Participatory Forest Management Plan

Thore-Makhili, Diamer

2022-2031

Thore-Makhili Valley Conservation Committee
&
Forest, Parks and Wildlife Department
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Credentials:

Writing and data Analysis
Athar Ali Khan
Hammad Gilani
Syed Nadeem Bukhari
Sifat Bahadur
Sajid Hussain
Muhammad Latif

Data collection team
Community members Gudai-Shekang Villages
Muhammad Latif
Karamat Hussain
Hamid Hussain
Sifat Bahadur
Nooruddin

Peer Review
National REDD+ Office, Ministry of Climate Change, Pakistan.
Muhammad Essa, DFO/REDD+ Focal Point GB
Frans Werter, Consultant
Jawad Ali
Arjumand Nizami

Technical assistance
Helvetas Swiss Intercooperation Pakistan
Forest, Parks and Wildlife Department, Gilgit Baltistan

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Endorsement

1. **Chairman: Thore-Makhili Valley Conservation Committee**

2. **REDD+ Focal Point: Forest, Parks and Wildlife Department**

Disclaimer:
This Participatory Forest Management Plan is not a funding commitment from Gilgit Baltistan 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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Acronyms

AGB	Above Ground Carbon
ANR	Assisted Natural Regeneration
BGB	Below Ground Carbon
ETI	Economic Transformation Initiative
FD	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
10 BTTP	10 Billion Tree Tsunami Programme
UC	Union Council

Executive Summary

Thore Makhili Forest located in Diamer Forest Division of Gilgit Baltistan is one of the three sites selected by the Forest, Parks and Wildlife Department (FD) 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 REDD+ Readiness Phase. Pakistan has made substantial progress in meeting REDD+ readiness requirements. 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 (PFMP) 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 PFMP. 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 determining an inclusive set of activities and successful implementation of REDD+.

The analysis of forest cover revealed that since 2010 the Forest in Lachrat is increasing at the rate of 43.79 hectares per year, sequestering 11,347 tonnes CO_2 eq annually. This shows a positive trend in this forest. The activities included in this PFMP if properly implemented, will further enhance resource base through collaborative forest management efforts of the stakeholders. This plan has proposed distribution of carbon and non-carbon benefits accrued by the implementation of plan according at the ratio of 70:20:10 basis, out of which 70% will go to the private owners, 20% to the government and 10% to the customary users. These benefits will be distributed if the targets are achieved so that the stakeholders can enjoy results-based payment and benefits. The success of this plan, therefore, is 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 GB 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 دیامر فارسٹ ڈویژن میں واقع مکھلی 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 ریڈپلس 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 ریڈپلس 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 ریڈپلس سرگرمیوں کا آغاز کر کے عالمی کوششوں میں شمولیت اختیار کی ہے۔ ریڈپلس 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 ریڈپلس کی تیاری کا مرحلہ کہا جاتا ہے۔ پاکستان نے ریڈپلس کی تیاری کی ضروریات کو پورا کرنے کے لیے خاطر خواہ پیش رفت کی ہے۔ پاکستان نے 2021ء میں ایک قومی ریڈپلس حکمتِ عملی تیار کی ہے۔ جب کہ گلگت بلتستان کے جنگلات، جنگلی حیات اور ماحولیات کے محکمے نے صوبائی سطح پر ایک جامع ریڈپلس ایکشن پلان تیار کیا ہے۔ گلگت بلتستان میں ریڈپلس 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 ریڈپلس 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۔ ریڈپلس پر عمل درآمد میں رہنمائی کے لیے اس منصوبے کے تحت دو مختلف منظرناموں 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 ذمے 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۔ ریڈپلس پر کامیاب عمل درآمد اور شراکتی سرگرمیوں کی تفصیلات کا تعین کرنے کے لیے یہ معلومات ضروری ہیں۔

جنگل کے رقبے کے تجزیے سے پتا چلتا ہے کہ 2010ء کے بعد سے مکھلی جنگل میں 43.79 ہیکٹر سالانہ کی شرح سے اضافہ ہو رہا ہے جس سے سالانہ 11,347 ٹن کاربن ڈائی آکسائڈ کا انجذاب عمل میں آ رہا ہے۔ یہ اضافہ واضح طور پر جنگلات کے رقبے میں مسلسل اضافے کی مثال ہے جب کہ گلگت بلتستان کے باقی حصوں میں زیادہ تر جنگلات مبینہ طور پر کم ہو رہے ہیں۔ اس PFMP میں شامل سرگرمیاں اگر مناسب طریقے سے لاگو ہوتی ہیں تو جنگلات کے مربوط انتظام کے لیے فریقین کی کوششیں اس رجحان کو مزید فروغ دیں گی۔

مجوزہ منصوبے کے مطابق اس منصوبے پر عمل درآمد سے حاصل ہونے والے کاربن اور نان کاربن محصولات میں سے 70 فی صد نجی مالکان کو حاصل ہوں گے، جبکہ 20 فی صد حکومت کو اور 10 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 منظرنامہ پیش کرتا ہے تاکہ شراکت دار نتائج پر مبنی ادائیگی اور فوائد سے مستفید ہو سکیں۔ لہٰذا اس منصوبے کی کامیابی اس میں شامل تمام فریقین کے عزم پر منحصر ہے۔

حکومت کی طرف سے ریڈپلس 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 مدت 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 رہنمائی 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

This PFMP has been prepared for the Thor Makhili private forest situated in district Diamer in Gilgit-Baltistan (GB) region. The site for preparation of PFMP has been jointly selected by the Forest, Parks and Wildlife Department (FD) of GB and the respective communities.

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 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 would enable the stakeholders of Thore-Makhili Forest to trade carbon credits in the national and international market in foreseeable future like any other product, by increasing and maintaining the carbon stock sequestered in the Forest.

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, provision of alternative sources of energy is provided on (**Table 9**). A major proportion of the budget has been allocated for production of hydropower under the aspiration to reduce extraction of trees from forest for cooking and space heating. The production of electricity at local level will also contribute to economic development by creating new livelihood opportunities that will decrease dependency on forest and pastures.

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 Thore-Makhili 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 management of private forests from commercial to Carbon sequestration, ecosystem services, and bio-diversity conservation;

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.

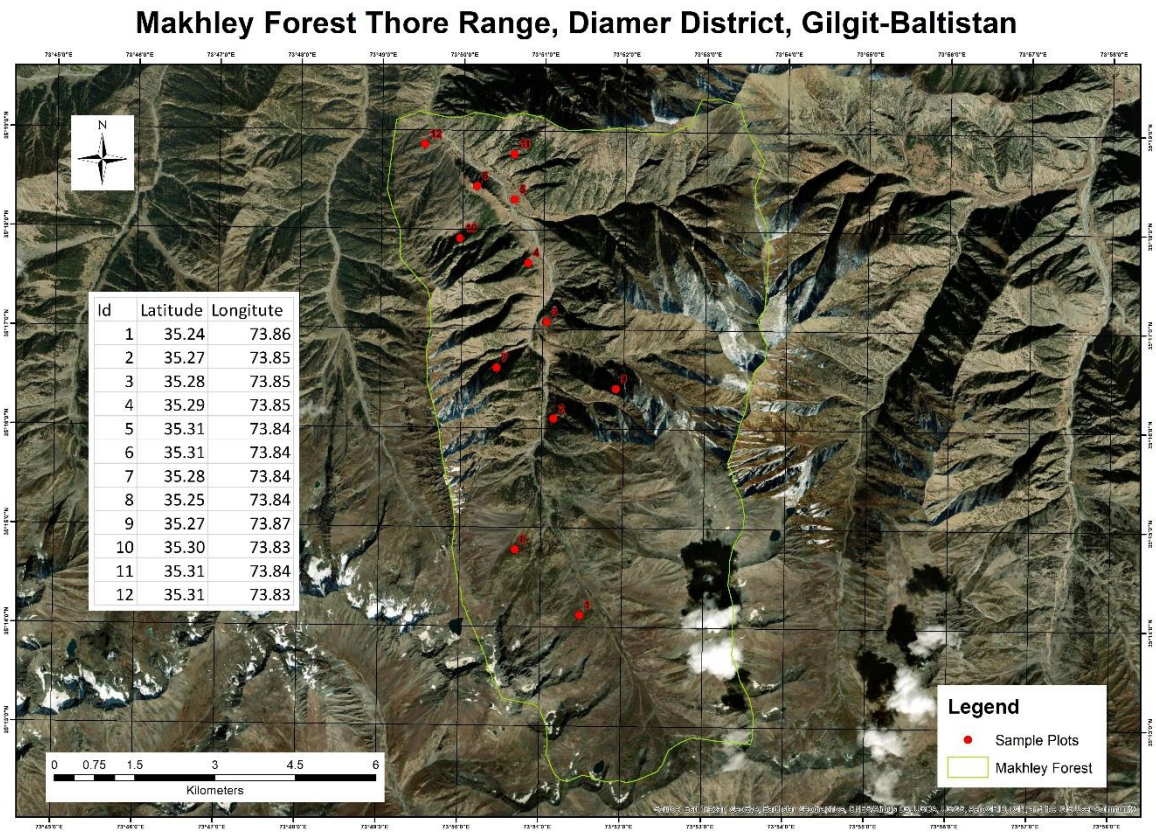
The overall methodology for preparation of the plan has been guided by PFMP Manual (version 1.0, 2021) for practitioners prepared under Forest Carbon Partnership Facility (FPCF) of the Ministry of Climate Change (MOCC), Islamabad. A multi-layered methodology was adapted for the preparation of PFMP, which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

i. Selection of site in light of the REDD+ guidelines and procedure. Thore-Makhili Forest was one of the three potential sites selected for preparation of PFMP.
ii. Participatory data collection. Local community of Thore-Makhili 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 5 out of 12 sample plots selected in Thore-Makhili Forests due to accessibility issues with remaining sample points. 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 17.64 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.

Figure 1: Sample plots for data collection.



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 GB 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 Thore-Makhili valley align well with the actions suggested in the climate change policy of GB 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 1, data)**. This section provides detail description of the location of the valley Thore-Makhili, and major components of the PFMP which includes; socio-economic conditions, ecological conditions, Stakeholders of the Forest, and the drivers of Deforestation and Forest degradation. The results are presented in this chapter.

2.1 Ecological conditions

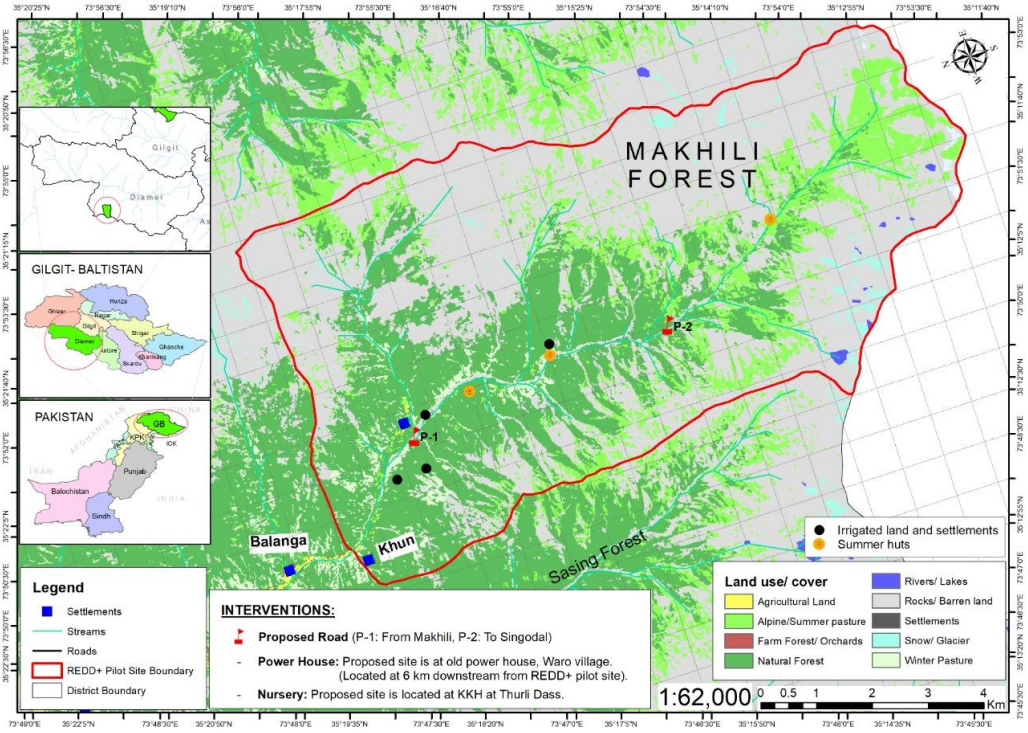
2.1.1 Location

The Forest site selected for REDD+ in District Diamer is located in Thore-Makhili valley between at an elevation range of 2,319 - 4,633 meters ASL located at centre Latitude, 35.2683N and centre Longitude 73.855E. The forest area is bounded by on the north by the Gilgit districts, on the east by the Astore District, on the south by the Naran District of Khyber Pakhtunkhwa Province and the Neelum District of Azad Kashmir, and on the west by the Upper Kohistan District of Khyber Pakhtunkhwa Province. Diamer district is located on the Karakoram Highway and first accessible district after Khyber Pakhtunkhwa.

2.1.2 Site description

The total area of Thore-Makhili Forest selected for demonstration of REDD+ is about 6,760 hectares. The Thore-Makhili forest is privately owned by local communities and is managed by the FD (Khan et al. 2015). It is a high-altitude forest area with heavy snowfall, harsh winter and significant watershed importance in the region. The figure 2 shows that dominant land cover at the PFMP site is forest or rock followed by pastures in the south. The forests are mostly in the north of the site whereas pastures are in the south.

Figure 2. Land Use map of Thore-Makhili



2.1.3 Vegetation type

According to the classification of Forest types of Pakistan, the Forest of Thore-Makhili falls in dry temperate coniferous forest comprising of evergreen tree species of Deodar trees (*Cedrus deodara*), Fir (*Abies pindrow*), Chilgoza (*Pinus gerardiana*), and Kail (*Pinus Wallichiana*). The broad-leaf tree species mainly (*Quercus ilex*) forms the under layer. The slopes at higher elevations are colonized by juniper species (*Juniperus excelsa* and *Juniperus communis*). The commercial harvest is carried out through selections felling by marking dead, dying and diseased trees that contributes in maintain good forest cover and regeneration. The *Quercus ilex* which is locally known as Bani is widely distributed on driers conditions of southern aspect is the main sources of fuel wood. The stands of evergreen tree species of fir (*Abies pindrow*), and spruce (*Picea smithiana*) are not harvested due to their little value to use as timber, or even fuel wood. Therefore, fir and spruces are vigorously growing in composition with other trees or in pure stands.

The pastures on high altitudes are healthy particularly on the northern aspect inside the forest patches or in between forest patches. A large proportion of fuel wood and timber used in GB comes from District Diamer which is either harvested legally or through auction of confiscated timber harvested illegally. The Forests in District Diamer are harvested following working schemes, but some of the Forests are still untouched while some Forests are being extensively harvested (Rao and Marwat, 2003). The community receive major share (50%) of the sale of timber harvested from private Forest.

2.2 Socio-economic conditions

2.2.1 Villages and people

Thore-Makhili is a valley comprising of 16 villages which fall in the in the Union Council (UC) Thor (an administrative unit). These 16 villages are the owners of the Thore-Makhili forest. According to the census of 2017, the population of the District Diamer is 0.26 million (GoP, 2020) out of which approximately 30,500 are resident of Thore-Makhil UC. The demographic data of the UC Thore-Makhili is given (**Table 1**). The average household size was estimated to be 10 members. The population consists of: Shin, Yashki, Dom, Kameen, Soniwal (Shina Speaking), Gujjar (Gojri speaking nomads), Khiliwal (Kohistani speaking), Swati and Pashtuns (Pashto speaking).

2.2.2 Right holders

Only Shin, Yashkun, Kamin and Dom tribes (1800 households) are the owner of the Forest and receive royalty (sale proceeds from commercial harvesting of Forest). They also have rights to collect timber and fuel wood for local use and grazing of livestock. The remaining population (1700 households) of Gujjar, Soniwal, Khiliwal, Pashtoon and Swatti do not have share in royalty, but can use Forest resources for their domestic use only. The none-owners especially members of Gujar tribe work for the owners of Forest as tenants and herding of their livestock on pastures.

2.2.3 Health and Education

There is no such data available on literacy and situation of health and nutrition in the valley. except one, all the rest 15 villages have a primary school. There are two middle or two high schools. The valley has only three basic health units, and two veterinary dispensaries (**Table 1**). A study conducted in 2017 indicated high mortality rate (103.1 per 1000 birth) due to lack of health and education facilities (PND, UNICEF, 2017).

Table 1. Demographic profile of Thore-Makhili

S/N	Village Name	Houses	Population	Primary schools	Middle Schools	High school	Basic Health Unit	Vet Dispensary
1	Thorpi	160	1600	1	0	0	1	0
2	Gatu Het	180	1800	1	0	0	0	0
3	Finar Saka	185	1850	1	0	0	0	0
4	Make	80	800	1	0	0	0	0
5	Minar	145	145	1	0	0	1	0
6	Sari	300	3000	0	1	1	1	0
7	Sahi Muhallah	200	2000	1	1	0	0	0
8	Mikhal Sirqa	150	1500	1	0	0	0	0
9	Kot Pari	400	4000	0	0	1	0	1
10	Bishot Gah	150	1500	1	0	0	0	0
11	Zari Charay	280	2800	1	0	0	0	1
12	Chamo Gah	80	800	1	0	0	0	0
13	Mili Moan	90	900	1	0	0	0	0
14	Gabar	200	2000	1	0	0	0	1
15	Siling Gah	150	1500	1	0	0	0	0
16	Makhili	300	3000	1	0	0	0	1
Total	16	3,050	30,500	14	2	2	3	4

2.2.4 Sources of livelihoods and dependence on forest resource

Major source of livelihood in Thore-Makhili is agro-pastoralism. A small proportion of their income comes from sale of none-timber Forest products (NTFPs) particularly from mushrooms and nuts. The majority of the local population is dependent on the natural Forest for grazing livestock, and collection of NTFPs, timber and fuelwood for their domestic use. Compared to other parts of GB, the climatic conditions in District Diamer are milder, with longer summer and relatively short winter. The use of fuelwood for space heating is relatively less than other part of GB. Houses are constructed mainly using wood. Alternative sources of fuel wood and timber are rare. Therefore, the people rely on natural Forests for energy for space heating and cooking.

Few people have found alternative sources of income including local Government Jobs, local businesses and labour mainly away from the hometown in other parts of the country. The revenue from sale of timber is distributed among families through the traditional institutions. The distribution of revenue is based on ownership of families in a Hatti (clans). According to the locals interviewed, the share in revenue from Forest is getting less and lesser with decreasing forests and increasing population.

The District Diamer is the major exporter of fuelwood to other districts of GB. Besides, local demand for fuelwood in District Diamer is also high in the absence of alternative sources of

A study conducted in 2003 estimated per capita per annum local wood consumption in GB as 1.395 m^3 (Ministry of Environment, 2003) Khan et al., (2009) estimated per capita/annum fuelwood consumption to be approximately 12,079 kg (12.079 m^3) for Bunji village located in District Astore. Ullah et al. (2021) found that each household in Basho valley use an average of 593 kilogram (0.593 m^3) of timber every month. This latest data was used to assess the total quantity of timber used in Thore-Makhili valley (**Table 2**).

Table 2. Per Annum wood consumption in Thore-Makhili

C	Villages	Households	Population	Per annum wood consumption (cubic meters)		
				Fuel wood	Timber	Total
1	Thore-Makhili	3,050	35,000	36,840.95	21,703.80	58,544.75

2.2.5 The Stakeholders

The stakeholder analysis (**Table 3**) was conducted to acquire information about major actors, and their interest and influence on Forest resources utilization, management, or restoration. The stakeholder analysis was conducted at two levels; first their interest and influence on Forest management; and then their interest and influence on carbon pool. 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 local community as owner of the forest is the most important stakeholder in forest management. The following two local institutions are important for forest management.

The Traditional Jirga: The disputes on Forest, pasture and other conflicts are resolved by the *Jirga.* In comparison to other district of GB the *jirga* system is proactive and strong in district Diamer, where every village has a *jirga* consisting of a number of *Motabars*[1] (members) and a *Jastero* (head of *Jirga*). There can be more than one *Jastero* in *jirga* who are selected with consensus from the adult male members of the community based on age, experience and dedication of the individuals (Bilal et al., 2003). The proceeding in *jirga* is led by the *Zaitu*[2] and *Jastero*. The *jirga* is responsible to resolve matter related to village, nominate and oversee the *zaitu*(s), and negotiates with functionaries in the Government on matters related to the village. The *jirga* is entitled to collect fines from the offenders. The negotiation with Government is generally led by *Jastero(s)* (ibid). The *Zaitu* is another body of local organization but formed by each *Khandan* (clans) in the village. There are two types of *Zaitu*, one looks after the affairs of crops and other related to Forest. The fines collected from offenders are divided among the members of the *Zaitu*. The zaito is paid in kind - 10 kilograms of cereals by each household.

[1] Trusted, respected and active and members of the group

[2] The systems which nominate individuals on term basis to keep an eye on offenders of free grazing ban within the irrigated land and offences related to forest

The *Jirga* makes decisions pertaining to all communal matters of the village. If the *jirga* is not able to resolve any conflict, the parties involved in the conflict may seek support of religious leaders who decide the case as per *Sharia* (Islamic laws). The parties however can also file the case in the formal judicial system. Most cases which involve conflict over communal resources like Forest offences are resolved through the *jirga*.

Forest Conservation Committee: The Forest conservation Committee (FCC) is a local organization formed by local communities to protect Forest in collaboration with partners in conservation of nature. FCC is in the process to get register with FD. The FCC controls illegal cutting and transportation of timber and firewood outside the villages. The FCC is collaborating with the FD on implementation of the 10 Billion Tree Tsunami Project (10 BTTP) and the Assisted Natural Regeneration (ANR) project for protection and restocking of Forest.

Forest Department
The FD is the manager of private forest of Thor-Makhili. The head office of the FD is Chief Conservator of Forest based in Gilgit. Among other branches, the REDD+ Cell of the FD is based in Gilgit. The FD has a Conservator and Divisional Forest Officer posted in district headquarter in Chilas. A Range Forest Officer (RFO) and several Forest Guards are posted in Thor-Makhili

Ministry of Climate Change
The forest is a provincial subject, and the relevant provincial governments are responsible to manage 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 the security agencies which intervene only if called by relevant authorities are other stakeholders. The protection of forest is not their core area of responsibility; therefore, these actors fall in the category of marginal players in the matrixes.

2.2.6 Stakeholder Analysis

The stakeholder analysis was conducted using an interest influence matrix (**Annex 2**) to acquire information about major actors, and their interest and influence on forest resources utilization, management, or restoration. The information on stakeholder was conducted during FGDs and KIIs with the community FD officials. Stakeholders' analysis was essential understand roles of various actors in implementation of interventions identified in this plan.

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 (**Annex 3**). 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 the forest owners 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 has little influence on local forest management and carbon pools on ground as forest management is the responsibility of the provincial governments. The influence of the MoCC may increase in the future with increasing REDD+ initiatives in the provinces supported by the MoCC. It is because of their role in international negotiations and distribution any income from sale of carbon.

The households with traditional rights for grazing and collection of forest products but no forest ownership rights fall under neglected players and need special attention to safeguard their interest.
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.

Table 3. Interest influence matrix on forest management and carbon pools

	Neglected players: Need special attention to safeguard their interests	**Major players:** Need to be fully involved
INTEREST Hight Score 2 and 3	MoCC Gujjars and any others who heavily depend on livestock for livelihoods and have interest on free grazing	Forest Department as manager of the resource. And mandate to support the local communities to increase Forest cover (10 BTTP) Local community - owner of the Forest.
	Marginal players Low priority	**Risk factors** Need to be addressed
INTERST Low Score 0 and 1	Law enforcement agencies 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).

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

Drivers of Deforestation

i. Large scale harvesting of commercial timber by the owners supported by the government in the past.

Drivers of Forest Degradation

i. Extraction of timber and fuelwood for local uses from the degraded forest.
ii. 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 livestock grazing is a major barrier to forest restoration.

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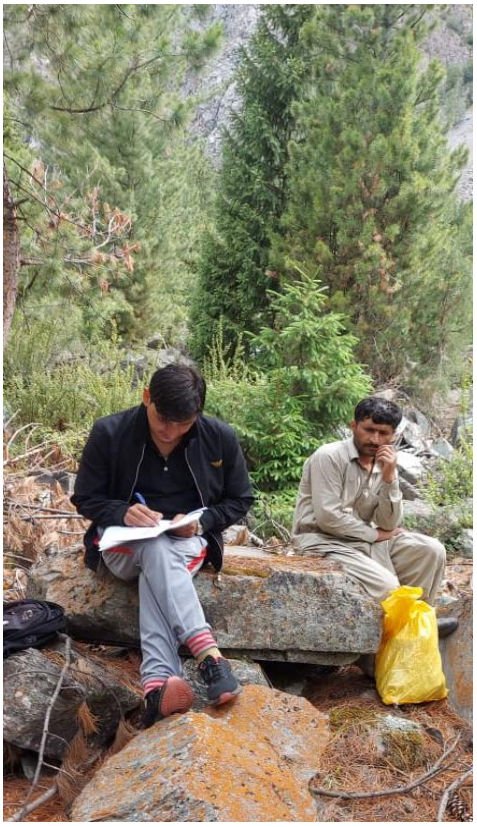
2.4 Carbon stock assessment in Thore-Makhili

This section provides details description of the results of based on analysis of data based on data collected from sample plots in forest selected (Figure 1) in Thore-Makhili. The forest carbon stock is also provided in individual trees/ species level (Annex I), and in different strata (above, below ground and in soil) of plots. The quantity of carbon stock in the sample plot over the past 10 years (in absence of REDD+), and in the future 10 years in REDD+ scenario is also presented



2.4.1 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 tree species, which includes tree DBH and height, and dry biomass of shrubs and litter (**Table 4**). The tree species level carbon stock is given in **Annex 1**. Based on this data individual plots level carbon stock for AGB and BGB was worked out (**Table 4**). The estimated stock of carbon per hectares (ha) was then used to estimate the total carbon stock in the selected site of Thore-Makhili Forest.

Table 4. Plot level above and below ground carbon stock

Plot No.	Average of AGC (ton/ha)	Average of BGC (ton/ha)
1	3.009320107	0.752330027
2	15.26554643	3.816386608
3	29.82344616	7.455861539
4	0.910216823	0.227554206
5	6.121051427	1.530262857
Grand Total	**5.586756383**	**1.396689096**

2.4.2 Forest Cover Assessment

The change in Forest cover was assessed by 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 an increase of 50.5 ha in Forest cover in the past 10 years at an average rate of 4.38 hectare (ha) per year (**Table 5**). The detail of the annual increase is provided in **Table 6.** The major reason for increases in the Forest cover being the effective control over illegal cutting and changes in Forest policies regards harvesting of Forest and emergence of local organizations explained under section 2.2.3 Socio-economic analysis of drivers.

Table 5. Change in forest cover (2010-2020)

No	Landsat Satellite Sensor	Landsat data acquisition	Forest Cover (ha)
1	Landsat-150	2020-10-19	1698.57
2	Landsat-36	2010-11-09	1260.63
Increase in Forest Cover in last 10 years			437.9
Per year increase in Forest cover			43.79

Table 6 provides **three scenarios** of forest cover in the coming ten years that may be followed:

Business as usual: Just preserving and maintaining the current trend which is already moving in the positive direction at a rate of 43.79 ha of forest cover per annum.

Scenario 1: Adding 10% more forest cover to the current positive trend.
Scenario 2: Adding 20% more forest cover to the current positive trend.
Scenario 3: Adding 50% more forest cover to the current positive trend

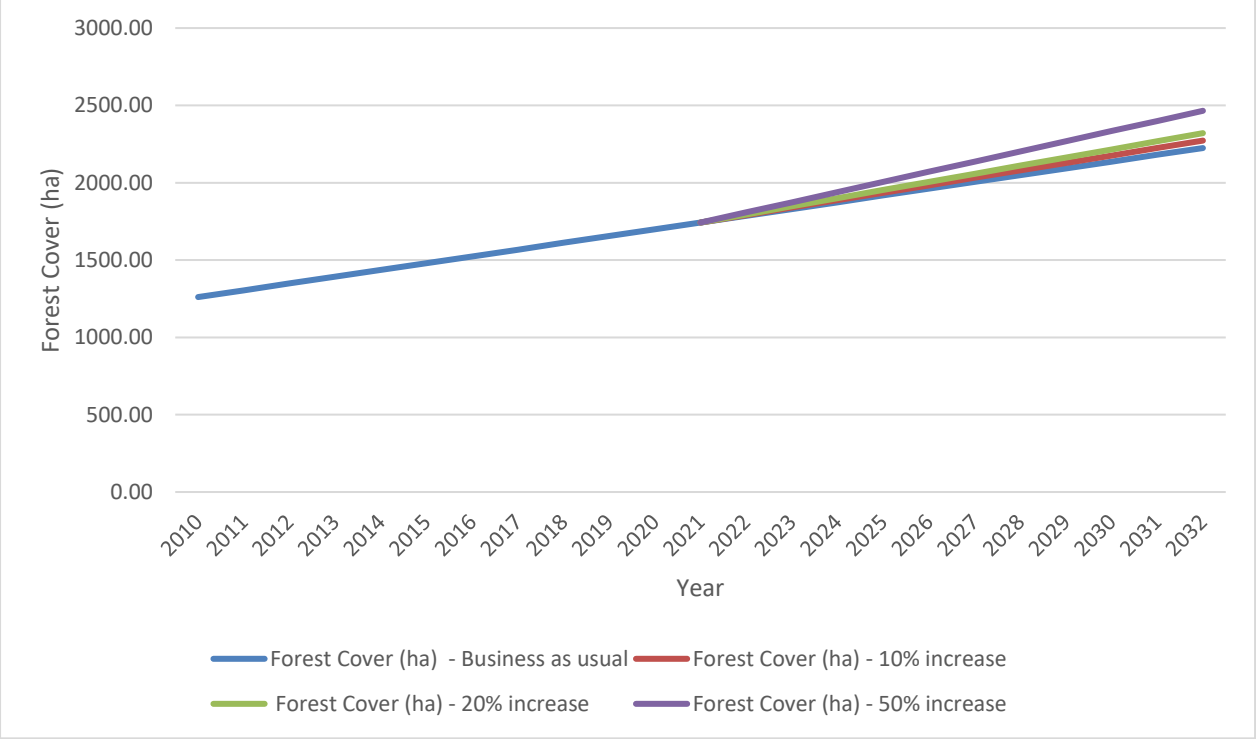
The different scenarios mean that the forest cover will increase by 43.79 ha per year (as observed in the last 10 years), however, with 10 % enhancement efforts further 4.4 ha of forest cover per annum may be added to the forest cover (in addition to 43.79 ha) or with 20% and 50% enhancement effort, 8.8 ha or 21.90 ha per annum (in addition to 43.79 ha) will be added respectively. Based on these scenarios carbon stocks are projected in the Table 8:

Table 6: Forest Cover Scenarios based on trend in the past 10 years

Rate of change per year	43.79	4.4	8.8	21.90
Year	**Forest Cover - Business as usual**	**Forest Cover - 10% increase**	**Forest Cover - 20% increase**	**Forest Cover - 50% increase**
2010	1260.63			
2011	1304.42			
2012	1348.22			
2013	1392.01			
2014	1435.81			
2015	1479.60			
2016	1523.39			
2017	1567.19			
2018	1610.98			
2019	1654.78			
2020	1698.57			
2021	1742.36	1742	1742	1742
2022	1786.16	1791	1795	1808
2023	1829.95	1839	1847	1874
2024	1873.75	1887	1900	1939
2025	1917.54	1935	1953	2005
2026	1961.33	1983	2005	2071
2027	2005.13	2031	2058	2137
2028	2048.92	2080	2110	2202
2029	2092.72	2128	2163	2268
2030	2136.51	2176	2215	2334
2031	2180.30	2224	2268	2399
2032	2224.10	2272	2320	2465

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

Figure 3: Forest Cover Trend and Scenario



2.4.3 Carbon stock estimation and CO_2 emissions

The field data and biomass collected from 5 samples was used to calculate Above Ground Biomass (AGB) using locally developed allometric equations (Khan et al., 2021) for 2010-2021 (**Table 7**). In Thore-Makhili, the cumulative carbon stock in five carbon pools (above, below, deadwood, litter and soil) was estimated to be 89,081 tonnes of Organic Carbon (Corg) back in 2010 which increased to 120,027 tonnes in 2020. This increase in carbon stock corresponds to the increase in Forest cover from 1260.63 ha in 2010 to 1698.57 ha in 2020 **(Table 7**) causing CO_2 sequestration at the rate of 11,347 tonnes of CO_2 eq. per annum (see figure 4 and table 7).

Figure 4: Forest Cover Maps used for Change Analysis

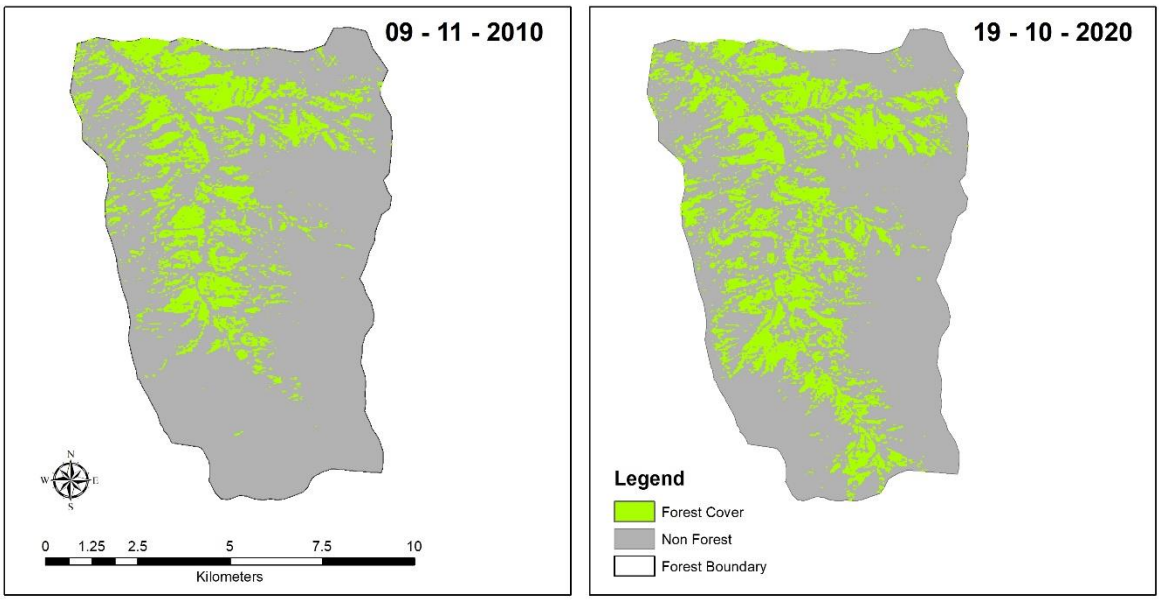


Table 7. Carbon stock estimation (2010-2020)

Carbon pool	Mean carbon stock (tonnes C stock per hectare)	Forest Cover (ha)	Total stock (tonnes C stock)	CO_2 (ton CO_2 eq)
2010 (2010-Nov-09)				
Above	5.59	1260.63	7,042.83	
Below	1.40		1,760.71	
Deadwood	4.30		5,422.46	
Litter	0.03		36.29	
Soil*	59.35		74,818.39	
Cumulative			89,081	326,629.17
2020 (2020-Oct-19)				
Above	5.59	1698.57	9,489.50	
Below	1.40		2,372.37	
Deadwood	4.30		7,306.21	
Litter	0.03		48.90	
Soil	59.35		100,810.13	
Cumulative			120,027	440,099.41
Rate of change per year				
2020-2010		**43.79**	**3,094.64**	**11,347**

* Soil Carbon Value taken from NRO Inventory

2.4.4 CO_2 emissions reduction Scenarios for Forest Enhancement

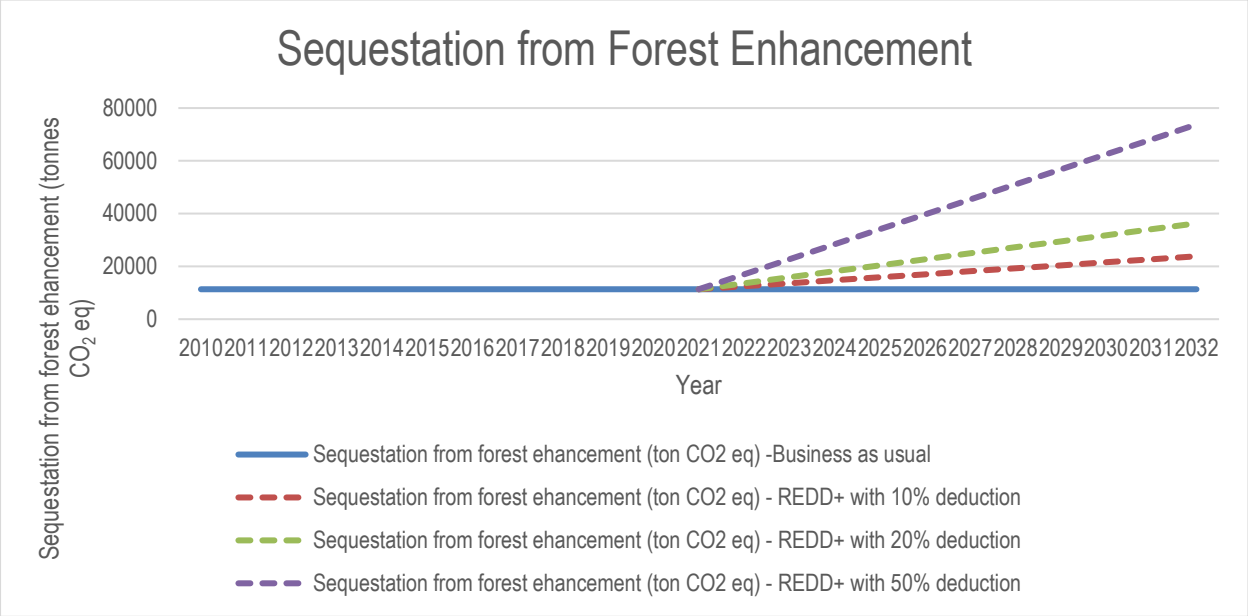
This section presents the future CO_2 sequestration scenarios applying 10%, 20% and 50% enhancement to current sequestration rate over the past 10 years due to forest cover increase (As per definition of forest adopted by Pakistan for REDD+). The current average CO_2 sequestration rate in Thore-Makhili Forest is 11,347 tonnes CO_2 eq per annum because of forest cover increase which can be boosted further by 1135 tonnes with 10% enhancement, 2269 tonnes with 20% enhancement and 5674 tonnes with 50% enhancement of forest cover. Figure 5 shows the CO_2 sequestration scenarios due to enhancement activities.

Table 8: CO_2 Sequestration trend and Different Enhancement scenarios

Rate of change per year	11347	1135	2269	5674
Year	**Sequestration from forest enhancement (ton CO_2 eq) -Business as usual**	**Sequestration from forest enhancement (ton CO_2 eq) - REDD+ with 10% Increase**	**Sequestration from forest enhancement (ton CO_2 eq) - REDD+ with 20% increase**	**Sequestration from forest enhancement (ton CO_2 eq) - REDD+ with 50% increase**
2010	11347			
2011	11347			
2012	11347			
2013	11347			
2014	11347			
2015	11347			
2016	11347			
2017	11347			

2018	11347			
2019	11347			
2020	11347			
2021	11347	11347	11347	11347
2022	11347	12482	13616	17021
2023	11347	13616	15886	22694
2024	11347	14751	18155	28368
2025	11347	15886	20425	34041
2026	11347	17021	22694	39715
2027	11347	18155	24963	45388
2028	11347	19290	27233	51062
2029	11347	20425	29502	56735
2030	11347	21559	31772	62409
2031	11347	22694	34041	68082
2032	11347	23829	36310	73756

Figure 5: CO_2 Emissions reduction scenarios – Forest Enhancement



2.4.5 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 35,000 with a growth rate of 3.13 per annum. The fuelwood and timber consumption per capita per annum was calculated as 1.05 m^3 and 0.62 m^3, respectively. Based on this data emissions from forest degradation are calculated and presented in the Table 9.

Table 9: 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) (ton CO_2 eq)	Timber Emission (TC*D*BEF2*CF*44/12) (ton CO_2 eq)	Emission from Forest Degradation (ton CO_2 eq) - Business as usual
2011	27986	29385	17351	34989	20660	55649
2012	28920	30366	17931	36157	21350	57507
2013	29855	31348	18510	37326	22040	59365
2014	30819	32360	19108	38532	22752	61284
2015	31815	33406	19725	39777	23487	63264
2016	32843	34485	20363	41062	24246	65308
2017	33905	35600	21021	42389	25029	67418
2018	35000	36750	21700	43758	25838	69596
2019	36096	37900	22379	45128	26647	71775
2020	37225	39087	23080	46540	27481	74021
2021	38390	40310	23802	47997	28341	76338
2022	39592	41572	24547	49499	29228	78728
2023	40831	42873	25315	51049	30143	81192
2024	42109	44215	26108	52647	31087	83733
2025	43427	45599	26925	54294	32060	86354
2026	44787	47026	27768	55994	33063	89057
2027	46188	48498	28637	57746	34098	91844
2028	47634	50016	29533	59554	35165	94719
2029	49125	51581	30458	61418	36266	97684
2030	50663	53196	31411	63340	37401	100741
2031	52248	54861	32394	65323	38572	103894
2032	53884	56578	33408	67367	39779	107146

[3] Wood Density (D)

Cedrus deodara	*0.43*
Picea smithiana	*0.43*
Pinus gerardiana	*0.5*
Pinus wallichiana	*0.43*
Quercus ilex	*0.64*
Average	*0.49*
Biomass Expansion Factor: BEF2	1.35 (IPCC Table 3A.1.10)
CF = carbon fraction of dry matter	0.5

2.4.6 Net Emissions from Deforestation and Forest Degradation

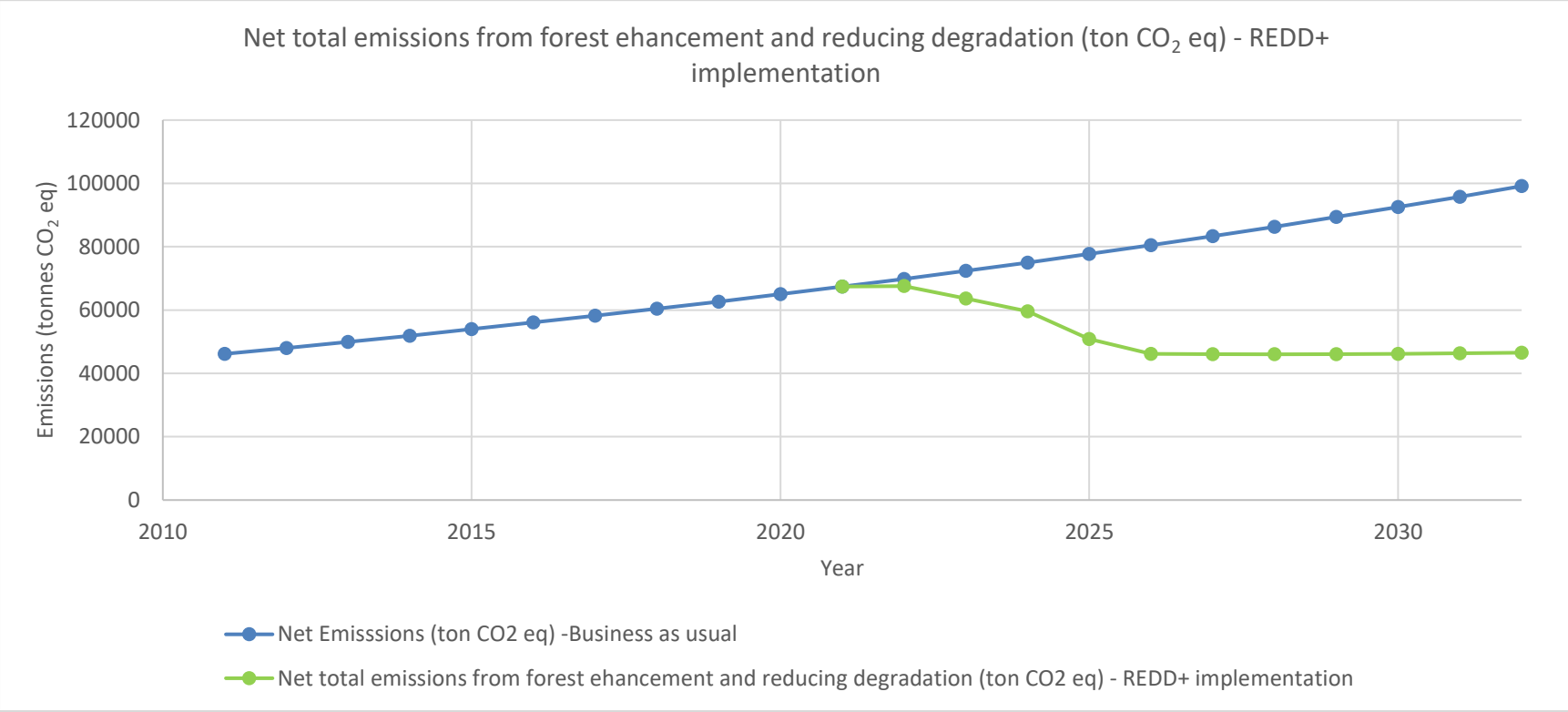
The table 10 below provides a net CO_2 sequestration scenario based on 20% forest cover enhancement and reducing emissions from forest degradation in an incremental manner annually from 5% to 25% with REDD+ activity. In this scenario, the net emissions from the forest will continue declining till 2029 due to cumulative effect of increasing forest cover and reduction in forest degradation due to REDD+ implementation but after that the emissions will again slowly start increasing due to pressure on the forest for local uses including fuelwood. The area under PFMP is 6760 ha and with 20% enhancement the forest cover will be only 2320 ha thus a lot of scope to enhance the forest cover and thus increase the carbon sink is available subject to availability of resources.

Table 10: Sequestration Scenario from Forest Enhancement and Reducing Degradation

Rate of change per year	3770					754	
Year	**Emission from deforestation (tonnes CO_2 eq) -Business as usual**	**Emission from Forest Degradation (tonnes CO_2 eq) - Business as usual**	**Total Emissions from deforestation and Forest Degradation (tonnes CO_2 eq)**	**5-25% Reduction in Degradation emissions**	**Net emissions from degradation**	**Emission from deforestation (tonnes CO_2 eq) - REDD+ with 20% reduction**	**Net total emissions from deforestation and degradation (tonnes CO_2 eq) - REDD+ implementation**
2011	11347	55649	44302				
2012	11347	57507	46160				
2013	11347	59365	48018				
2014	11347	61284	49937				
2015	11347	63264	51917				
2016	11347	65308	53961				
2017	11347	67418	56071				
2018	11347	69596	58249				
2019	11347	71775	60428				
2020	11347	74021	62674				
2021	11347	76338	64991				
2022	11347	78728	67381				67381
2023	11347	81192	69845	4060	81192	13616	67575
2024	11347	83733	72386	4187	79546	15886	63661
2025	11347	86354	75007	8635	77719	18155	59563
2026	11347	89057	77710	17811	71245	20425	50821

2027	11347	91844	80497	22961	68883	22694	46189
2028	11347	94719	83372	23680	71039	24963	46076
2029	11347	97684	86337	24421	73263	27233	46030
2030	11347	100741	89394	25185	75556	29502	46054
2031	11347	103894	92547	25974	77921	31772	46149
2032	11347	107146	95799	26787	80360	34041	46319

Figure 6: Sequestration scenarios – Forest Enhancement and Reduced degradation



3 Proposed Interventions and Budget

The interventions proposed here 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 are, therefore, suggested for managing Thore-Makhili Forest as a REDD+ pilot site:

Table 11. Proposed interventions to control Drivers of Deforestation and Forest

	Drivers/Barriers	**Activities to curb major drivers and barriers**	**Verifiable indicators**	**Means of verification**
1	**Deforestation**			
1.1	Commercial harvesting of forest for revenue generation through selection felling.	Ban commercial harvesting of forest	No tree markings, no fresh stump, no harvesting	FD notifications/records
		Plantation of forest areas where natural regeneration is not present.	Regeneration patches, trees growing on regular intervals and potholes. No. of plants planted	Reports, records
		Appoint community Forest Guards and game watchers	No. of community Forest Guards/game watchers recruited and trained	Report, records,
		Establish area enclosure for regeneration	No. of enclosure and total areas enclosed for grazing control to promote natural regeneration	Area under enclosure
1.2	Small scale illegal timber harvesting to sell for cash income in the absence of alternate sources of income	Create livelihood opportunities by linking touristic resorts with valley roads. These roads and tracks will also be used for transportation of saplings and for planting.	Kilometers / number of roads constructed No. of Tourist facilities developed and manage by locals Increase in flow of tourists. New sources of earning	Physical verification, record, case studies
		Provide trainings to local community on hospitality/tourism management, NTFP value addition, handicrafts	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 and business.	Undertake energy plantations on wastelands	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 %25 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 nurseries	Number / area on which nurseries established, production of sapling at local level	Reports records, physical verification
		Sowing in blank areas	Total area (hectare) sown for regeneration of natural forest	FD/community records/field visit reports

Ten years budgeting and operational planning of the PFMP is given in **Table 12**.

Table 12. Indicative operation plan and budge of PFMP for 10 years

				Operational Plan											
S.N.	**Activity**	**Unit**	**Unit cost**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Total units**	**Total cost**
				Short term			**Medium term**			**Long term**					
1	Preparation for implementation of PFMP and periodical follow up meetings (community and other stakeholders.	Meeting	50,000	3	1	1	1	3	1	1	1	1	3	16	800,000
2	Notification of forums	Notification	0	1										1	0
3	Appointment of 5 community Forest guards	Month	50,000	60	60	60	60	60	60	60	60	60	60	600	30,000,000
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	Nursery establishment and maintenance	Plant	40		20,000	20,000	20,000	20,000	20,000	20,000				120,000	48,00,000
6	Purchase and plant in blank areas	plant	80		20,000	20,000								40,000	3,200,000
7	Planting in blank and sparsely vegetated patches	Plant	40				20,000	20,000	20,000	20,000	20,000	20,000		120,000	4,800,000
8	Development of 2 MW hydropower plant for alternative energy	MW	50000000				2							2	100,000,000
9	Community / youth motivational events	Event	25,000	2	2	2	2	2	2	2	2	2	2	20	500,000
10	Introduction of fuel-efficient technologies	Technologies	2,000,000				1							1	2,000,000
11	Trainings to promote alternative sources of livelihoods (e.g., handicraft and NTFP)	Training	150,000			1		1		1				3	450,000
12	Construction of tracks to planting sites and Forest nurseries	km	4,000,000			4								1	4,000,000
13	Area enclosures for grazing control for natural regeneration	hectare	0		500					500				1000	0
14	Develop funding proposals to generate funding for PFMP activities	Proposals	1,000,000	1										1	10,000,000
	Total														148,550,000

4 Implementation Mechanism for the PFMP

4.1 Resources for activities

The FD manages of the forest and having linkages with national and international funding sources will take a lead this activity. The key stakeholders identifying in this plan, especially the FD and the FCC and local *jirga* of Thore-Makhili will jointly look for resources for implementation of activities identified in this plan. The FD will submit proposals for potential funding sources including 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

Village and district level REDD+ implementation committees notified by the FD will oversee implementation of activities. The notifications will include description of responsibilities of FD, the respective communities, and any other relevant stakeholders.

The village level implementation committee may consist of representative of the community of Thore-Makhili, and the FD. The members of FCC will represent the community in the village level implementation committee to be notified by the FD. The FD will assign duties of an officer to represent the department in the village implementation committee. The representative of the community will be responsible to harness support of the community for implementation of activities.

The village implementation committee will be supervised by a district level committee chaired by the Deputy Commissioner with members from the Thore-Makhili and the FD. The responsibility of the district committee will be to monitor progress on implementation of activities and harnessing support from the relevant actors including 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 Thor-Makhili 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. Due to obvious carbon and non-carbon benefits, the stakeholders may be expected to value standing trees, than cut for other uses.

In the REDD+ Scenario 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 base payments from reduced carbon emissions.

Compared to the protected forest, a mechanism for distribution of benefits in the private forest should be relatively simpler. The FD could charge some fee for management, linkages with carbon buyers and other national and international negotiation. The community could distribute their share as per their traditional rights on the forest. A proposed ratio for distributing REDD+ carbon and non-carbon benefits is 70:20:10. 70% will go to the private owners of the communities. 20% will go to the government whereas 10% will go to the customary users of forest resources.

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, a *jirga* system 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 villages

The FCC of Thore-Makhili with the help of *jirga* will settle any disputes with villages and Haiti. Any unsettled disputes will be referred to the district implementation committee. 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 FD, therefore both partners (Community and the FD) 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.

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I. Stakeholder group (names)	Communities of Thore-Makhili, the Users Group of 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 1 for location Thore-Makhili village.
3. Social organization in the forest area	
A. Traditional organizations (e.g., jirga)	.
Organization (name; purpose; membership)	Local Jirga is a traditional organization comprising of local elders who handle matters related to natural resources which also involves conflict resolution, imposition, and collection of fine
B. Formal organization (e.g., social; welfare organization or village development committee	
Organization (name; purpose; membership)	FCC is a local organization formed by local communities to protect forest in collaboration with partners in conservation of nature. The FCC is in process to get register with Forest Department.
Organization (name; purpose; membership)	There are two unregistered welfare organisations. Youth Organization and Public welfare organization
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)	There is no restriction on use of timber for construction of homes at village level.
Timber for commercial selling (where; locate on the map)	Legally through timber harvested by FPW Department under the working schemes.
Firewood (where; locate on the map)	As per need for space heating and cooking. Besides, firewood is sold for income by some.
Grazing (where; locate on the map)	All households graze their livestock in the forest.
Grass cutting (where; locate on the map	Grass is cut and stored for stall feeding in winter.
Other products, e.g., mushroom, pine nuts, pine needles, vegetables, stones, minerals, medicinal plants (where; locate on the map)	Apart from endangered medicinal plants, all NTFP in the area are collected for domestic use or to sell in the local market for income.
Forest areas related daily labour/employment (employed by whom; for what?)	The FPWE and contractors hire locals for planting and transportation of timber. Forest guards (nigehbans) are employed by Forest Department GB for watch and ward.
Tourism (what; where; locate on the map)	Apart from local travellers and occasional tourist, currently there is no such tourism.
Hunting/Fishing	The local hunters hunt birds and other wildlife illegally for domestic consumption.
What would it mean if you had no access to these forest products? (Any alternatives? Threat to livelihood?)	Alternative sources of timber, fuel wood, faming including livestock farming are not available in the area. Any restriction on use of forest products will be a threat to the livelihoods of the local population
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?	The Gilgit Private Forests Regulation (1970) and the Rules framed in 1975 under the Regulation provides legal cover to the traditional and customary rights of community in the private forest.
Timber (shares)	The community being the owner of the forest can harvest timber for their domestic use.
Fodder: grass cutting/grazing	The right holder community and other graziers have full access to pasture for grazing their livestock.

Firewood	The community have full right to collect firewood from the forest they own.
Other products:	Since the community is owner of forest they can harvest all products except for hunting for which permission is needed from the FWPE Department
6. Conflicts / disputes	
On different land uses: Describe nature of conflict, between which groups and put location on map if possible	No land dispute because the forest is owned by the community is divided equally among *Hatti* (family/groups).
On social issues: Describe nature of conflict, between which groups and put location on map if possible	There are no such disputed or conflict on resources in the area.
Do they have effect on forest management? And How?	There are not currently, or history of any disputes related to forest, but conflict on forest can create law and order situations.
Existing Conflict resolution mechanisms: - traditional (e.g., jirga) - formal (court)	Village level conflicts are resolved through traditional *Jirga*, but the forest offences are dealt by FPWE Department. The disputed related to land if not settled by local Jirga are dealt by the Revenue Department, which criminal and often forest offences are dealt by the formal Court of Justice.
7. Other Forest Management Projects	
Are there any other Forest Management Projects in the area? If so, which projects? What are their activities?	ETI has supported in widening and construction of irrigation channels in Thore valley these interventions are expected to increase cultivated areas and irrigated plantations. The 10BTTP is expected to contribute to the land development.

STAKEHOLDER	INTEREST in Forest		INFLUENCE on Forest	
	Type of interest	Level of interest*	Type of influence	Level of influence*
FOREST Department	Sustainable management of Forest resources and avoid Forest degradation as legal representative of the Government Revenue from commercial sale as management fee	3	Legal manager: decision on commercial outtake quantities based on Forest inventories and technical help to owners on improvement of Forest resources Decision on ban on commercial extraction when the harvesting reaching unsustainable limits	3
Community of Thore-Makhili	As owners of the Forest, sustainable management for Forest, grazing livestock, harvest timber, fuel wood and minor Forest produce Commercial sale of timber for cash income	3	Legal owner of Forest. Local control Negotiations with the FD on how much and from where to harvest commercial timber Negotiation with contractors on sale of timber	3
MoCC	Sustainable management of Forest resources. Implementation of REDD+ and other national and international obligations	2	Implementation of national forest policies and international obligations	1
Law & Enforcement Agencies	None	0	Legal action on need basis	1
10 BTTP (FOREST)	Increase Forest cover by planting through engaging communities	2	Reduce pressure on natural Forest through promotion of agro-Forestry and social Forestry.	1
Gujars	Grazing	3	Influence owners for continuation of grazing in the Forest which may cause damages to regeneration	1
WAPDA	Reducing siltation in the rivers caused by deforestation	1	Power generation will decrease dependency on Forest	1
Economic Transformation Initiative by IFAD	Land development to decrease poverty and pressure on Forest through encouraging farm Forestry	1	Awareness on natural resources conservation and importance of form Forestry to reduce pressure on natural Forest	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	35.307	73.846	1	Quercus	*Quercus ilex*	91.44	5.2	1,010.75	10.11	4.75	1.19
1	35.307	73.846	2	Quercus	*Quercus ilex*	88.392	2.1	528.43	5.28	2.48	0.62
1	35.307	73.846	3	Quercus	*Quercus ilex*	88.392	2.5	593.44	5.93	2.79	0.70
1	35.307	73.846	4	Quercus	*Quercus ilex*	51.816	4	398.56	3.99	1.87	0.47
1	35.307	73.846	5	Quercus	*Quercus ilex*	54.864	4.9	492.25	4.92	2.31	0.58
1	35.307	73.846	6	Quercus	*Quercus ilex*	85.344	4.3	812.53	8.13	3.82	0.95
1	35.307	73.846	7	Quercus	*Quercus ilex*	54.864	6.1	569.51	5.70	2.68	0.67
1	35.307	73.846	8	Quercus	*Quercus ilex*	54.864	5.9	557.01	5.57	2.62	0.65
1	35.307	73.846	9	Quercus	*Quercus ilex*	48.768	5.5	454.46	4.54	2.14	0.53
1	35.307	73.846	10	Quercus	*Quercus ilex*	54.864	5.5	531.59	5.32	2.50	0.62
1	35.307	73.846	11	Quercus	*Quercus ilex*	39.624	5.8	357.12	3.57	1.68	0.42
1	35.307	73.846	12	Quercus	*Quercus ilex*	33.528	5.8	285.92	2.86	1.34	0.34
1	35.307	73.846	13	Quercus	*Quercus ilex*	54.864	5.6	538.00	5.38	2.53	0.63
1	35.307	73.846	14	Quercus	*Quercus ilex*	57.912	5.2	550.32	5.50	2.59	0.65
1	35.307	73.846	15	Quercus	*Quercus ilex*	112.776	4.4	1,195.61	11.96	5.62	1.40
1	35.307	73.846	16	Quercus	*Quercus ilex*	91.44	4.9	971.56	9.72	4.57	1.14
1	35.307	73.846	17	Quercus	*Quercus ilex*	39.624	5.4	340.54	3.41	1.60	0.40
1	35.307	73.846	18	Quercus	*Quercus ilex*	48.768	3.8	355.33	3.55	1.67	0.42
1	35.307	73.846	19	Quercus	*Quercus ilex*	54.864	4.4	458.23	4.58	2.15	0.54
1	35.307	73.846	20	Quercus	*Quercus ilex*	64.008	3.6	492.25	4.92	2.31	0.58
1	35.307	73.846	21	Quercus	*Quercus ilex*	85.344	7	1,123.77	11.24	5.28	1.32
1	35.307	73.846	22	Quercus	*Quercus ilex*	91.44	7.2	1,255.16	12.55	5.90	1.47
1	35.307	73.846	23	Quercus	*Quercus ilex*	60.96	5.1	581.64	5.82	2.73	0.68
1	35.307	73.846	24	Quercus	*Quercus ilex*	88.392	5.8	1,038.99	10.39	4.88	1.22
1	35.307	73.846	25	Quercus	*Quercus ilex*	60.96	4.7	550.87	5.51	2.59	0.65
1	35.307	73.846	26	Quercus	*Quercus ilex*	91.44	6.9	1,220.11	12.20	5.73	1.43
1	35.307	73.846	27	Quercus	*Quercus ilex*	121.92	5.8	1,594.04	15.94	7.49	1.87
1	35.307	73.846	28	Quercus	*Quercus ilex*	85.344	6.3	1,047.67	10.48	4.92	1.23
1	35.307	73.846	29	Quercus	*Quercus ilex*	36.576	4.3	263.06	2.63	1.24	0.31
1	35.307	73.846	30	Quercus	*Quercus ilex*	48.768	3.8	355.33	3.55	1.67	0.42
1	35.307	73.846	31	Quercus	*Quercus ilex*	57.912	6	605.31	6.05	2.84	0.71
1	35.307	73.846	32	Quercus	*Quercus ilex*	85.344	6.5	1,069.69	10.70	5.03	1.26
1	35.307	73.846	33	Quercus	*Quercus ilex*	73.152	5.9	816.88	8.17	3.84	0.96
1	35.307	73.846	34	Quercus	*Quercus ilex*	70.104	6.5	823.29	8.23	3.87	0.97
1	35.307	73.846	35	Quercus	*Quercus ilex*	48.768	6.9	528.49	5.28	2.48	0.62

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	35.307	73.846	36	Quercus	*Quercus ilex*	57.912	4.4	492.42	4.92	2.31	0.58
1	35.307	73.846	37	Quercus	*Quercus ilex*	39.624	3	230.29	2.30	1.08	0.27
1	35.307	73.846	38	Quercus	*Quercus ilex*	94.488	4.7	987.14	9.87	4.64	1.16
1	35.307	73.846	39	Quercus	*Quercus ilex*	76.2	3.6	620.83	6.21	2.92	0.73
1	35.307	73.846	40	Quercus	*Quercus ilex*	88.392	5.1	953.75	9.54	4.48	1.12
1	35.307	73.846	41	Quercus	*Quercus ilex*	70.104	5.9	771.90	7.72	3.63	0.91
1	35.307	73.846	42	Quercus	*Quercus ilex*	82.296	4.7	821.34	8.21	3.86	0.97
1	35.307	73.846	43	Quercus	*Quercus ilex*	54.864	4.3	451.27	4.51	2.12	0.53
1	35.307	73.846	44	Quercus	*Quercus ilex*	73.152	3.9	620.17	6.20	2.91	0.73
1	35.307	73.846	45	Quercus	*Quercus ilex*	70.104	6.7	840.06	8.40	3.95	0.99
1	35.307	73.846	46	Quercus	*Quercus ilex*	33.528	4.1	226.99	2.27	1.07	0.27
1	35.307	73.846	47	Quercus	*Quercus ilex*	36.576	3.6	233.73	2.34	1.10	0.27
1	35.307	73.846	48	Quercus	*Quercus ilex*	33.528	4.2	230.66	2.31	1.08	0.27
1	35.307	73.846	49	Quercus	*Quercus ilex*	73.152	5.3	760.61	7.61	3.57	0.89
1	35.307	73.846	50	Quercus	*Quercus ilex*	79.248	6.6	979.11	9.79	4.60	1.15
1	35.307	73.846	51	Quercus	*Quercus ilex*	48.768	4.4	391.74	3.92	1.84	0.46
1	35.307	73.846	52	Quercus	*Quercus ilex*	73.152	5.5	779.60	7.80	3.66	0.92
1	35.307	73.846	53	Quercus	*Quercus ilex*	48.768	3.3	323.48	3.23	1.52	0.38
1	35.307	73.846	54	Quercus	*Quercus ilex*	60.96	2.6	371.48	3.71	1.75	0.44
1	35.307	73.846	55	Quercus	*Quercus ilex*	42.672	3.7	292.23	2.92	1.37	0.34
1	35.307	73.846	56	Quercus	*Quercus ilex*	57.912	3.3	406.62	4.07	1.91	0.48
1	35.307	73.846	57	Quercus	*Quercus ilex*	36.576	2.3	173.47	1.73	0.82	0.20
1	35.307	73.846	58	Quercus	*Quercus ilex*	82.296	4.6	809.67	8.10	3.81	0.95
2	35.303	73.856	1	Deodar	*Cedrus deodara*	96.52	4.6	1,008.04	10.08	4.74	1.18
2	35.303	73.856	2	Deodar	*Cedrus deodara*	60.96	3.5	383.60	3.84	1.80	0.45
2	35.303	73.856	3	Deodar	*Cedrus deodara*	53.34	5.6	452.16	4.52	2.13	0.53
2	35.303	73.856	4	Quercus	*Quercus ilex*	15.24	3.9	76.87	0.77	0.36	0.09
2	35.303	73.856	5	Quercus	*Quercus ilex*	30.48	2.5	143.86	1.44	0.68	0.17
2	35.303	73.856	6	Quercus	*Quercus ilex*	50.8	5.5	479.83	4.80	2.26	0.56
2	35.303	73.856	7	Quercus	*Quercus ilex*	38.1	5.4	323.22	3.23	1.52	0.38
2	35.303	73.856	8	Quercus	*Quercus ilex*	60.96	5.4	604.19	6.04	2.84	0.71
2	35.303	73.856	9	Quercus	*Quercus ilex*	40.64	3.5	263.92	2.64	1.24	0.31
2	35.303	73.856	10	Deodar	*Cedrus deodara*	170.18	21.8	8,915.33	89.15	41.90	10.48
2	35.303	73.856	11	Deodar	*Cedrus deodara*	213.36	22.3	13,099.90	131.00	61.57	15.39
2	35.303	73.856	12	Deodar	*Cedrus deodara*	203.2	28.9	14,933.53	149.34	70.19	17.55
2	35.303	73.856	13	Deodar	*Cedrus deodara*	83.82	4.9	844.15	8.44	3.97	0.99
2	35.303	73.856	14	Deodar	*Cedrus deodara*	81.28	7.7	1,158.29	11.58	5.44	1.36

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2	35.303	73.856	15	Quercus	*Quercus ilex*	40.64	6.8	410.61	4.11	1.93	0.48
2	35.303	73.856	16	Deodar	*Cedrus deodara*	60.96	7.8	734.32	7.34	3.45	0.86
2	35.303	73.856	17	Deodar	*Cedrus deodara*	45.72	6.8	412.22	4.12	1.94	0.48
2	35.303	73.856	18	Chilghoza	*Pinus gerardiana*	40.64	7	397.00	3.97	1.87	0.47
2	35.303	73.856	19	Deodar	*Cedrus deodara*	15.24	3.5	40.57	0.41	0.19	0.05
2	35.303	73.856	20	Deodar	*Cedrus deodara*	264.16	25.6	20,708.59	207.09	97.33	24.33
2	35.303	73.856	21	Deodar	*Cedrus deodara*	30.48	3.2	116.01	1.16	0.55	0.14
2	35.303	73.856	22	Chilghoza	*Pinus gerardiana*	60.96	7.9	1,142.83	11.43	5.37	1.34
2	35.303	73.856	23	Deodar	*Cedrus deodara*	165.1	16.6	6,806.29	68.06	31.99	8.00
2	35.303	73.856	24	Deodar	*Cedrus deodara*	154.94	11.3	4,496.40	44.96	21.13	5.28
3	35.282	73.850	1	Spruce	*Picea smithiana*	127	25.5	4,810	48.10	22.61	5.65
3	35.282	73.850	2	Spruce	*Picea smithiana*	137.16	26.1	5,589	55.89	26.27	6.57
3	35.282	73.850	3	Spruce	*Picea smithiana*	127	27.9	5,191	51.91	24.40	6.10
3	35.282	73.850	4	Spruce	*Picea smithiana*	182.88	28.3	9,745	97.45	45.80	11.45
3	35.282	73.850	5	Kail	*Pinus wallichiana*	60.96	7.9	538	5.38	2.53	0.63
3	35.282	73.850	6	Deodar	*Cedrus deodara*	182.88	27.8	12,199.78	122.00	57.34	14.33
4	35.301	73.841	1	Deodar	*Cedrus deodara*	60.96	4.8	495.48	4.95	2.33	0.58
4	35.301	73.841	2	Deodar	*Cedrus deodara*	50.8	3.2	265.47	2.65	1.25	0.31
4	35.301	73.841	3	Deodar	*Cedrus deodara*	63.5	3.2	381.13	3.81	1.79	0.45
4	35.301	73.841	4	Deodar	*Cedrus deodara*	10.16	4.2	24.38	0.24	0.11	0.03
4	35.301	73.841	5	Deodar	*Cedrus deodara*	15.24	2.7	32.87	0.33	0.15	0.04
4	35.301	73.841	6	Deodar	*Cedrus deodara*	10.16	4.7	26.70	0.27	0.13	0.03
4	35.301	73.841	7	Deodar	*Cedrus deodara*	10.16	3	18.56	0.19	0.09	0.02
4	35.301	73.841	8	Deodar	*Cedrus deodara*	12.7	3	26.64	0.27	0.13	0.03
4	35.301	73.841	9	Deodar	*Cedrus deodara*	10.16	4	23.43	0.23	0.11	0.03
4	35.301	73.841	10	Deodar	*Cedrus deodara*	12.7	4.7	38.34	0.38	0.18	0.05
4	35.301	73.841	11	Deodar	*Cedrus deodara*	10.16	4.9	27.62	0.28	0.13	0.03
4	35.301	73.841	12	Deodar	*Cedrus deodara*	53.34	4.8	399.07	3.99	1.88	0.47
4	35.301	73.841	13	Deodar	*Cedrus deodara*	111.76	6.1	1,606.87	16.07	7.55	1.89
4	35.301	73.841	14	Deodar	*Cedrus deodara*	22.86	4.9	102.79	1.03	0.48	0.12
4	35.301	73.841	15	Deodar	*Cedrus deodara*	83.82	6	994.69	9.95	4.68	1.17
4	35.301	73.841	16	Deodar	*Cedrus deodara*	76.2	6.2	875.28	8.75	4.11	1.03
4	35.301	73.841	17	Deodar	*Cedrus deodara*	17.78	4.5	63.84	0.64	0.30	0.08
4	35.301	73.841	18	Deodar	*Cedrus deodara*	20.32	5.1	87.73	0.88	0.41	0.10

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4	35.301	73.841	19	Deodar	*Cedrus deodara*	15.24	4.9	53.28	0.53	0.25	0.06
4	35.301	73.841	20	Deodar	*Cedrus deodara*	7.62	3.1	11.96	0.12	0.06	0.01
4	35.301	73.841	21	Deodar	*Cedrus deodara*	10.16	3.2	19.56	0.20	0.09	0.02
4	35.301	73.841	22	Deodar	*Cedrus deodara*	17.78	4.2	60.37	0.60	0.28	0.07
4	35.301	73.841	23	Deodar	*Cedrus deodara*	17.78	4.3	61.53	0.62	0.29	0.07
4	35.301	73.841	24	Deodar	*Cedrus deodara*	22.86	9.8	180.25	1.80	0.85	0.21
4	35.301	73.841	25	Deodar	*Cedrus deodara*	20.32	4.7	82.11	0.82	0.39	0.10
4	35.301	73.841	26	Deodar	*Cedrus deodara*	22.86	4.5	95.94	0.96	0.45	0.11
4	35.301	73.841	27	Deodar	*Cedrus deodara*	15.24	3.9	44.29	0.44	0.21	0.05
4	35.301	73.841	28	Deodar	*Cedrus deodara*	10.16	4.4	25.31	0.25	0.12	0.03
4	35.301	73.841	29	Deodar	*Cedrus deodara*	15.24	4.4	48.83	0.49	0.23	0.06
4	35.301	73.841	30	Deodar	*Cedrus deodara*	43.18	6.1	344.09	3.44	1.62	0.40
4	35.301	73.841	31	Deodar	*Cedrus deodara*	33.02	5.6	207.86	2.08	0.98	0.24
4	35.301	73.841	32	Deodar	*Cedrus deodara*	12.7	4	33.64	0.34	0.16	0.04
4	35.301	73.841	33	Deodar	*Cedrus deodara*	10.16	4	23.43	0.23	0.11	0.03
4	35.301	73.841	34	Deodar	*Cedrus deodara*	38.1	6.3	288.36	2.88	1.36	0.34
4	35.301	73.841	35	Deodar	*Cedrus deodara*	38.1	6.3	288.36	2.88	1.36	0.34
4	35.301	73.841	36	Deodar	*Cedrus deodara*	20.32	4.3	76.40	0.76	0.36	0.09
4	35.301	73.841	37	Deodar	*Cedrus deodara*	20.32	4.3	76.40	0.76	0.36	0.09
4	35.301	73.841	38	Deodar	*Cedrus deodara*	22.86	4.6	97.66	0.98	0.46	0.11
4	35.301	73.841	39	Deodar	*Cedrus deodara*	20.32	4.1	73.51	0.74	0.35	0.09
4	35.301	73.841	40	Deodar	*Cedrus deodara*	20.32	5.2	89.12	0.89	0.42	0.10
4	35.301	73.841	41	Deodar	*Cedrus deodara*	30.48	4.9	163.85	1.64	0.77	0.19
4	35.301	73.841	42	Deodar	*Cedrus deodara*	38.1	6.5	295.75	2.96	1.39	0.35
4	35.301	73.841	43	Deodar	*Cedrus deodara*	22.86	5	104.49	1.04	0.49	0.12
4	35.301	73.841	44	Deodar	*Cedrus deodara*	22.86	5.5	112.88	1.13	0.53	0.13
4	35.301	73.841	45	Deodar	*Cedrus deodara*	12.7	4.8	39.00	0.39	0.18	0.05
4	35.301	73.841	46	Deodar	*Cedrus deodara*	12.7	4.8	39.00	0.39	0.18	0.05
4	35.301	73.841	47	Deodar	*Cedrus deodara*	15.24	4.5	49.73	0.50	0.23	0.06
4	35.301	73.841	48	Deodar	*Cedrus deodara*	10.16	4.5	25.78	0.26	0.12	0.03
4	35.301	73.841	49	Deodar	*Cedrus deodara*	12.7	4.6	37.67	0.38	0.18	0.04
4	35.301	73.841	50	Deodar	*Cedrus deodara*	10.16	3.5	21.03	0.21	0.10	0.02
4	35.301	73.841	51	Deodar	*Cedrus deodara*	10.16	3.5	21.03	0.21	0.10	0.02
4	35.301	73.841	52	Deodar	*Cedrus deodara*	91.44	7.6	1,387.13	13.87	6.52	1.63
5	35.305	73.837	1	Deodar	*Cedrus deodara*	78.74	5.2	800.44	8.00	3.76	0.94
5	35.305	73.837	2	Deodar	*Cedrus deodara*	104.14	8.7	1,910.82	19.11	8.98	2.25
5	35.305	73.837	3	Deodar	*Cedrus deodara*	154.94	8.7	3,637.87	36.38	17.10	4.27

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5	35.305	73.837	4	Deodar	*Cedrus deodara*	109.22	5.5	1,423.52	14.24	6.69	1.67
5	35.305	73.837	5	Deodar	*Cedrus deodara*	78.74	4.5	711.95	7.12	3.35	0.84
5	35.305	73.837	6	Deodar	*Cedrus deodara*	134.62	9	2,977.38	29.77	13.99	3.50
5	35.305	73.837	7	Deodar	*Cedrus deodara*	78.74	7.6	1,088.61	10.89	5.12	1.28
5	35.305	73.837	8	Deodar	*Cedrus deodara*	71.12	4.8	636.10	6.36	2.99	0.75
5	35.305	73.837	9	Deodar	*Cedrus deodara*	106.68	4.8	1,227.15	12.27	5.77	1.44
5	35.305	73.837	10	Deodar	*Cedrus deodara*	38.1	8.4	364.05	3.64	1.71	0.43
5	35.305	73.837	11	Deodar	*Cedrus deodara*	81.28	10.1	1,443.10	14.43	6.78	1.70
5	35.305	73.837	12	Deodar	*Cedrus deodara*	91.44	5.3	1,035.80	10.36	4.87	1.22
5	35.305	73.837	13	Deodar	*Cedrus deodara*	38.1	4	199.56	2.00	0.94	0.23
5	35.305	73.837	14	Deodar	*Cedrus deodara*	33.02	5.8	213.85	2.14	1.01	0.25
5	35.305	73.837	15	Deodar	*Cedrus deodara*	106.68	11.6	2,508.52	25.09	11.79	2.95
5	35.305	73.837	16	Deodar	*Cedrus deodara*	76.2	10.9	1,382.61	13.83	6.50	1.62
5	35.305	73.837	17	Deodar	*Cedrus deodara*	60.96	6.6	641.35	6.41	3.01	0.75
5	35.305	73.837	18	Deodar	*Cedrus deodara*	114.3	6.6	1,776.32	17.76	8.35	2.09
5	35.305	73.837	19	Deodar	*Cedrus deodara*	76.2	14	1,693.48	16.93	7.96	1.99
5	35.305	73.837	20	Deodar	*Cedrus deodara*	63.5	12.3	1,134.75	11.35	5.33	1.33
5	35.305	73.837	21	Deodar	*Cedrus deodara*	45.72	4	268.16	2.68	1.26	0.32
5	35.305	73.837	22	Deodar	*Cedrus deodara*	76.2	12.5	1,544.89	15.45	7.26	1.82
5	35.305	73.837	23	Deodar	*Cedrus deodara*	78.74	7	1,018.43	10.18	4.79	1.20
5	35.305	73.837	24	Deodar	*Cedrus deodara*	76.2	7	965.73	9.66	4.54	1.13
5	35.305	73.837	25	Deodar	*Cedrus deodara*	106.68	6	1,470.36	14.70	6.91	1.73
5	35.305	73.837	26	Deodar	*Cedrus deodara*	109.22	11.4	2,569.56	25.70	12.08	3.02
5	35.305	73.837	27	Deodar	*Cedrus deodara*	78.74	10	1,359.72	13.60	6.39	1.60
5	35.305	73.837	28	Deodar	*Cedrus deodara*	60.96	4.4	461.75	4.62	2.17	0.54