	5.01	1.25
6	36.13403	74.38416	14	Spruce	*Picea smithiana*	76.2	11.2	1,008	10.08	4.74	1.18
6	36.13403	74.38416	15	Juniper	*Juniperous Spp.*	12.7	2.6	37	0.37	0.17	0.04
6	36.13403	74.38416	16	Kail	*Pinus wallichiana*	78.74	14.7	1,457	14.57	6.85	1.71
6	36.13403	74.38416	17	Spruce	*Picea smithiana*	40.64	6.1	208	2.08	0.98	0.24
6	36.13403	74.38416	18	Spruce	*Picea smithiana*	12.7	2	11	0.11	0.05	0.01
6	36.13403	74.38416	19	spruce	*Picea smithiana*	66.04	10.8	767	7.67	3.61	0.90
6	36.13403	74.38416	20	Spruce	*Picea smithiana*	20.32	5.8	61	0.61	0.29	0.07
6	36.13403	74.38416	21	Kail	*Pinus wallichiana*	33.02	5.5	133	1.33	0.63	0.16
6	36.13403	74.38416	22	Spruce	*Picea smithiana*	45.72	9.2	359	3.59	1.69	0.42
6	36.13403	74.38416	23	Spruce	*Picea smithiana*	81.28	13.5	1,317	13.17	6.19	1.55
6	36.13403	74.38416	24	Spruce	*Picea smithiana*	38.1	7.1	212	2.12	1.00	0.25
6	36.13403	74.38416	25	Spruce	*Picea smithiana*	35.56	8.8	226	2.26	1.06	0.27
6	36.13403	74.38416	26	Spruce	*Picea smithiana*	15.24	4.7	32	0.32	0.15	0.04
6	36.13403	74.38416	27	Spruce	*Picea smithiana*	17.78	4.5	40	0.40	0.19	0.05
6	36.13403	74.38416	28	Spruce	*Picea smithiana*	43.18	8.5	305	3.05	1.43	0.36
6	36.13403	74.38416	29	Spruce	*Picea smithiana*	33.02	6.1	146	1.46	0.69	0.17
6	36.13403	74.38416	30	Spruce	*Picea smithiana*	38.1	6.7	202	2.02	0.95	0.24
6	36.13403	74.38416	31	Kail	*Pinus wallichiana*	20.32	6.6	66	0.66	0.31	0.08
6	36.13403	74.38416	32	Kail	*Pinus wallichiana*	12.7	2.5	12	0.12	0.06	0.01
7	36.13017	74.38536	1	Kail	*Pinus wallichiana*	53.34	6.1	339	3.39	1.59	0.40
7	36.13017	74.38536	2	Kail	*Pinus wallichiana*	17.78	5.2	43	0.43	0.20	0.05
7	36.13017	74.38536	3	Kail	*Pinus wallichiana*	53.34	14.2	712	7.12	3.35	0.84
7	36.13017	74.38536	4	Kail	*Pinus wallichiana*	71.12	13.6	1,138	11.38	5.35	1.34
7	36.13017	74.38536	5	Betula	*Betula utilis*	200.66	18	705.09	7.05	3.31	0.83
7	36.13017	74.38536	6	Betula	*Betula utilis*	167.64	18.2	589.02	5.89	2.77	0.69
7	36.13017	74.38536	7	Betula	*Betula utilis*	160.02	20	562.23	5.62	2.64	0.66
7	36.13017	74.38536	8	Kail	*Pinus wallichiana*	12.7	2.9	14	0.14	0.07	0.02
7	36.13017	74.38536	9	Kail	*Pinus wallichiana*	22.86	6.9	85	0.85	0.40	0.10
7	36.13017	74.38536	10	Kail	*Pinus wallichiana*	12.7	2.1	11	0.11	0.05	0.01
7	36.13017	74.38536	11	Betula	*Betula utilis*	185.42	17.9	651.52	6.52	3.06	0.77
7	36.13017	74.38536	12	Kail	*Pinus wallichiana*	109.22	15.9	2,777	27.77	13.05	3.26
7	36.13017	74.38536	13	Kail	*Pinus wallichiana*	22.86	7.4	90	0.90	0.42	0.11
7	36.13017	74.38536	14	Kail	*Pinus wallichiana*	12.7	5.2	24	0.24	0.11	0.03
7	36.13017	74.38536	15	Betula	*Betula utilis*	154.94	13.5	544.37	5.44	2.56	0.64

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7	36.13017	74.38536	16	Kail	*Pinus wallichiana*	20.32	3	33	0.33	0.16	0.04
7	36.13017	74.38536	17	Betula	*Betula utilis*	165.1	13.6	580.09	5.80	2.73	0.68
7	36.13017	74.38536	18	Betula	*Betula utilis*	160.02	13.9	562.23	5.62	2.64	0.66
7	36.13017	74.38536	19	Kail	*Pinus wallichiana*	38.1	9.8	284	2.84	1.34	0.33
7	36.13017	74.38536	20	Kail	*Pinus wallichiana*	43.18	11.1	396	3.96	1.86	0.46
7	36.13017	74.38536	21	Spruce	*Picea smithiana*	17.78	6.9	57	0.57	0.27	0.07
7	36.13017	74.38536	22	Kail	*Pinus wallichiana*	20.32	7.1	71	0.71	0.33	0.08
7	36.13017	74.38536	23	Kail	*Pinus wallichiana*	38.1	8.6	254	2.54	1.19	0.30
7	36.13017	74.38536	24	Kail	*Pinus wallichiana*	17.78	5.1	42	0.42	0.20	0.05
7	36.13017	74.38536	25	Kail	*Pinus wallichiana*	20.32	4.1	44	0.44	0.21	0.05
7	36.13017	74.38536	26	Spruce	*Picea smithiana*	33.02	6.4	152	1.52	0.72	0.18
7	36.13017	74.38536	27	Kail	*Pinus wallichiana*	68.58	7	595	5.95	2.80	0.70
7	36.13017	74.38536	28	Betula	*Betula utilis*	132.08	4	464.02	4.64	2.18	0.55
8	36.13019	74.38533	1	Kail	*Pinus wallichiana*	76.2	11.4	1,100	11.00	5.17	1.29
8	36.13019	74.38533	2	Kail	*Pinus wallichiana*	78.74	13.8	1,379	13.79	6.48	1.62
8	36.13019	74.38533	3	Kail	*Pinus wallichiana*	40.64	6.8	231	2.31	1.09	0.27
8	36.13019	74.38533	4	Kail	*Pinus wallichiana*	43.18	7.1	267	2.67	1.25	0.31
8	36.13019	74.38533	5	Kail	*Pinus wallichiana*	50.8	9.1	442	4.42	2.08	0.52
8	36.13019	74.38533	6	Kail	*Pinus wallichiana*	17.78	5.3	43	0.43	0.20	0.05
8	36.13019	74.38533	7	Juniper	*Juniperous Spp.*	17.78	4.7	66	0.66	0.31	0.08
8	36.13019	74.38533	8	Kail	*Pinus wallichiana*	45.72	7.4	306	3.06	1.44	0.36
8	36.13019	74.38533	9	Kail	*Pinus wallichiana*	22.86	6.3	78	0.78	0.37	0.09
8	36.13019	74.38533	10	Kail	*Pinus wallichiana*	17.78	5.9	48	0.48	0.22	0.06
8	36.13019	74.38533	11	Juniper	*Juniperous Spp.*	15.24	3.5	51	0.51	0.24	0.06
8	36.13019	74.38533	12	Juniper	*Juniperous Spp.*	10.16	3.8	25	0.25	0.12	0.03
8	36.13019	74.38533	13	Juniper	*Juniperous Spp.*	12.7	3.2	37	0.37	0.17	0.04
8	36.13019	74.38533	14	Kail	*Pinus wallichiana*	22.86	5.5	70	0.70	0.33	0.08
8	36.13019	74.38533	15	Kail	*Pinus wallichiana*	20.32	5.5	57	0.57	0.27	0.07
8	36.13019	74.38533	16	Kail	*Pinus wallichiana*	53.34	8.1	435	4.35	2.04	0.51
8	36.13019	74.38533	17	Kail	*Pinus wallichiana*	35.56	8.3	218	2.18	1.02	0.26
8	36.13019	74.38533	18	Kail	*Pinus wallichiana*	15.24	3.8	25	0.25	0.12	0.03
8	36.13019	74.38533	19	Kail	*Pinus wallichiana*	15.24	4	26	0.26	0.12	0.03
8	36.13019	74.38533	20	Kail	*Pinus wallichiana*	22.86	4.2	55	0.55	0.26	0.06
8	36.13019	74.38533	21	Spruce	*Picea smithiana*	22.86	5.9	76	0.76	0.36	0.09
8	36.13019	74.38533	22	Kail	*Pinus wallichiana*	53.34	11.6	596	5.96	2.80	0.70

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8	36.13019	74.38533	23	Kail	*Pinus wallichiana*	48.26	4.6	222	2.22	1.04	0.26
8	36.13019	74.38533	24	Kail	*Pinus wallichiana*	73.66	9.6	891	8.91	4.19	1.05
8	36.13019	74.38533	25	Kail	*Pinus wallichiana*	76.2	12.5	1,193	11.93	5.61	1.40
8	36.13019	74.38533	26	Kail	*Pinus wallichiana*	45.72	8.2	335	3.35	1.57	0.39
9	36.13538	74.38554	1	Kail	*Pinus wallichiana*	129.54	15.5	3,667	36.67	17.23	4.31
9	36.13538	74.38554	2	Kail	*Pinus wallichiana*	104.14	9.5	1,623	16.23	7.63	1.91
9	36.13538	74.38554	3	Juniper	*Juniperous Spp.*	38.1	7.6	241	2.41	1.13	0.28
9	36.13538	74.38554	4	Kail	*Pinus wallichiana*	48.26	8.4	376	3.76	1.77	0.44
9	36.13538	74.38554	5	Kail	*Pinus wallichiana*	93.98	13.2	1,810	18.10	8.51	2.13
9	36.13538	74.38554	6	Kail	*Pinus wallichiana*	45.72	10	399	3.99	1.88	0.47
9	36.13538	74.38554	7	Kail	*Pinus wallichiana*	12.7	5	23	0.23	0.11	0.03
9	36.13538	74.38554	8	Kail	*Pinus wallichiana*	96.52	11.8	1,719	17.19	8.08	2.02
9	36.13538	74.38554	9	Kail	*Pinus wallichiana*	30.48	7.8	157	1.57	0.74	0.18
9	36.13538	74.38554	10	Kail	*Pinus wallichiana*	78.74	7.7	825	8.25	3.88	0.97
9	36.13538	74.38554	11	Kail	*Pinus wallichiana*	71.12	10.3	891	8.91	4.19	1.05
9	36.13538	74.38554	12	Juniper	*Juniperous Spp.*	66.04	7.2	614	6.14	2.89	0.72
9	36.13538	74.38554	13	Kail	*Pinus wallichiana*	22.86	3.7	49	0.49	0.23	0.06
9	36.13538	74.38554	14	Kail	*Pinus wallichiana*	35.56	11	279	2.79	1.31	0.33
9	36.13538	74.38554	15	kail	*Pinus wallichiana*	45.72	10.5	416	4.16	1.96	0.49
9	36.13538	74.38554	16	Spruce	*Picea smithiana*	50.8	10	461	4.61	2.17	0.54
9	36.13538	74.38554	17	Kail	*Pinus wallichiana*	63.5	12	835	8.35	3.92	0.98
9	36.13538	74.38554	18	Juniper	*Juniperous Spp.*	12.7	2.8	37	0.37	0.17	0.04
9	36.13538	74.38554	19	Spruce	*Picea smithiana*	45.72	5.9	246	2.46	1.16	0.29
10	36.1374	74.38325	1	Kail	*Pinus wallichiana*	45.72	8.5	346	3.46	1.63	0.41
10	36.1374	74.38325	2	Kail	*Pinus wallichiana*	35.56	8.3	218	2.18	1.02	0.26
10	36.1374	74.38325	3	kail	*Pinus wallichiana*	63.5	10.4	736	7.36	3.46	0.86
10	36.1374	74.38325	4	Juniper	*Juniperous Spp.*	63.5	8.2	575	5.75	2.70	0.68
10	36.1374	74.38325	5	Juniper	*Juniperous Spp.*	50.8	7.7	393	3.93	1.85	0.46
10	36.1374	74.38325	6	Kail	*Pinus wallichiana*	63.5	10.5	742	7.42	3.49	0.87
10	36.1374	74.38325	7	Kail	*Pinus wallichiana*	50.8	9.9	476	4.76	2.24	0.56
10	36.1374	74.38325	8	Kail	*Pinus wallichiana*	35.56	7.2	192	1.92	0.90	0.23
10	36.1374	74.38325	9	Spruce	*Picea smithiana*	73.66	6.9	631	6.31	2.97	0.74
10	36.1374	74.38325	10	Kail	*Pinus wallichiana*	63.5	9	648	6.48	3.05	0.76
10	36.1374	74.38325	11	Kail	*Pinus wallichiana*	53.34	7.6	411	4.11	1.93	0.48
10	36.1374	74.38325	12	Kail	*Pinus wallichiana*	68.58	10.2	829	8.29	3.89	0.97

Plot No.	Latitude	Longitude	Tree ID	Species Name (Local Name)	Tree Specie (Scientific Name)	DBH (cm)	Tree height (m)	Dry AGB (kg)	AGB (ton/ha)	AGC (ton/ha)	BGC (ton/ha)
10	36.1374	74.38325	13	Kail	*Pinus wallichiana*	73.66	10.2	940	9.40	4.42	1.10
10	36.1374	74.38325	14	Kail	*Pinus wallichiana*	63.5	10.1	717	7.17	3.37	0.84
10	36.1374	74.38325	15	Kail	*Pinus wallichiana*	60.96	11.9	771	7.71	3.63	0.91
10	36.1374	74.38325	16	Kail	*Pinus wallichiana*	43.18	8.5	313	3.13	1.47	0.37
10	36.1374	74.38325	17	Kail	*Pinus wallichiana*	73.66	11.8	1,068	10.68	5.02	1.26
10	36.1374	74.38325	18	Kail	*Pinus wallichiana*	63.5	9.7	692	6.92	3.25	0.81
10	36.1374	74.38325	19	Kail	*Pinus wallichiana*	71.12	10	868	8.68	4.08	1.02
10	36.1374	74.38325	20	Kail	*Pinus wallichiana*	30.48	5.8	121	1.21	0.57	0.14
10	36.1374	74.38325	21	Kail	*Pinus wallichiana*	22.86	3	41	0.41	0.19	0.05
10	36.1374	74.38325	22	Kail	*Pinus wallichiana*	22.86	2	29	0.29	0.13	0.03
10	36.1374	74.38325	23	Kail	*Pinus wallichiana*	12.7	3	15	0.15	0.07	0.02
10	36.1374	74.38325	24	Juniper	*Juniperous Spp.*	63.5	5	575	5.75	2.70	0.68