Provincial REDD+ ACTION PLAN Sindh 2022-2031

REDD+ Pakistan

Prepared under the REDD+ Readiness Preparation Project for Pakistan financed by Forest Carbon Partnership Facility (FPCF), implemented by Federal Ministry of Climate Change (MoCC) through National REDD+ Office (NRO), Islamabad.

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Table of Contents

List of Tables

List of Figures

List of Pictures

ACRONYMS

ADB	Asia Development Bank
FAO	Food and Agriculture Organization of United Nations
FCPF	Forest Carbon Partnership Facility
FGD	Focus Group Discussion
FGRM	Feedback Grievances and Redressal Mechanism
FREL/ FRL	Forest Reference Emission Level/ Forest Reference Level
FSMP	Forestry Sector Master Plan
GHG	Green House Gases
GIS	Geographic Information System
ICIMOD	International Centre for Integrated Mountain Development
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land Use Change and Forestry
MoCC	Ministry of Climate Change
MRV	Measurement Reporting and Verification
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NGOs	Non – Governmental Organizations
NRO	National REDD+ Office
NRS	National REDD+ Strategy
PES	Payment for Ecosystem Services
PFMP	Participatory Forest Management Plans
PRAP	Proposed Remedial Action Plan
PRMC	Provincial REDD+ Management and Coordination Committees
REDD+	Reducing Emissions from Deforestation and Forest Degradation; and the Role of Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks in Developing Countries
R-PP	REDD+ Readiness Preparation Proposal
SESA	Strategic Environmental and Social Assessment
SFM	Sustainable Forest Management
SIS	Safeguard Information System
SLMS	Satellite Land Monitoring System
SUPARCO	Pakistan Space & Upper Atmosphere Research Commission
TBTTP	Ten Billion Tree Tsunami Project
ToR	Terms of Reference
ToT	Training of Trainers
UNFCCC	United Nation's Framework Convention on Climate Change
WB	World Bank
WGs	Working Groups

SUMMARY

The Pakistan National REDD+ Strategy was approved in in 2021. This Provincial REDD+ Action Plan (PRAP) has been developed to contribute to the strategy's objectives and sustainable management of the forest resources of Sindh province.

Preparation of this PRAP took a multi-stakeholder participatory approach and is designed to help meet the objectives of Pakistan's National REDD+ Strategy as well as envisaged objectives of Sindh's Forest Policy. The specific objective of this document are to (i) Outline actions in line with ground realities to address the prioritized drivers and barriers with context specific actions[1] and related budget (ii) Improve health of the forest ecosystems by reducing deforestation and forest degradation and enhancements of biomass (iii) Define effective implementation and monitoring of REDD+ actions to address the drivers (iv) Identify social and environmental risks associated with actions and propose mitigation (v) Propose a clear benefit sharing mechanism associated with implementation of REDD+ activities, and (vi) Identify areas for enabling policy, legal and institutional arrangements in favour of implementing PRAP.

The PRAP outlines actions that support investment on improving local livelihoods to address local drivers of deforestation and degradation in order to achieve sub national and national REDD+ and forest policy objectives. The PRAP identifies measures and interventions that will contribute to national and global goal of reducing emissions. The Sindh Forest and Wildlife department as custodian of the Sindh forests advocates that REDD+ policies and measures are designed locally and with full involvement of local institutions and communities.

Total forest resources of Sindh are spread over 1,125,866 hectares. The forest resources of Sindh are classified in reserve and protected categories. There are four different categories viz. riverine forests, irrigated plantations, grazing lands and mangrove forests. Irrigated plantations are the main features of manmade plantations raised on canal irrigation system of river Indus. The grazing fields and unclassified wastelands of the province were declared as protected forests where the rights of the people are allowed more than that of reserved forests.

The main drivers of deforestation prioritized by the stakeholders included (i) Clearing of forest land for infrastructure development, mining and settlement, (ii) Encroachment for illegal / subsistence cultivation (iii) Clearing of forest land for commercial agriculture. The drivers of degradation included (i) These drivers were analysed by the stakeholders and several underlying causes were identified (i) water scarcity and drought, (ii) salinity and water logging and (iii) demand for firewood..

The PRAP proposes several actions to address underlying causes of deforestation and degradation. One of the key actions identified is to propel sustainable agroforestry system to balance economic agricultural development with environmental conservation. This document recognizes that agriculture and silvo-pastoral systems need to co-exist in Sindh thus forestry sector is not confined to forestry experts only; it warrants participation of experts from other relevant sectors to ensure effective returns to the people. Land use management and legal protection for forest land in Sindh was another measure that this document reinforces by suggesting strong policy actions. Other efforts to improve forest resources include improving enabling policy environment for REDD+ implementation (participatory monitoring system, benefit sharing mechanism, forest law enforcement and implementation strengthened, capacity building of actors on forest monitoring system), introducing alternative incomes and livelihood opportunities, promoting sustainable forest-based enterprises and vocational education, and Forest based Payments from Forest Ecosystem Services.

1 A set of interlinked activities that form a coherent strategy for counteracting a driver of deforestation, forest degradation and/ or barriers to expansion of a forest carbon enhancement activity.

One of the key action identified in this PRAP is continuation and refining participatory approach to forest management in which the province has already travelled a long way. In addition, integration of trees on private lands (as in case of TBTTP) has been emphasized to promote sustainable solutions to energy demands on forests.

The PRAP will make a traction through Participatory Forest Management Plans (PFMPs) with an approach that encourages harvesting trees on a rotational basis so that timber and fuel may be produced and used sustainably for local use. The PRAP suggests activities aimed at enhancing forest stocks so that forests continue to see improvement for effective REDD+ results. Sindh Forest department will follow a site specific, landscape approach in developing PFMPs in which various actions are planned and implemented in a coordinated way, aiming at maximizing economic, social and environmental benefits.

The total indicative financial size of this PRAP is PKR2,220 million for ten years (2022-2031).

1 INTRODUCTION

Pakistan signed and ratified the UN Framework Convention on Climate Change (UNFCCC) in 1994. Pakistan also initiated a national dialogue on REDD+ in 2010 and submitted its REDD+ Readiness Preparation Proposal (R-PP) to the World Bank Forest Carbon Partnership Facility (FCPF) in 2014. The Federal Ministry of Climate Change (MoCC) through its Office of the Inspector General of Forests (OIGF) has been implementing Readiness activities after approval of R-PP in 2014 with financial and technical support from FCPF along with other bilateral initiatives and UN-REDD target support fund.

One of the key outputs[2] of REDD+ Readiness activities was preparation of a National REDD+ Strategy for Pakistan which was finalized in 2021 with the vision that forests provide ecosystem services and livelihood support on a sustainable basis. As part of the development of the strategy direct and underlying drivers of deforestation and forest degradation and barriers to enhancement of biomass and forest area/cover were assessed at the national level. The strategy also identified measures necessary to effectively address the drivers and barriers. For the implementation of recommendations proposed under the National REDD+ Strategy (NRS), it is important to elaborate the drivers and barriers at sub-national and local levels. To undertake these tasks at the sub-national and local level, the strategy suggested development of Provincial REDD+ Actions Plans (PRAPs) and Participatory Forest Management Plans (PFMPs).

The PRAP of Sindh therefore is in line with the recommendation of the NRS. This document provides details on province specific drivers of deforestation and forest degradation and describes actions to address them in order to improve forest resources of the province.

The actions also aim to strengthen opportunities and address challenges for strengthening REDD+ readiness at the provincial level.

1.1 Context of Sindh

1.1.1 Area and location

Sindh province in located in south-east of Pakistan bordering with Balochistan in its west / north-west, Punjab in its north-east, and Indian states of Rajasthan and Gujrat in its east and Arabian sea in its south. Sindh is part of Indus River Delta and has derived its name from that river, known as Sindhu. The total area of the province is 140914 km² and out of this 8% percent land is under forest cover[3]. Sindh has a diverse land use with agriculture, forests, rangelands, hills, deserts and bare lands, coasts and water bodies (**Figure 1**).

1.1.2 Demographic and socioeconomic patterns

The Sindh Population as per Pakistan Census Report 2017 is 47.85 million[4] (Male: 51.98%; Female: 48%; Transgender: 0.02%) accommodated within 8.63 million households constituting 23% of the total population of Pakistan. The rural and urban population constitute 48.10% (23,021,876) and 51.89% (24,832,634) of the total population of Sindh, respectively. Most of the population of Sindh follows Islam. There are also minority communities of Zoroastrians, Hindus, Christians and Sikhs (in some locations majority of the population). The population of Sindh is increasing at an average 2.41% per annum and will cross 58 million by 2030 and 81 million by 2050[5], if growth continues at current rates. Sindhi natives comprise 79% of the population whereas 19% are settlers from other ethnic origins.

2 National REDD+ Strategy, National Forest Monitoring System, Safeguard Information System, Forest Reference/ Emission Level
3 https://sindhforests.gov.pk/page-overview
4 https://www.pbs.gov.pk/sites/default/files//population_census/sindh_tehsil.pdf
5 Projection is based on the current rate of population growth reported in census report 2017.

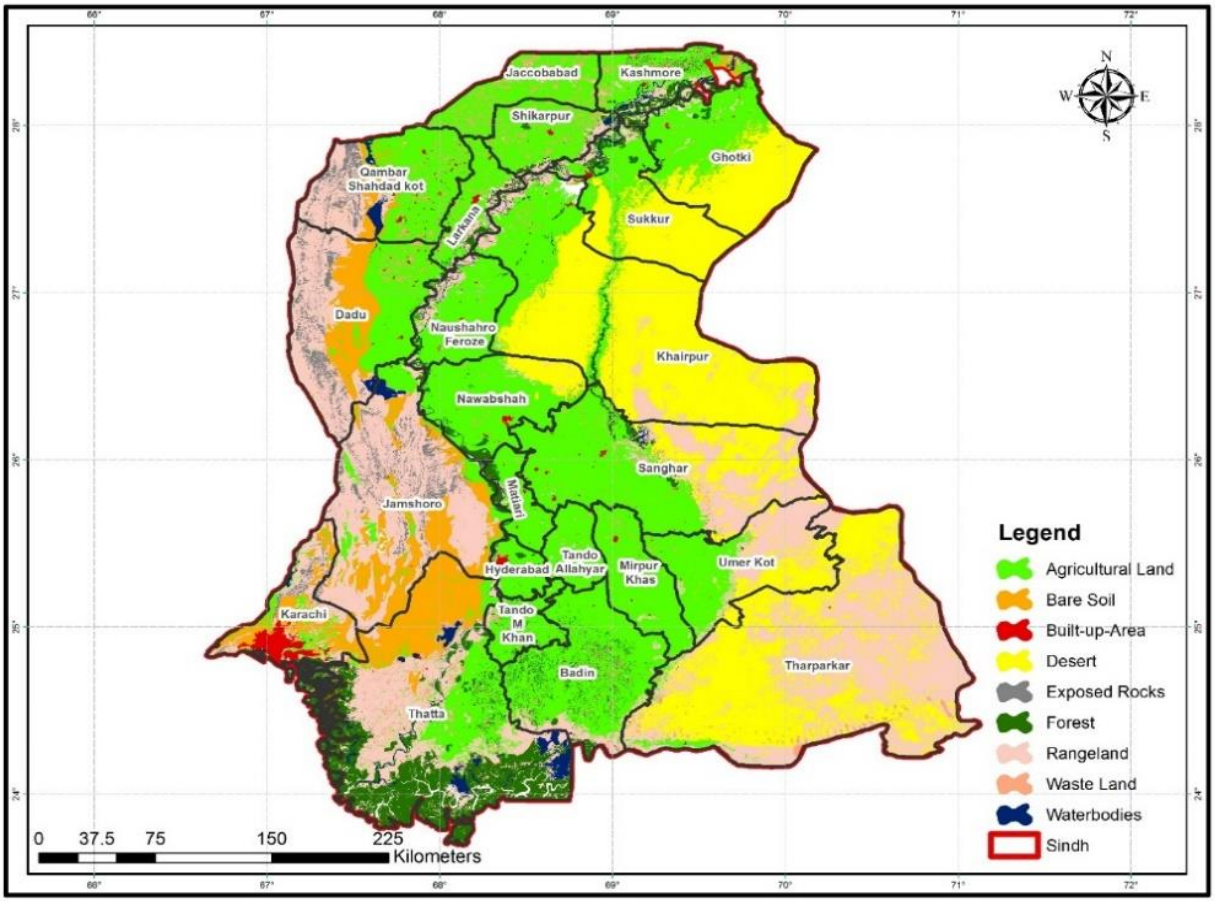

Figure 1: Sindh Geographical and land use map

Source: Climate Change Policy, Sindh (Draft) 2019

1.1.3 Economy

Sindh has the 2nd largest economy in Pakistan. A study conducted by Ministry of Planning, Government of Pakistan found that urban Sindh is the most prosperous region in the country, and its GDP per capita was 1.400 $ In 2010, which is say 35% more than the national average. Agriculture, followed by forestry, is the main land use in most parts of Sindh. A majority of the people of Sindh depend on agriculture as their main source of livelihood. The total cultivable area of Sindh is 7.14 million hectares[6] with more than 50 percent of the total geographical area as cultivable land. Sindh is a major contributor of staple crops in the country, producing 35 percent of rice, 28 percent of sugarcane, 20 percent of cotton and 12 percent of wheat.

1.1.4 Climate

Sindh is affected with various manifestations of Climate Change such as increased variability of river flows and floods, heat waves and drought. Sea level along the Karachi coast has risen approximately 10 centimeters in the last century and is expected to further rise by 60 centimeters by the end of the century to threaten the low-lying coastal areas south of Karachi towards Keti Bander and the Indus River delta affecting the infrastructure and livelihoods in these areas. By the end of this century, the annual mean temperature is expected to rise by 3°C to 5°C[7]. Different natural events such as floods, droughts and storm surges have also led to "climate migration". Sindh is the country's most urbanized province with an estimated population of nearly 47.55 million people, 49.5 percent of whom live in

6 https://documents1.worldbank.org/curated/en/592271468287148292/pdf/E42960v10SINDH070PUBLIC00Box379832B.pdf
7 Rafiq, A. 2014
https://www.academia.edu/35243533/CLIMATE_RISK_MANAGEMENT_FRAMEWORK_FOR_BUSINESS_ORGANIZATIONS_IN_PAKISTAN

urban areas[8]. According to the World Bank, 15 per cent of the total GDP of Sindh is being lost yearly due to the environmental degradation and climate change, which is much higher than national figures.

With winter season showing a greater warming trend than summers in Sindh, heat stresses and water requirements have increased throughout the province. However, the coastal belt has not shown any cooling or warming trends. The implication for Indus delta manifests in shorter winter and longer summer (Afzal et al. 2012), which affects life cycle of economically important crops including marine life. The Indus Delta supports habitat for wildlife and 97% of the total mangrove forests and is home to over one million people, 135,000 of which depend on mangroves for their livelihood. It is expected that sea level rise will inundate low-lying areas and result in degradation of mangrove forests, declining drinking water quality, and decrease in fish and shrimp productivity[9].

Changing precipitation patterns in Sindh depict predominant conditions of drought. Some flood years are a result of upstream water flowing downstream through the Indus River. The surplus water in the upstream directly affects the low elevation plains of Sindh. Weak monsoons results in high temperatures and reduce freshwater availability in Sindh which has effects on crops, forests and all living beings ((Afzal et al. 2012; Rasul et al. 2004). The mangrove forests regulate cyclones and storms in coastal areas which are likely to become more frequent and intense (Rasul et al. 2005).

Droughts: About 65% of Sindh is arid with less than 100mm of average rainfall with several districts under drought classification of IPC 3 (crises), 4 (calamity) or higher (famine) (WFP 2021). Tharparkar, Dadu and Sukkur districts are especially prone to droughts (NDMA 2007; Khan & Gadiwala 2013). Tharparkar has frequently being declared a 'drought calamity area' (Global Water Partnership 2015).

Floods: Being a lower catchment area, the districts along the River Indus are highly vulnerable to floods (National Disaster Management Authority, 2011). Historically, the districts most commonly affected, in terms of damages to human, wildlife, and rural/urban infrastructure, during 2010 and 2013 floods are Hyderabad, Shaheed Benazirabad, Sukkur, and Thatta (PCO, IMAP, NASA 2012)(World Health Organization 2013).

Heat Waves: Heat waves are caused by a prolonged period of hot weather with intense monsoon rains and long dry spells. Most of the province is located in the intense heat zone (Afzal et al. 2012; uz Z. Chaudhry et al. 2015).

The increase in temperature enhances the rate of evaporation of moisture from the soil surface and transpiration from the plant tissues in the vegetated areas of the province. The increased requirements of irrigation water in the province due to higher evapotranspiration is compounded with lesser water availability. This will also result in degradation of rangeland and further deterioration of the already degraded cultivated land areas suffering from water erosion, wind erosion, waterlogging, salinity etc. Sindh has over 350 KMs long coast, rich in natural resources. The coastal areas are most vulnerable and exposed to cyclones. There is evidence of sea-level rise along the coast also (Afzal et al. 2012).

Due to increased frequency of storm surges combined with the sea level rise, the sea water intrusion has become an emerging challenge which would claim more land area with the passage of time. The increased saline and sodic contents of soil would deteriorate the yielding potential of fertile deltaic soils (Bot et al., 2000) and eliminate natural habitat of mangroves along the shoreline and northward shift of biodiversity. The important eco-systems in Sindh, such as mangroves, have come under extreme pressure due to sea water encroachment, anthropogenic pressure and deforestation. There has been mass depletion of mangrove forests in the area due to illegal logging and untreated industrial waste.

8 Pakistan Bureau of Statistics, 2016
9 Chaudhry Q.Z. (2017). Climate Change Profile of Pakistan. ADB. Accessed at https://www.adb.org/sites/default/files/publication/357876/climate-change-profile-pakistan.pdf

Coastal districts of Sindh, such as Karachi, Badin, and Thatta are highly vulnerable, and the livelihoods of fisher communities is being negatively impacted by it.

With an ever-growing population and increasing demands for wood and wood-products on a very small forest resource base, all forests in Sindh remained under continuous stress and the utilization of these forests over and above their productive capacities. So far, the energy requirements of the province are concerned, the existing wood energy requirements are estimated to be 6 .4 million m^3 against sustained supply of 1.68 million m^3, and thus there is a generating gap of 4.72 million m^3 between wood energy supply and demand.

Sindh's priorities areas, according to the Sindh Government Vision are, energy, water management, agriculture, industrial development, education and health, urban management and infrastructure building. The draft climate change policy of Sindh recognizes climate change as the biggest threat to these ambitions. The Provincial REDD+ Action Plan emphasizes that restoration and further growth of forest resources is one of several remedial measures to mitigate the risks posed by climate change.

1.1.5 Overview of the forest resources

The forest resources of Sindh are classified in four different categories viz. riverine forests, irrigated plantations, protected forests and mangrove forests (Figure 2). The riverine forests of Sindh are confined to riverine tract of Indus within the protective embankments on both sides of the river. They are stretched from Northeast of the province to the South near Arabian Sea where Indus falls in the sea. Irrigated plantations are the main features of manmade plantations raised on canal irrigation system of river Indus. These plantations were raised mainly to meet the ever-increasing demand of wood and wood products in the country in general and the province in particular. The grazing fields and unclassified wastelands of the province were declared as protected forests where the rights of the people are allowed more than that of reserved forests.

The Indus delta mangroves, also categorized as protected forests, have great environmental value as they protect the coastal population from sea intrusion and serve as shield against cyclones which hit the coasts of Sindh occasionally. Out of the total 8% forest area, riverine forests and irrigated plantations which are categorized as productive forests cover only 2.29% area, clearly indicating that the province is deficient in forestry resources. The remaining area under the control of Sindh Forest Department (SFD) consists of mangrove forests and rangelands, which are classified as protective forests. Forests of Sindh are rather unique because of low rainfall and subtropical location. The inundation of the river Indus as an annual recurring phenomenon was the only source for providing irrigation to the forests of Sindh as most of the productive forests are located in the protective embankments of river Indus. After the construction of the barrages and dams, this source of water supplies considerably diminished impoverishing the riverine forests.

The Government of Pakistan has launched the largest ever afforestation program in the history of the country i.e., the Ten Billion Tree Tsunami Programme (TBTTP). This four-year flagship national program (2019-2023) will increase the existing forest area of the country, including Sindh. During 2016-2025, more than 2 billion plants will be planted and/or regenerated to restore forest resources of Sindh[10] contributing to overall national sequestration potential of 148.76 MtCO2e emissions by the year 2030.

[10] Source: Sindh Forest Department, 2022

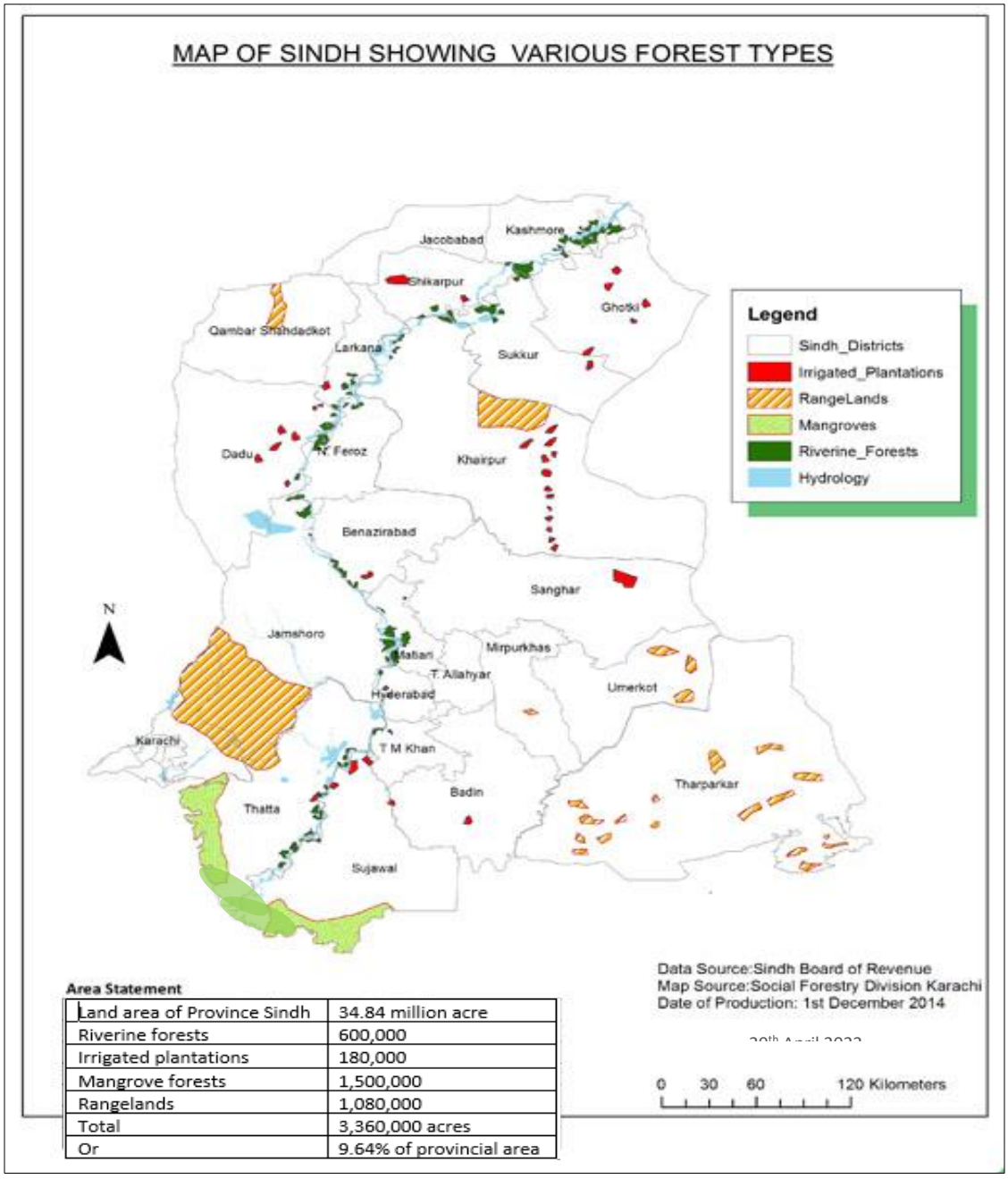

Figure 2: Forestry types of Sindh

Source: Sindh Forest department

Broadly, land tenure rights may also be classified as 'formal or *de jure*' or 'customary or *de facto*'. Formal property rights are those that are explicitly acknowledged by the state whereas informal property rights are those that lack official recognition and protection. Customary property rights are exercised by indigenous communities by virtue of their historical relationship with the forests on which their survival depends. Distinction between formally recognized and customary rights are rather blur.

The provisions of the Forest Act of 1927 and the Land Revenue Act of 1867 (amended as the Sindh Land Tenure Act of 1967) remain the main legal instruments that determine the legal aspects of

landownership, including of forest land. However, it only covers the existing power system and entitlements to management of forests and lacks clarity on unrecognized claims (carbon pools), legal and customary jurisdictions of rights, access and use patterns with respect to resources and various stakeholder categories and their stakes.

Like elsewhere in Pakistan, the land revenue in Sindh is collected by the State. Land revenue is not collected from private forest owners or communal forests, but the State charges royalties and taxes from owners and right holders on the income generated from the sale of trees (FAO, 1974). In case of Sindh, all forests are state owned, however, boundary issues prevail. Therefore, wherever settlements have not been drawn, neither land boundaries nor ownership are clear, a clarification of land tenure rights is essential in order to understand the existing relationship that people have with land and to assess where and how REDD+ can be incorporated in the current tenure system.

Table 1 provides an overview of forest tenure system in Sindh.

Table 1: Forest tenure system in Sindh

Legal Category / Tenure Regime	Forest type	Rights	Management Arrangement
Government Forests Reserved Forest (Section 3 of the Forest Act)	• Riverine forests (241,198 hectares) • Irrigation plantations (82,277 hectares)	• Timber sale proceed: 100% government • Community rights: Grazing, firewood collection	• Owned (proprietary rights), administered, regulated and managed by the Government through Forest Department. • Managed through working plans.
Government Forests Protected Forest (Section 29 of the Forest Act)	• Mangroves (littoral and swamp) 344,845 hectares • Rangelands (tropic thorn) 457,546 hectares • Canal or roadside plantations	• No felling • Community rights: Grazing, lopping	• Owned (proprietary rights), administered, regulated and managed by the Government through Forest Department. • Managed through working plans. • May also be managed through conservation initiatives with community participation
Total forest area		**884,668 hectares**	

1.2 Structure of Sindh Forest Department

The organizational set up of forest management in Sindh has had a complex history. From 1871 to 1936, it was administered by the Chief Conservator of the Bombay Presidency through a conservator in Sindh. When Sindh was separated from the Bombay Presidency and made an independent province in 1936, its forest organization too was separated and given the status of Chief Conservator's office, but not made independent as it remained attached first to the Revenue Department and then to the Agriculture Department till 25 years after the independence (barring the period of 15 years from 1955 to 1970, during which the provincial identity of Sindh was lost in the monolith province of West Pakistan, euphemistically called One Unit)[11]. In 1972, the forest office was detached from Agriculture department and elevated to the status of an administrative department with its own secretary. Since then, the Forest department has had a number of other disciplines, namely, Wildlife, Environment, Livestock and Fisheries attached to it intermittently. Its current appendage is Wildlife.

Following reorganization in 1978-79 on self-finance basis, the administrative set up of the Department

11 https://sindhforests.gov.pk/page-organizational-structure

had expanded and consisted of, apart from the Secretary, the Secretariat personnel and the Chief Conservator, 6 Conservators, 21 Divisional Officers, 67 Range Forest Officers, about 165 Foresters and 658 Guards, their respective administrative units being, in downward size-shrinking order, circle, division, range, sub-range/block and beat. There was one Project Director for Sindh Forestry Development Project and one Director for Sericulture & Apiculture, while one of the six conservators also looked after the Planning, Research, Monitoring & Evaluation wing.

In 2001-02, the set up underwent yet another reorganization in the form of devolution, when 1 of its 6 afforestation circles was transferred and its conservator deputed to the district government as Executive District Officers (Forest). Other such deputation staff to the district governments are 16 Divisional Forest Officers as District Officer (Forest), 31 Range Forest Officers as Deputy District Officers (Forest), 44 Foresters and 153 Forest Guards. Functional devolution to the district level includes management of rural/social forestry, roadside plantations, amenity planting/urban forestry, community planting, irrigated plantations up to 2000 acres of area and raising of saplings in nurseries. There are five wings governing sixteen thematic area in the department. A brief description of each wing is given in the following:

Afforestation: This functional wing is concerned with (a) afforestation and regeneration, e.g. planting of new stock and reproduction from old stock; (b) protection of the existing stock from damage by natural elements (through manual and mechanical means) and human hands (through punitive legislation); (c) marketing, that is sale of timber, fuelwood and other productions of SFD; and (d) implementation of measures prescribed for betterment of forests under the SFD management plans.

Social Forestry: The Social Forestry (or agroforestry) wing (i) establishes forest and farmer nurseries for supplying planting stock to interested persons/institutions; (ii) provides technical assistance to progressive farmers interested in farmland tree planting; (iii) motivates agriculturists and other people to plant trees on their farms, institutions, playgrounds and other open spaces; and raises and maintains roadside plantations. After the abolition of district government system in 2010 the entire setup of forestry component, working under district government system, was absorbed back into SFD through setup of two Social Forestry Circles one each at Hyderabad and Sukkur. The positions of District Officer (Forests) were re-designated as Divisional Forest Officers, Social Forestry Divisions at district level. However, one Divisional Forest Officer, Social Forestry Division looks after Karachi irrespective of districts included in metropolitan city of Karachi.

Rangeland / Pasture Management: Tasks of this wing are the preparation and execution of range improvement programmes, and the scientific utilization of arid lands for maximum production of healthy forage for livestock. Two Range Management Divisions are presently working to manage the rangelands of Sindh one each based at Karachi and Mirpur Khas. The DFO, RM Division, Karachi looks after the rangelands falling in the districts of Karachi, Thatta and Jamshoro districts; whereas the DFO, RM, Mirpur Khas manages the rangelands of Thar desert (Mirpur Khas, Umarkot and Mithi districts).

Planning, Research, Monitoring & Evaluation: The Planning, Research, Monitoring and Evaluation Wing of the department is responsible for preparing short, medium, and long-term provincial plans related to forest management. This wing prepares and executes action plans for new research projects; co-ordinates research programmes with other similar research organizations of the country; monitors and evaluates development projects of SFD; and runs a training school, where forest guards (and game watchers) undergo a six-month training course.

Sericulture & Apiculture: This wing (or Directorate) rears silkworms with imported and local mulberry varieties and establishes bee colonies for producing honey and is also charged with the responsibility of supplying it to interested farmers.

The organizational structure of the Sindh Forest, Wildlife and Environment department is provided in Figure 3:

1.3 Stakeholders, roles, and responsibilities

This section compiles results from secondary analysis of information contained in various studies and published documents and discussion with key informants from the province.

The Sindh Forest Department and local communities are the key stakeholders of the province with the highest stake in REDD+. The department recognizes contribution from local community, other relevant government institutions, and CSOs/NGOs for their engagement in forest development, sustainable management and capacity building activities. Communities have been actively engaged through different NGOs as well as by the department in forest conservation activities, especially in coastal areas. Community watch and ward has been engaged (locally called *nigehbans*) to observe misuse of resources. There are five key forest dependent social groups in Sindh having different social and economic interests and influence in forest management related decisions and their implementation[12]:

1. Private forest/ woodland owners, who plant trees on their private lands and establish woodlands and have full control and use of such woodlands for their basic needs (timber, firewood, grazing, grass cutting, fodder collection and get revenue through wood sale.
2. Fishing communities live in mangrove forests with a high dependence on forests. These communities participate in forest protection as *Negehban* – the title given to them by Sindh Forest department as a job incentive.
3. The "Jut" community is known for camel rearing with an average of 30-50 camels per household. Juts are dependent on mangrove forests for grazing/ feeding of their camel herds.
4. Forest contractors mostly invest in forests for profit purposes.
5. Refugees and nomads mostly depend on the forests. These groups are generally on the move to graze their cattle and try to get as many benefits from forests as they can. They cause forest degradation due to overuse of forests and trampling/grazing of regeneration by animals.

The analysis shows that there might be some overlapping responsibilities such as legal permissions from government institutions and customary permissions by owner groups to the non-owner users. The non-owner users can use forests only on the permission of Forest Department and legal owners under customary arrangements. The power conflict between government institutions and owner groups might weaken the control by forest owners/ writ of the government. In such situations, the forests may be controlled and used by other non-owner user groups giving rise to conflicts between owners and non-users. Another potential conflict could be between government institutions and civil society organizations regarding organizations and strengthening of local communities. The forest department has established several Forest Conservation Committees (FCCs) and strengthened their management capacities from time to time. On the other side, the local NGOs/ CSOs have also established a network of Village Organizations (VOs) with overlapping vested interests. This may create conflicts between VOs and FCCs over resource management issues.

Table 2 presents some of the key stakeholders that are relevant in implementing different REDD+ initiatives in the province.

12 Sindh Forest Department, 2021

Table 2: Key REDD+ stakeholders in Sindh

Key stakeholder Group	Stakeholders	Roles in Forest Management
Government Institutions	• Forest and Wildlife Department • Planning & Development Department *Other departments:* • Agriculture • Environment & Climate Change • Human Settlement • Energy • Irrigation • Livestock and fisheries • Mines and minerals	• Responsible for implementing REDD+ Action Plan • Providing conducive policy, legal and institutional environment for forest management planning, administration and technical support, monitoring and control of illegal activities, coordination with other government and non-government agencies • Others: Important actors for coordination actions to address drivers of deforestation and forest degradation and enhance forest resources
Communities	• Individual households, woodland owners, forest users and dwellers • Organized communities / CBOs • Farmers / peasants and graziers • Absent landlords / owners of agricultural lands and power elite	• Have a direct stake in REDD+ benefit and thus will be motivated to conserve forest resources for a longer term while responsibly using forest resources according to *de jure* or customary laws • Forming local community groups to support planning & implementation of forestry programmes, projects and activities • Provide local knowledge to counter drivers • Ensuring participatory forest management and operational plans for enhancement • Engage and strengthen participatory monitoring process to ensure transparency • At times difficult to deal with due to conflicting interests
Civil Society Organizations	• Local NGOs in multi-sector development • Citizens' fora and collectives for opinion building (e.g. journalists) • National NGOs in in multi-sector development • Conservation NGOs with specific projects	• Organize and strengthen community organizations • Address livelihood and poverty issues (indirectly responsible for degradation) • Mobilizing and aware civil society for effective public sector development policies in forestry sector • Create platforms for dialogue on forest management issues • Promote voices/concerns of poor and marginalized social groups • Offer implementation of development interventions when required

Key stakeholder Group	Stakeholders	Roles in Forest Management
International organizations	• International NGOs interested in development sectors with an implication on communities and forests • Multi-lateral organizations with political power to influence policy and global opinion • Conservation actors with global presence • International donor organizations	• Providing advocacy, advisory, and technical roles in developing or modifying policies that grant or protect local people's equitable access to forest resources • Facilitate advocacy for environmental conservation and public awareness • Build capacity of government and local communities to plan, implement and maintain forest conservation activities; • Help government institutions and local communities to implement the programmes and specific activities in the forestry sector • Establish viable conservation models for replication • Generate finances for activities (including research & technology development.
Private Sector	• Industries with corporate social responsibility interests and concerns • Banks/ Micro Finance Institutions • Private investors and traders • Technology developers and vendors	• Investing in sustainable forest management through sustainable business opportunities e.g. carbon tradeoffs, NTFP business, eco-tourism business etc. • Providing access to microfinance services for businesses, local production and promoting jobs • Creating alternative opportunities for local economies through employment and income generation benefits from the market for local communities • Creating linkages through public-private partnership for participatory planning
Media	• Print media, newspapers • Electronic media including public and private sources • Social media • Institutional communique, newsletters and magazines	• Highlight equity issues for weaker stakeholders (women, landless, poor) • Mentoring and influencing decision making of government and other stakeholders • Report illegal activities and highlight good practice • Inform the public on key programs and activities; and ensure rights to information • Bring opinion-makers, policy makers and implementers, private sector, communities and other stakeholders together
Academia and research	• All regional public or private universities in agriculture, technology development and social sciences including University of Karachi, Mehran University Jamshoro, Tandojam Agriculture University, NED University of Engineering & Technology • Provincial government research institutions • Federal government research institutions with or without provincial presence • International research institutions with provincial programmes (including CGIAR[13] institutions)	• Important opinion makers through research • Conduct critical and neutral studies on good practice; forest diversity and environmental changes and trends • Study dynamics of drivers of deforestation and forest degradation and forest enhancement and compare effectiveness of solutions • Study and propose alternatives (to timber, to firewood, income opportunities) and economics • Silvicultural-based sustainable forest management and solutions

13 https://www.cgiar.org/

2 METHODOLOGY

The main goal of the Sindh's REDD+ Action Plan is to *serve as a strategic set of options to addressing drivers of deforestation, forest degradation and barriers to enhancement, while ensuring local livelihoods and incentives from REDD+ activities and aligning with National REDD+ objectives of Pakistan.*

2.1 Main objectives

The main objectives of the Provincial REDD+ Action Plan are as follows:

1. Outline strategic options to address the prioritized drivers and barriers with context specific actions[14] and related budget
2. Improve the health of forest ecosystems by reducing deforestation and forest degradation and enhancement of forest biomass
3. Define effective implementation and monitoring of REDD+ actions to address the drivers
4. Identify social and environmental risks associated with actions and propose mitigation
5. Propose a clear benefit sharing mechanism associated with implementation of REDD+ activities
6. Identify areas for enabling policy, legal and institutional arrangements in favour of implementing PRAP.

2.2 Steps followed to prepare PRAP

The PRAP for the province has been prepared stepwise using a highly interactive process entailing consultations with representatives of the multiple stakeholders and with institutional memory holders of the subnational entity. In addition, updated secondary data, policy documents and research references have been consulted as a founding base for discussions and interventions proposed in this action plan. The methods followed are based on international best practices and examples, particularly within Asian countries[15]. The methodological steps are summarized below:

2.2.1 Review of literature

A detailed review of literature was conducted on drivers of deforestation and forest degradation in Sindh. This included documents available with the Ministry of Climate Change, the Sindh Forest Department and online sources. Available maps were reviewed, and these were improved to clearly mark administrative boundaries. These maps were then used to understand land use, land use change, forest cover/ forest cover change. This information was then presented to the stakeholders for triangulation and discussions on the drivers of deforestation and degradation.

2.2.2 Multi-stakeholder consultation

A consultation workshop was held in the province to undertake the tasks listed below. Since many of the drivers and barriers originate outside forestry sector, participation of relevant actors, other than the forest sector was ensured in the workshop so that views of all relevant actors are documented (Annex 1).

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14 A set of interlinked activities that form a coherent strategy for counteracting a driver of deforestation, forest degradation and/ or barriers to expansion of a forest carbon enhancement activity.

15 https://lib.icimod.org/record/33717 https://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/viet-nam-183/communication-knowledge-sharing-2000/communication-and-knowledge-sharing-materials-2002/leaflets-and-brochures-2009/17322-viet-nam-infobrief-series-viet-nams-experience-with-developing-provincial-redd-action-plans-prap.html?path=un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/viet-nam-183/communication-knowledge-sharing-2000/communication-and-knowledge-sharing-materials-2002/leaflets-and-brochures-2009, https://lib.icimod.org/record/33672

A. Prioritization of already known drivers
The participants of the workshop shortlisted drivers of deforestation and causal links from the list that was taken from the National REDD+ Strategy and literature and prioritize them based on their impact. Following elements were considered while prioritizing drivers:

- Consider the level of future threat (increasing, decreasing or stay unchanged)
- Consider its impact on forest quality, biomass density and area
- Build consensus by scoring prioritization of drivers of deforestation and forest degradation
- Drivers of deforestation and forest degradation need to be spatially linked with their geographic and socio-economic contexts
- Establish cause and effect linkages between drivers to identify problem trees (some drivers are more the effects than drivers)
- Identify barriers to enhancement of forest (biomass) as specifically as possible

A consensus-based scoring was conducted for prioritization of drivers of deforestation and forest degradation for further analysis.

B. Causal analysis of the prioritised drivers
   - The drivers of deforestation and forest degradation as well as barriers to enhancement activities prioritised [16] by stakeholders were debated in a moderated group exercise.
   - Cause and effect of all drivers were analysed. The group prepared cause and effect problem trees so that interventions may be defined to remove causes as far as possible.
   - The geographical hotspots of the drivers identified and spatially mapped by experts for quantification.
   - The hotspots of drivers identified by the stakeholders, were randomly verified in the field.

C. Solutions and actions
   - Identify strategic solutions to address causal factors identified in the earlier exercise
   - Identify actions to address prioritised drivers and underlying causes
   - The proposed actions were validated through field visits for their relevance to the geographic contexts.

D. Analysis of social and environmental safeguards
Social and environmental safeguard analysis of the proposed actions and risk reduction and mitigation measures to address safeguard issues. Potential safeguards of the proposed actions were discussed and analyzed founded on the Social and Environmental Safeguard Analysis (SESA) study conducted under Pakistan's REDD+ Readiness process[17] and tailored to the Sindh provincial context.

E. Focus group discussions
Focus group discussion (FGDs) were also held with local stakeholders (including communities) where the proposed actions were presented, and risk mitigation measures were identified.

2.2.3 Expert group consultations

The analysis from multi-stakeholder session and FGDs was peer reviewed by expert groups and improved. This is the stage where a few important issues related to REDD+ implementation were elaborated including:

- Outline overall distribution mechanism for potential carbon benefits emerging REDD+ activities

16 The participants were encouraged to identify new driver, if any, or split / merge earlier drivers identified before prioritization exercise.
17 https://www.redd-pakistan.org/wp-content/uploads/2021/06/Strategic-Social-and-Environmental-Assessment-PAkistan.pdf

- Capacity needs assessment of the stakeholders in connection with REDD+ implementation
- Identify measures to address capacity gaps and enhance existing capacities
- Monitoring indicators and protocols for proposed actions
- REDD+ benefit sharing mechanism proposed to monitor distribution of benefits
- An indicative budget for interventions

2.2.4 Quantitative analysis of deforestation and degradation

A spatial analysis was conducted to understand changes in forest leading to conversion from forest to other land cover classes (deforestation). In this study, 2008 and 2012 land cover maps at level 1 (6 IPCC classes) were used for the spatial mapping. At the province level using a 6x6 land cover classes matrix was generated to assess the conversion of the forest area to other land cover land cover classes (i.e., Forest to Cropland, Forest to Grassland, Forest to Settlement, Forest to Wetland and Forest to Other land). No recent studies are available for quantification of degradation. Therefore, degradation hotspots were identified by the stakeholders during the interactive session in the PRAP workshop and were mapped accordingly after random field verification.

2.2.5 Drafting and endorsement of the PRAP

Using the material collected, the PRAP was developed which includes immediate, medium and long-term intervention. The PRAP also include monitoring protocols, safeguards and actors relevant to implement actions.

The plan was endorsed at the meeting of the Provincial REDD+ Management Committee on 24th March 2022 (note attached in Annex II). The discussion held during the PRMC was integrated in the plan and a revised plan was shared with the province.

3 DESK REVIEW: DIRECT AND INDIRECT DRIVERS OF DEFORESTATION & FOREST DEGRADATION

The Sindh government recognizes REDD+ as financial incentive-based forest management scheme likely to incentivize ongoing forest management initiatives to address drivers of deforestation and forest degradation and associated behavioral change among the local communities. The intent and approach of the government on REDD+ have been described in this REDD+ Action Plan.

The NRS provided a strong base to initiate the identification and prioritization process of province specific DoDD and barriers to enhancement. These drivers were further verified through desk review of other studies on DoDD. The summary of these references is given in Table 3. It is to be emphasized that Sindh's forestry resources have received a lot of interest from researchers and, therefore, the references in the table may not be complete. Therefore, a dialogue among major stakeholders was held to further validate this prioritization of drivers for a desk analysis:

Table 3: Drivers of deforestation & forest degradation determined from review of literature (Sindh)

Deforestation	Commercial agricultural expansion	Land encroachment for mining, housing and other purposes	Infrastructure development (roads, urban expansion, transmission lines, industrial zones, construction of river embarkments)
Reference to Literature	• Draft NRS (2018) • Pakistan's R-PP (2013) • Amanullah and Ahmed (2015)	• Draft NRS (2018) • Pakistan's R-PP (2013) • Abbasi et al (2012)	• Draft NRS (2018) • Pakistan's R-PP (2013) • Government of Sindh 2013 • Tagar and Shah 2015) • Abbasi et al. (2011) • Siddiqui et al (2004) • Amanullah and Ahmed (2015) • Tagar and Shah (2015)
Forest Degradation	Unsustainable wood extraction (fuelwood and timber)	Reduced fresh water for riverine and mangrove forests (5)	Subsistence agriculture
Reference to Literature	• Draft NRS (2018) • Pakistan's R-PP (2013) • GoP (1992a and b)	• Draft NRS (2018) • Pakistan's R-PP (2013) • Tagar and Shah (2015) • Amjad et al. (2007) • Memon (2002)	• Draft NRS (2018) • Pakistan's R-PP (2013) • Memon (2002)
Barriers to Enhancement	Droughts	Grazing	Lack of awareness; Weak management capacity
Reference to Literature	• Abbasi et al. 2012	• Amjad et al 2007	• Abbasi et al. 2012 • Amjad et al. 2007

4 ANALYSIS OF DIRECT AND INDIRECT DRIVERS OF DEFORESTATION & FOREST DEGRADATION

The following sections provide details of direct and indirect or underlying causes of deforestation and forest degradation and barriers to forest (biomass) enhancement.

4.1 Drivers of deforestation

4.1.1 Prioritization of drivers of deforestation

The drivers identified from the literature and spatial quantification of deforestation were presented to the stakeholders during consultation process for prioritization. Three drivers were qualified by the stakeholders for further analysis and deliberation in the PRAP (**Table 4**).

Table 4: Ranking of drives of deforestation

Direct Driver	Location (s)/ Forest Type (s)	Future Threat	Biomass/ Carbon Impact	Future impact	Total
(1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High)					
Mining and infrastructure development (settlement)	• Settlement and mining: Deh Babr Band, Deh Khadegi, Deh Ghagar • Settlement: Deh Chuhar, Khairpur, Nara, Deh Kathore • Mining: Jamshoro, Thatta, Tharparkar, Nagar Parkar	4	3	3	10
Encroachment for illegal cultivation	Riverine areas	2	2	2	6
Commercial/ subsistence agriculture expansion	Thatta, Hyderabad, Sukkar, Khairpur, Nawabshah, Larkana, Dadu	2	1 (due to legal support)	2	5

It is important to note that the stakeholders added 'mining' to infrastructure development (which has not been covered much under the literature). This prioritization is also supported by quantification of drivers of deforestation (**Figure 5**) which shows that forestland was converted to crops or grasslands, settlements and other land uses. Sindh has a growing industrialization and an active private sector development which is corporatizing land-based resources for expansion. This shows its impact in the prioritization of the drivers of deforestation. The stakeholders assessed that mining and development associated with infrastructure expansion is chiefly responsible for deforestation. This is followed by land conversion for agriculture either for subsistence (more scattered) or commercial (large pieces of land under commercial monocrops) purposes. **Table 5** provides an overview of slightly reformulated causes of drivers of deforestation. Locations were noted by the participants as hotspots of the prioritized drivers **(Table 6).** The problem tree with prioritized drivers of deforestation prepared by the participants during consultation workshop is presented in **Figure 4**.

Table 5: Direct and indirect causes of deforestation

Direct Drivers	Underlying/ Indirect Drivers
Clearing of forest land infrastructure development, mining and settlement	• Illegal land grabbing beyond leased land by powerful land mafia associated with weak implementation of lease policy and illegal allotments of forest land due to political influence • Unclear demarcation of forest boundaries associated with lack of land use planning and policy and unsecure land tenure • High demand for settlement (housing facilities) and road construction for increasing population associated with unregulated eruption of housing facilities, ineffective or

	lack of land use planning and conflicting and non-coherent policies of forests and land revenue • Poor or no land use policy • Low interest of private sector to invest in forestry • Weak forest governance, monitoring and reporting system associated with poor monitoring capacity (human resource and technical) • Obsolete or poor laws with spaces for manipulation associated with illegal influencing for change forest land to other land uses • Weak implementation of EIA guidelines, particularly for mining with more harm than necessary to forestland • Lack of coordination among relevant departments (including mining, housing, industries etc.)
Encroachment for illegal / subsistence cultivation	• Low agricultural productivity from available land due to poor technical inputs improve productivity • Lack of research base in agriculture sector associated with poor coordination between line departments and lack of awareness in dryland agriculture • Lack of employment and alternative livelihood sources associated with lack of incentives in forest conservation • Insecure land tenure for poor farmers leading to short term mentality • Weak forest monitoring and reporting system associated with poor monitoring capacity (human resource and technical)
Clearing of forest land for commercial agriculture	• Poor or no land use policy • Illegal land grabbing beyond leased land by powerful land mafia associated with weak implementation of lease policy and illegal allotments of forest land due to political influence • Unclear demarcation of forest boundaries associated with lack of land use planning and policy and unsecure land tenure • Weak forest governance, monitoring and reporting system associated with poor monitoring capacity (human resource and technical) • Obsolete or poor laws with spaces for manipulation associated with illegal influencing for change forest land to other land uses

Table 6: Geographical hotspots of the key drivers of deforestation in Sindh

Geographical hotspots of key drivers of deforestation		
Encroachment for illegal cultivation	**Commercial agriculture expansion**	**Mining/ infrastructure development/ settlement**
Riverine areas	Thatta, Hyderabad, Sukkar, Khairpur, Nawabshah, Larkana, Dadu	Khairpur, Nara, Deh Kathore, Deh Khadegi, Deh Ghagar, Deh Babr band, Deh Chuhar, Jamshoro, Thatta, Tharparkar (Mithi, Nagar Parkar)

Field verification of these drivers on some of the hotspots was conducted and evidence was collected through photos and conversation with local stakeholders.

4.1.2 Quantification of drivers of deforestation

A spatial analysis was conducted to understand the changes from forest to other land cover classes (deforestation). In this study, 2004 and 2008 land cover maps at level 1 (6 IPCC classes) were used for the spatial mapping. At the province level, a 6x6 land cover change matrix was generated to assess the conversion of the forest area to other land cover land cover classes (i.e., Forest to Cropland, Forest to Grassland, Forest to Settlement, Forest to Wetland and Forest to Other land). According to spatial analysis, in total forest lost during 2004-2008, 54% has gone to the crops. 25% forests came under wetlands, 18% to other land uses (including mainly infrastructure and mining) and 3% changed to grasslands (Figure 5).

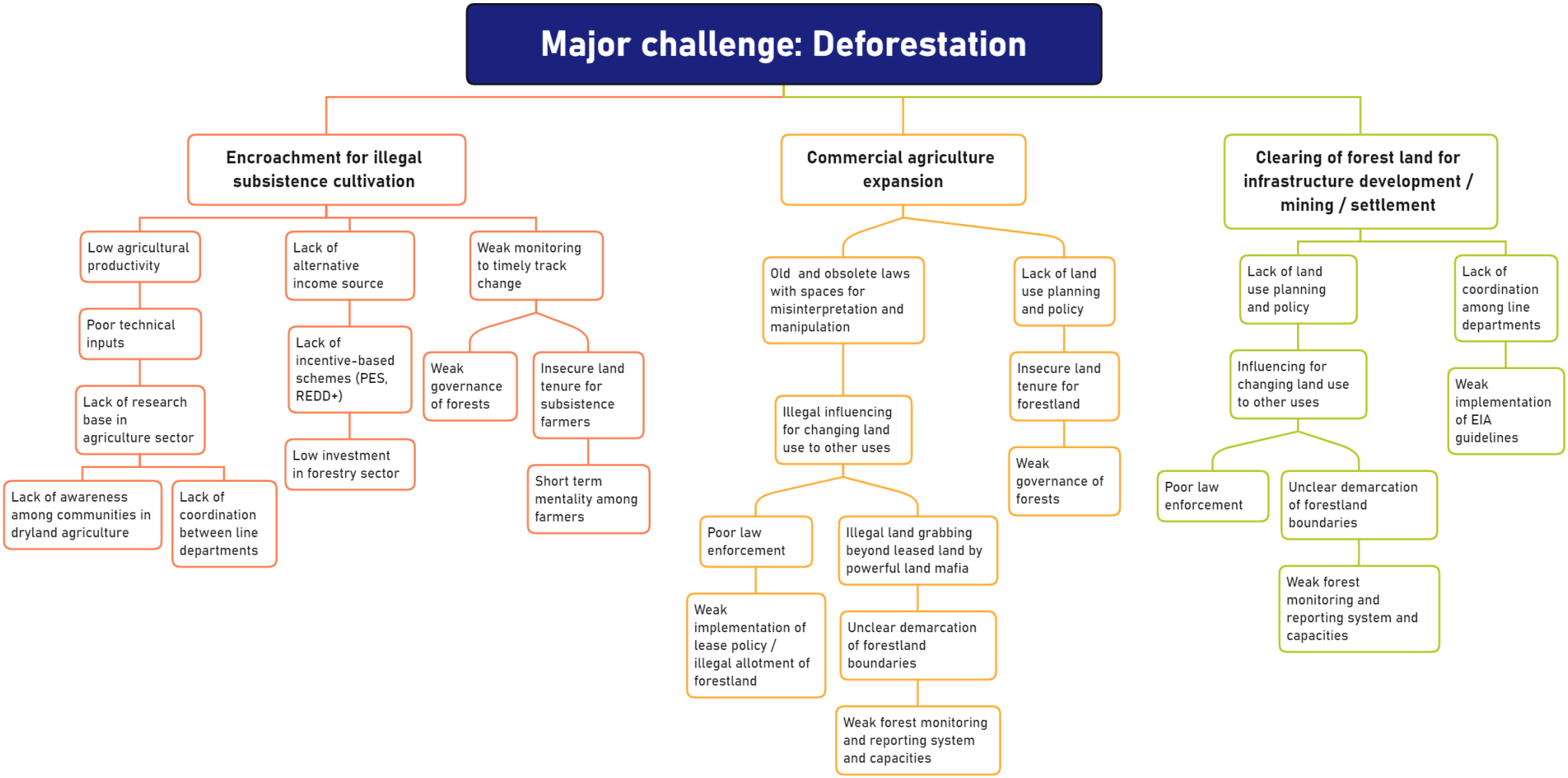


Figure 3: Problem Tree of Deforestation

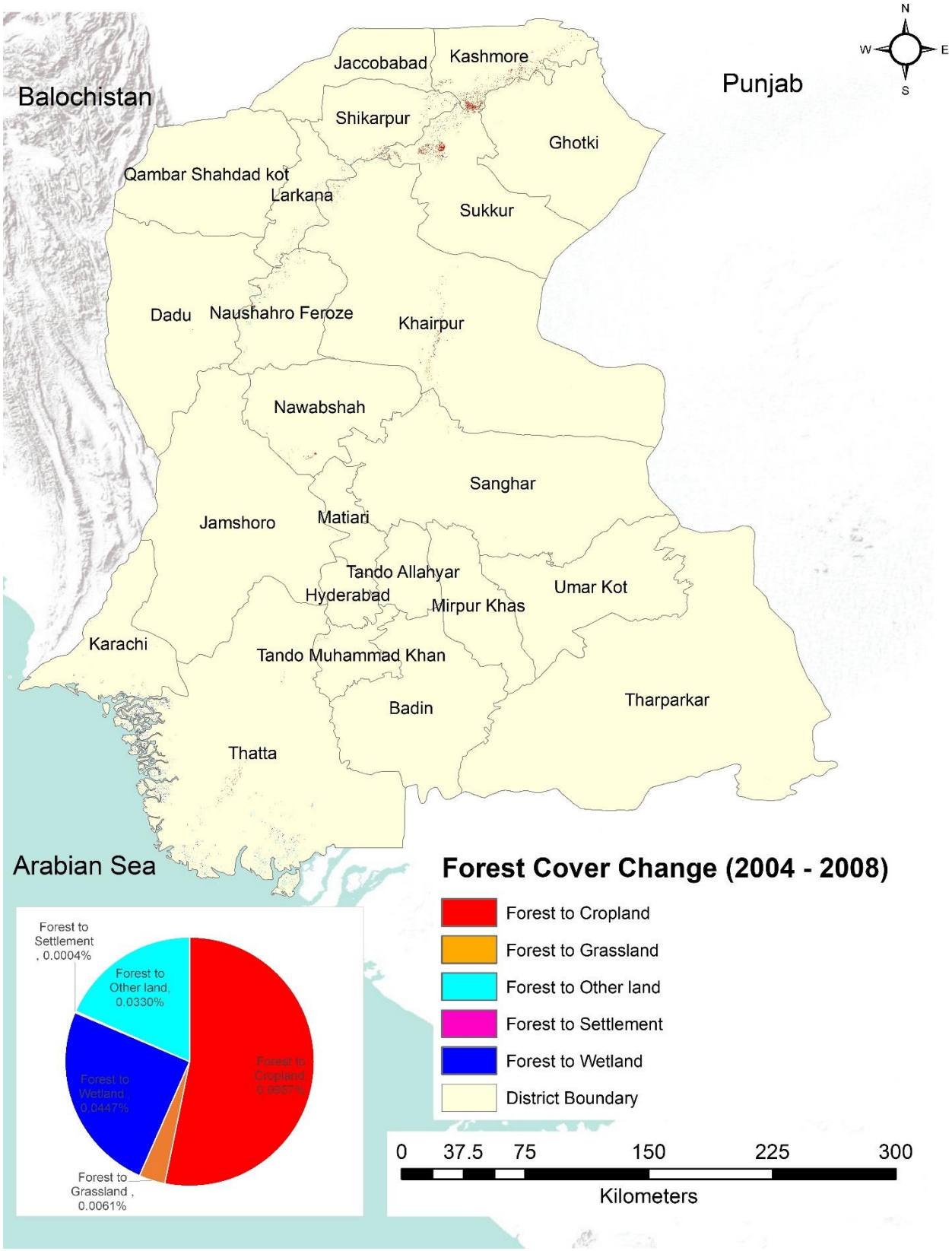


Figure 4: Forest cover change of Sindh (2004 – 2008)

4.2 Drivers of Forest Degradation

4.2.1 Prioritization of drivers of forest degradation

Three direct causes of forest degradation were prioritized by the stakeholders during the consultation process for further analysis **(Table 7)**.

Table 7: Ranking of direct drivers of forest degradation

Direct Driver	Location (s)/ Forest Type (s)	Future Threat	Biomass/ Carbon Impact	Future impact	Total
(1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High)					
Water scarcity (upstream water diversion, sea intrusion, drought)	Rainfed Barani Areas Tharparkar, Mithi, Jamshoro (riverine, rangelands), Dadu, Thatta), Badin, Nara	5	4	1	10
Salinity and water logging)	Thatta, Hyderabad, Badin, Sanghar, Khairpur,	3	4	2	9
Fuel wood/timber extraction	Ghotki, Sakkur, Thatta, Badin	3	4	2	9
Over grazing and browsing	Jamshoro Dadu, Thatta, Karachi, Sajawal (barrier to enhancement)	3 (high in mangroves)	4	1	8
Agriculture	Riverine areas	2	2	1	5

It is important to note that the stakeholders introduced salinity and water logging asa driver of degradation to the list, which is not covered in the literature. **Table 8** provides an overview of the direct drivers of forest degradation identified by the group and associated underlying causes. The problem tree with prioritized drivers of forest degradation prepared by the participants during consultation process is presented in **Figure 6**:

Table 8: Direct and Indirect causes of forest degradation

Direct Drivers	Underlying/ Indirect Drivers
Water scarcity due to upstream water diversion and sea intrusion Climate induced droughts	• Poor watershed management in the upstream associated with poor institutional (technical & technological) capacity leads to challenges faced in mangrove ecology • Lack of climate change adaptation and mitigation measures associated with lack of research base on drought mitigation • Lack of coordination among departments (environment, forests, wildlife, drainage management, industry, infrastructure and others) impacting natural resources. • Development initiatives, even with good intension, may have contradictory impacts
Salinity and water logging	• Poor land management in agriculture • Lack of adaptation measures associated with lack of research on drought mitigation • Lack of incentive-based policies, private investment in forestry sector and lack of information on incentive-based schemes from REDD+
Fuelwood/ timber extraction	• High dependency on forest for firewood and timber for energy and construction • Lack of/ poor access to affordable alternatives by local communities which already suffers with poverty/ lack of alternative income sources • Lack of institutionalized role of community in managing natural resources • Lack of investment from private sector in forestry / energy sector • Lack of incentive-based policies, private investment in forestry sector and lack of information on incentive-based / PES[18] schemes from REDD+ • Overgrazing and browsing

18 A Payment for Ecosystem Services (PES) scheme is aimed at compensating *forest owners or users* to ensure a certain level of health in specific ecosystems to maintain or improve environmental services that the forest provides, including the increase in forest carbon stocks and reduced deforestation and forest degradation. A PES scheme is that forest owners or direct users can ensure the provision of environmental service for the enjoyment and use of those who can compensate for it. PES creates a positive incentive to keep or improve forested areas and to avoid other activities that destroy or degrade the forest. PES schemes must promote additional income to forest owners /users. NRS, 2018.

The participants also identified geographical hotspots of the key drivers leading to forest degradation in Sindh listed in **Table 9.** The hotspot locations are shown on a map in **Figure 7.**

Table 9: Prioritised drivers of deforestation and forest degradation for the PRAP - Sindh

Prioritised drivers of degradation		
High demand for fuelwood/ timber	**Climate induced droughts**	**Water logging and salinity**
Ghotki, Sakkur, Thatta, Badin	Rainfed Barani Areas Tharparkar, Mithi, Jamshoro (riverine, rangelands), Dadu, Thatta), Badin, Nara	Thatta, Hyderabad, Badin, Sanghar, Khairpur,

Field verification of these drivers on some of the hotspots was conducted and evidence was collected through photos and conversation with local stakeholders.

4.2.2 Quantification of drivers of forest degradation

Quantification of degradation is not available. Some of the secondary data, however, indicated that the existing wood energy requirements of the province are much higher than the supply. The demand is estimated to be 6.4 million m³ against sustained supply of 1.68 million m³, and thus there is a generating gap of 4.72 million m³ between wood energy supply and demand[19].

The Government of Pakistan conducted a first baseline study in 2003-2004 on "Supply and Demand of Fuelwood and Timber for Household and Industrial Sectors and Consumption Pattern of Wood and Wood Products in Pakistan". The study revealed that the per capita availability of forests in Sindh in 2002-2003 was 0.024 hectare (ha) per capita of the population. The study also revealed that the total supply of timber and fuel wood from state forests was 1.681 million m³. On the other hand, the fuelwood consumption in Sindh was 4.614 million m³ in 2003 that was anticipated to increase to 6.155 million m³ in 2018[20]. The use of industrial timber was 2.725 million m³ in 2003 which was anticipated to increase to 3.635 million m³ in 2018. The supply gap of wood was 5.66 million m³ in 2003 that was anticipated to grow to 8.11 million m³ in 2018. The Sindh Forest Department chalked out their afforestation and rehabilitation programmes under TBTTP to tackle the additional area in order to achieve targeted wood production and increasing productivity level through intensive management of existing forest resources.

19 https://sindhforests.gov.pk/page-overview

20 Supply and Demand of Fuelwood and Timber for Household and Industrial Sectors and Consumption Pattern of Wood and Wood Products in Pakistan ((Maanics Int., 2004).

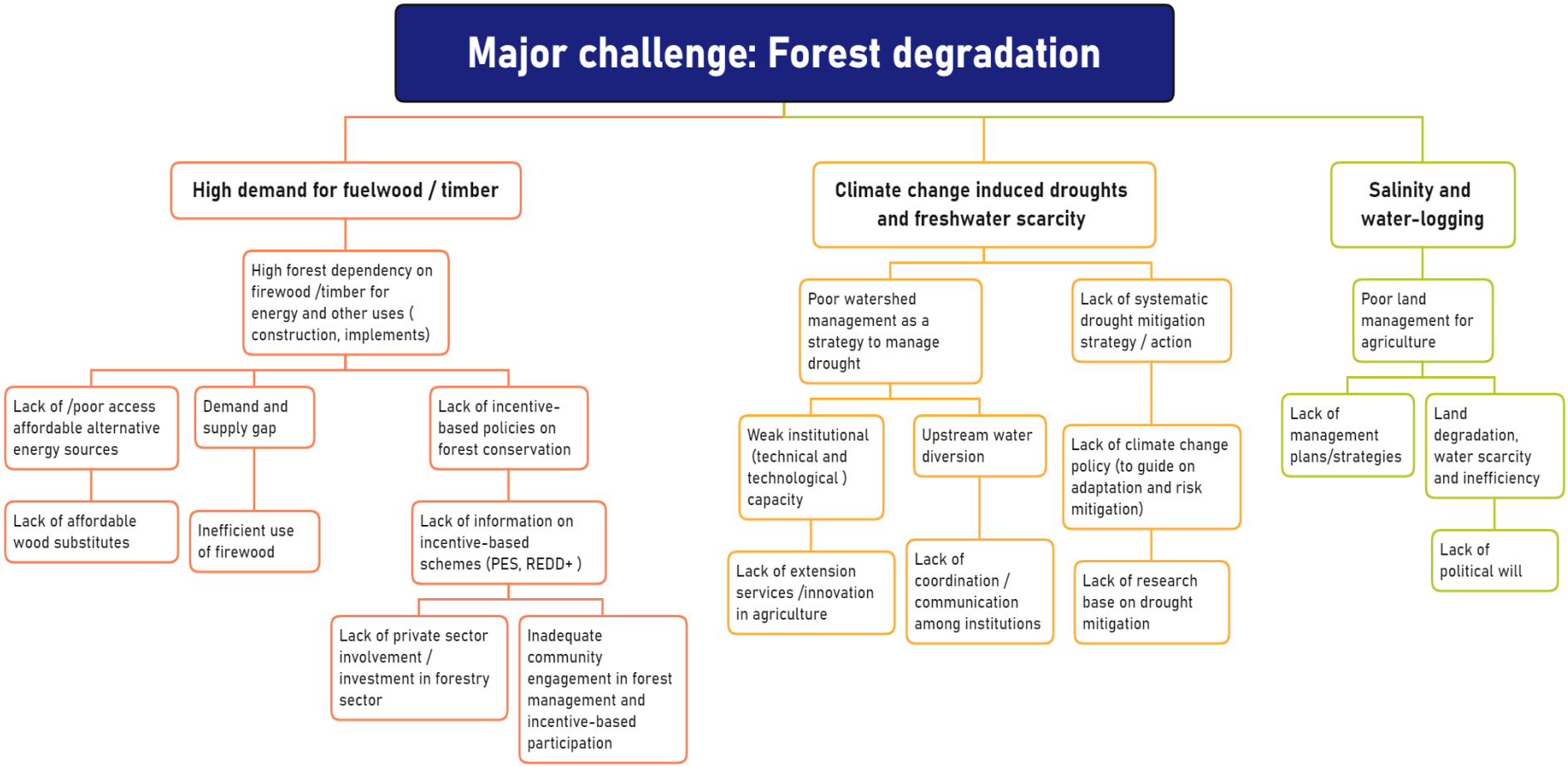


Figure 5: Problem Tree of Forest Degradation

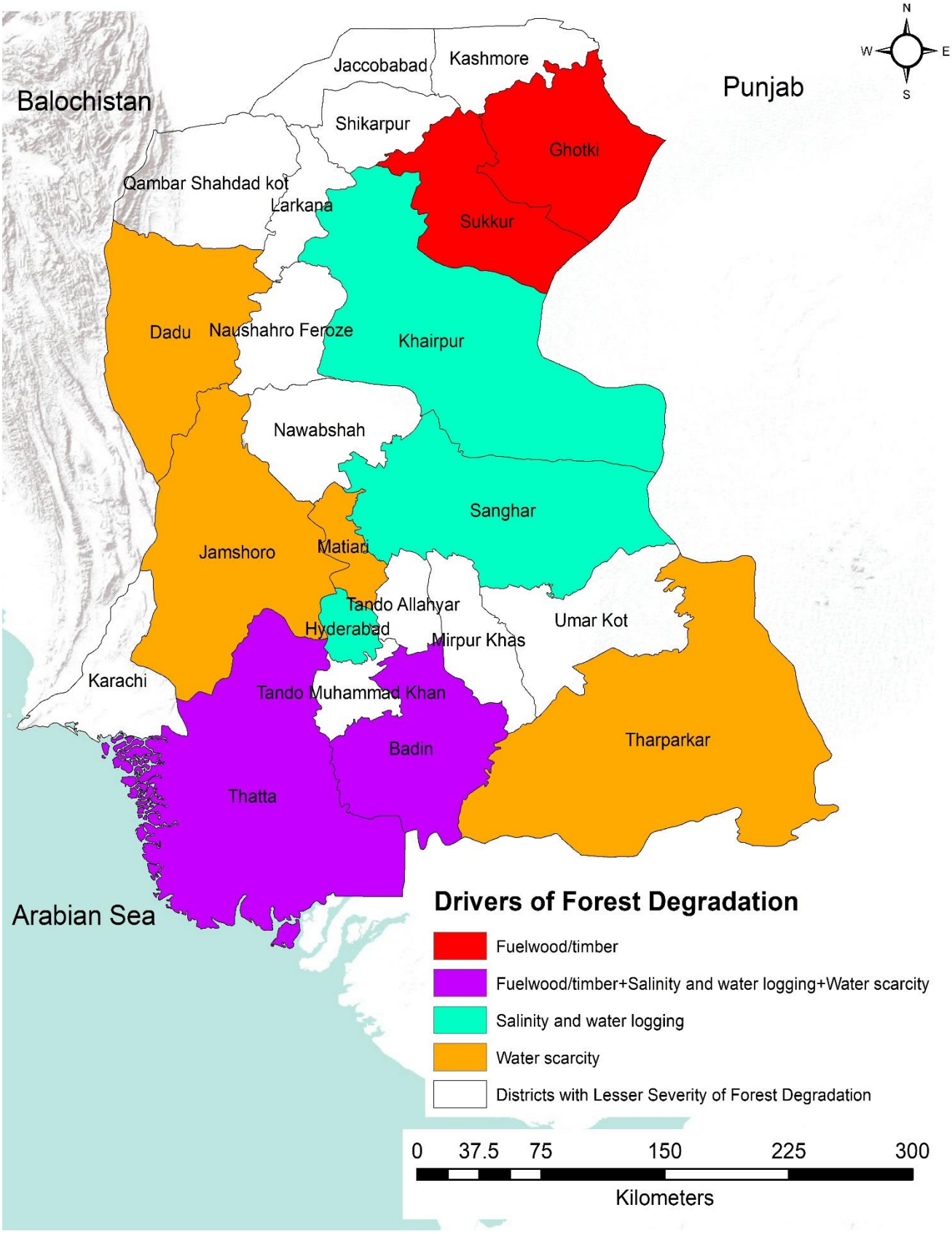


Figure 6: *Hotspots of forest degradation*

Picture 1: Desertification and drought conditions in Sindh

Picture 2: Household needs for firewood.

Picture 3: Grazing pressure on already slim resource base

Picture 4: Fuelwood: Demand on forests for firewood

4.3 Barriers to enhancement of forest biomass

4.3.1 Prioritization of barriers

The Government of Sindh is committed to enhance the provincial forest biomass through conservation, development, and sustainable management of forest resources. This commitment is manifested through different measures already in place contributing to lands restoration, biodiversity conservation and inclusive conservation of existing natural forests. Three enhancement options were rated by the stakeholders. They agreed that reforestation, afforestation and sustainable forest management / forest conservation are all good options for Sindh (**Table 10**).

Table 10: Ranking of options to remove enhancement barriers/ challenges

Enhancement Activities	Location (s)	Potential Area affected	Biomass/ Carbon Impact	Total Score
(1: Very Low, 2: Low, 3: Medium, 4: High, 5: Very High)				
Reforestation & Forest restoration	Riverine (Sakkur, Nawabshah, Hyderabad, Jamshoro, Dadu, Larkana), Tharparkar, Naushero Feroz, Mirpur Matheelo, Thatta, Sajawal, Tando Mohammad Khan	5	5	10
Afforestation	Mangroves (Keti Bundar, Shah Bandar, Kharo Chan), Riverine (Sakkur, Nawabshah, Hyderabad, Jamshoro, Dadu, Larkana), Tharparkar, Naushero Feroz, Mirpur Matheelo, Thatta, Sajawal, Tando Mohammad Khan, Badin	5	4	9
SFM & conservation	Nawabshah, Sukkur	3	4	7

4.3.2 Analysis of barriers

Table 11 provides an overview of analysis of the barriers to enhancement activities in Sindh. The problem tree with prioritized barriers of enhancement activities is presented in **Figure 8.**

Table 11: Barriers to enhancement of forest biomass

Major Barriers	Underlying challenges
Policy/ governance barriers	• Challenge faced in retaining forestland as forestland as opposed to other land uses supported by powerful stakeholders • Lack of efficient land use policies and action plans • Lack of incentive-based forest policies • Weak implementation and monitoring of existing policies
Institutional barriers	• Inadequate human and financial resources • Lack of extension services and weak law enforcement
Technological barriers	• Limited knowledge of geo-spatial tools and monitoring technology • Limited knowledge of salinity control, drought mitigation plans and water-logged soil reclamation
Social barriers	• Low awareness and community interest and participation • Free grazing and trampling
Economic barriers	• Lack of access to international markets (PES, REDD+) • Lack of value chain promotion of NTFPs, fruits and forest ESs • Weak business plans to attract private sector (NTFPs)

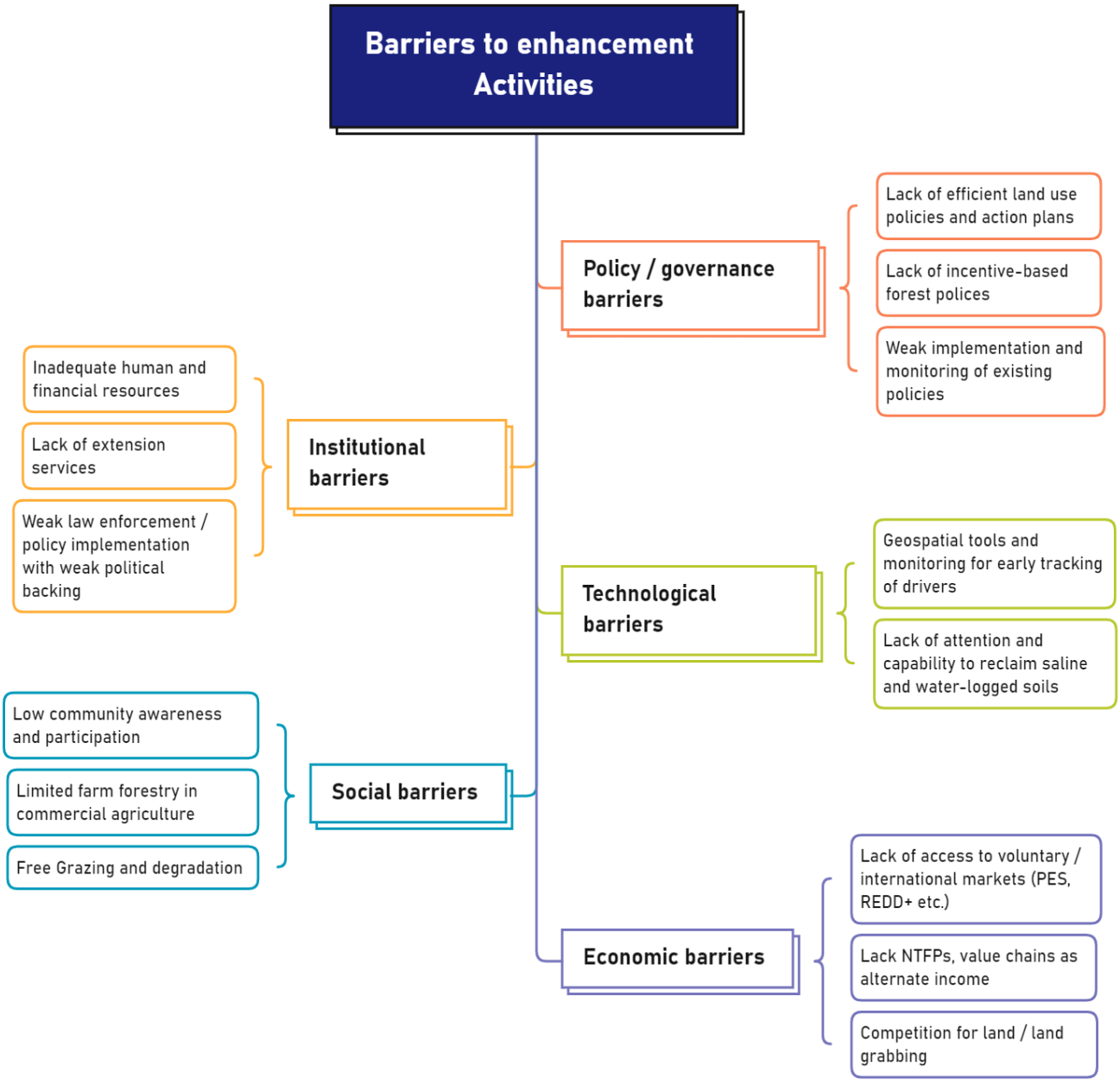


Figure 7: Problem tree of barriers to enhancement of forest carbon stock

5 ACTIONS TO MANAGE DRIVERS, UNDERLYING CAUSES AND BARRIERS

This chapter elaborates solutions for reducing the rate of deforestation and forest degradation in Sindh and activities for enhancing forest carbon stocks. Different solution pathways have been elaborated and presented in this chapter.

5.1 Addressing drivers of deforestation

This section documents actions for addressing direct and indirect drivers of deforestation. The solution tree is given in **Figure 9** and **Table 12** provides an action plan to address underlying causes of deforestation.

5.1.1 Overall actions necessary to curb underlying causes of deforestation

The detailed discussion on prioritized drivers of deforestation led to a solution tree with multiple options. The participants clubbed a set of comprehensive pathway to address the two drivers (encroachment of land for subsistence and commercial agriculture) which included effective policy development and coordination which have an overarching effect on the drivers and underlying causes.

In summary, the following overall actions were identified to reduce deforestation:

- *Ensure clarity on land use* and boundary demarcation of forestland, agricultural land and land available for settlements. This will include formulation of land use policy and mapping to establish benchmarks and secure forestlands. Advocacy campaign for effective institutionalization and implementation of land use planning and policy are required.

- *Incentive based PES Schemes:* Based on discussions and earlier initiatives in Sindh, a Payment for Ecosystem Services (PES) scheme is aimed at compensating forest owners or users to ensure a certain level of health in specific ecosystems to maintain or improve environmental services that the forest provides, including the increase in forest carbon stocks and reduced deforestation and forest degradation. PES schemes may be effective if PES is managed in such a manner that economic returns directly reach the forest-dependent communities (including users, owners, nomads, and seasonal migrants). However, the overall socioeconomic feasibility of PES will largely depend on alternative income generation options available to local communities at the local level in an easy-to-access manner.

- *Improved and participatory monitoring mechanisms* to flag encroachment on timely basis by including strong evidence-based indicators to support the department's stance. This includes establishment of a strong monitoring system at sub national level and link this with the national forest monitoring system to detect changes.

- *Coordination between departments* for planning, monitoring, and where feasible, joint initiatives in hotspot areas. A high priority has been indicated by the stakeholders for land revenue, agriculture, mining and tourism actors. This may include reconstituting PRMC and other REDD+ forums in Sindh.

5.1.2 Take measures to check illegal encroachments

The most significant driver of deforestation in Sindh seems to be the matter of illegal change to land use to commercial needs (including commercial agriculture, mining, and settlement) – some of this also happens for subsistence agriculture. Since Sindh does not have forest resources for production purposes, the change of land use scavenges on change of wasteland or wilderness to other more productive uses backed by influential decision making. Under this IP, several enabling decisions are needed to empower Sindh Forest Department in terms of using REDD+ as an incentive for improved conservation by acquiring cooperation from the public and other relevant departments, improve monitoring system to timely track changes, and define schemes which make REDD+ an attractive option not just for the department but also for the province.

- Forest boundaries need to be clearly delineated, mapped, and recorded
- Institutional and monitoring capacity (human, mobility) enhanced to improve forest management and check encroachment well in time
- Law enforcement strengthened to improve forest governance
- Spaces for incorrect interpretation and manipulation minimised by reviewing / revising most relevant policies and rules
    - Policy for grant of NOC with limitation for establishing settlement/ mining schemes devised and implemented
    - Mining/ EIA rules and guidelines strictly followed and implemented
    - Draft improved forest policy / respective rules with respect to securing forestland
    - Land use planning policy developed and implemented
    - Improved policy coordination among land-based actors

5.1.3 Reduce expansion of agriculture into forestland

Strengthening subsistence agriculture systems and diversifying alternative income and livelihood options for the forest dependent poor and marginalized households should reduce pressures on forests for breaking more plots for agriculture, given the evidence that these pressures come mainly from poorer households which cannot make ends meet together with their limited livelihood options (due to lack of productivity and alternatives for income). Agricultural intensification and alternative income generation were suggested as a support to address underlying causes of deforestation.

Based on the underlying causes identified, the PRAP proposes two pathways to address the loss of forest to agriculture-based livelihoods:

1. *Agricultural productivity enhancement* to increase crop production from limited land. Modern techniques to enhanced productivity of existing land and crops could be effective means to prevent further conversion of forestland to agriculture:

    - Irrigation practices improved by introducing modern techniques to enhance productivity of existing agricultural land and bring more barren land under agricultural systems to help reduce further demand and expansion into forest land.
    - Drought mitigation measures coupled with drought resistant varieties to secure farmers in dry spells, which are not uncommon in Sindh.
    - Improved capacity of agriculture extension to intensify productivity using multiple techniques (crop selection, moisture management, soil fertility enhancement and pest management).
    - Public private partnerships established, and market access improved to ensure better economic return from agriculture.
    - Vertical farming introduced at household level on limited land and water for nutrition and income saving (case study 1)

An important caution is that increasing agricultural productivity does not automatically reduce pressure from deforestation, especially at the beginning. This is because the opportunity cost of keeping forests is higher with the productivity of agricultural systems. Therefore, additional means, such as land use planning, mapping and strict compliance, are required in order to avoid a situation in which increasing productivity in agriculture becomes a perverse incentive for deforestation.

2. ***Alternative income opportunities.*** Based on several successful examples sustainable forest-based enterprises may be promoted for the villagers to create employment opportunities in the forestry sector (NTFPs, case study 2). Vocational education and skill-based training opportunity for economically poor and marginalized may be introduced (including on NTFP traits) to create specialisation in NTFP value addition and trade. In addition, there is an ample potential in Sindh to promote payments from forest ecosystem Services[21] to incentivize local communities for conservation.

21 A Payment for Ecosystem Services (PES) scheme is aimed at compensating *forest owners or users* to ensure a certain level of health in specific ecosystems to maintain or improve environmental services that the forest provides, including the increase in forest carbon stocks and reduced deforestation and forest degradation. The basic idea of a PES scheme is that forest owners or direct users can ensure the provision of environmental service for the enjoyment and use of those who can compensate for it. PES schemes would create a positive incentive to keep or improve forested areas (in quality or extension) and to avoid other activities that destroy or degrade the forest. PES schemes should also promote alternative sustainable activities to provide additional income to forest owners or users. NRS, 2018

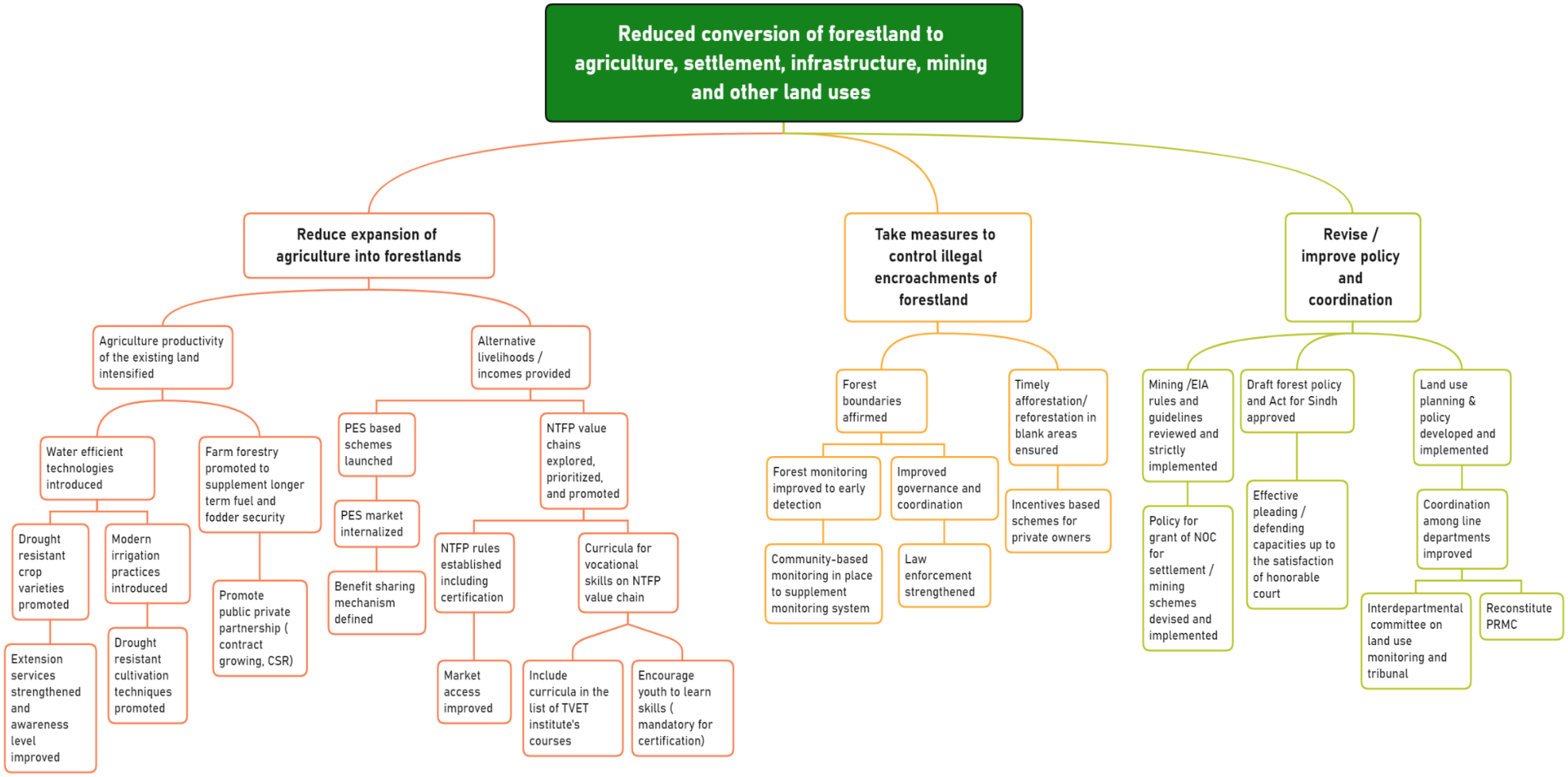


Figure 8: Solution tree of deforestation

Table 12: Action plan to address prioritized drivers of deforestation

Driver	Key underlying causes	Proposed Actions to address the underlying causes	Indicative Timeframe			Responsible Actors		Indicative targets	Indicative Budget (Rs. mill.)
			Short term (1-3 yrs)	Medium term (1-7 yrs)	Long term (1-10 yrs)	Lead	Support		
Clearing of forestland for commercial interests (mining, housing schemes, agriculture)	Lack of land use policy	Land use policy and SOP development • Affirm forest boundaries with clear demarcation and digital land records • Land use mapping and monitoring • Do no harm standards in case of mining / tourism activities	✓	✓		Revenue department	Forest, Planning & Development, Law departments	Land use policy 29 district land use maps / DNH standards	30
		Policy/procedure for enforcement of land use policy • Include or improve NOC system in land use policy • Monitor land use	✓	✓		Revenue departments	Forest department	Improved NOC procedures	20
		Strong accountability ensured for forest resource development • Centralized forest monitoring system • Participatory forest management and monitoring system	✓			Forest departments	Communities	Full-fledged provincial and Circle based monitoring system	10
	Old and obsolete law with spaces for misinterpretation and manipulation	Improve / revise relevant policies • Mining EIA rules and guideline (including Dos and Don'ts) revised and implemented • Draft forest policy and Act approved and implemented • Effective pleading / defending capacities in legal cases	✓	✓	✓	Forest department	Agriculture, Tourism, mining departments	• Contradictions documented • Minutes of meetings to resolve issues	40
	Lack of coordination among departments	Improved coordination among relevant departments • Inter-departmental committee established for land use monitoring and tribunal • Reconstitute PRMC, other bodies • Regular meetings Implement decision	✓			Revenue department	Forest, Agriculture, Tourism, mining departments	Notifications, regular PRMC and coordination, meetings	15
	Weak forest monitoring to detect change	• Improved and participatory monitoring mechanisms • Capacity building of community institutions to flag issues • Regular reporting and draw lessons	✓	✓	✓	Forest department	Communities Agriculture District administration	District land use maps, district FGRMs, no. of training events	40

Driver	Key underlying causes	Proposed Actions to address the underlying causes	Indicative Timeframe			Responsible Actors		Indicative targets	Indicative Budget (Rs. mill.)
			Short term (1-3 yrs)	Medium term (1-7 yrs)	Long term (1-10 yrs)	Lead	Support		
Clearing of forestland land for agriculture	Low agriculture productivity	Improve agriculture / land productivity • Water efficient technologies • Introduce drought resistant varieties and management • Improve extension outreach to the farmers		✓	✓	Agriculture department	Forest department, communities	Open, hotspot areas	150
		• Introduce agroforestry to supplement longer term fuel and fodder security • Promote public private partnership to invest in block plantation / farm forestry (contract growing for industry, corporate social responsibility)		✓	✓	Forest department, Private sector	Communities, Agriculture department	10,000,000 plants / fulfill 60% firewood needs of the province	30
	Lack of alternative livelihoods and employment	• Promising NTFPs explored, prioritised, and promoted • Prepare NTFP rules including certification • Introduce certification systems • Support market development of NTFPs	✓	✓	✓	Forest department	SMEs, potential private sector / buyers	05 value chains, 15 SMEs Certification protocol	185
		• Vocational education and skill-based training opportunity (including NTFP traits) • Establish curricula for NTFP and other non-traditional forest-based income generation skills • Include these curricula in TVET menu • Encourage youth skill training (mandatory for certification)		✓	✓	Forest department, TEVTA	Private sector / potential buyer companies	1000 HH / youth TVET curriculum	80
	Pay for Eco-system Services schemes	• Introduce Forest based PES scheme[22] to incentivize conservation • Develop PES with benefit sharing mechanism • Implement PES schemes	✓	✓		Forest department	Tourism (Public and private), Revenue	03 schemes developed and piloted	90

22 A Payment for Ecosystem Services (PES) scheme is aimed at compensating *forest owners or users* to ensure a certain level of health in specific ecosystems to maintain or improve environmental services that the forest provides, including the increase in forest carbon stocks and reduced deforestation and forest degradation. The basic idea of a PES scheme is that forest owners or direct users can ensure the provision of environmental service for the enjoyment and use of those who can compensate for it. PES schemes would create a positive incentive to keep or improve forested areas (in quality or extension) and to avoid other activities that destroy or degrade the forest. PES schemes should also promote alternative sustainable activities to provide additional income to forest owners or users. NRS, 2018

5.2 Social and environmental risks and safeguards

This section provides an analysis of any likely social or environmental harm on people or resources as a result of proposed actions in this plan. Major social and environmental risks associated with implementation of actions are given in **Table 13**:

Table 13: Major social and environmental risks associated with implementation of PRAP actions

Risks	Likelihood[23]	Impact	Mitigation measure to be taken by REDD+ Cell in the province
The risk of undue influence of privileged groups on the subject of land use policy / mapping (hurdling policy development, refuse surrender)	• Medium	• High	• Ensure active representation of all relevant departments and a high powered committed to support this task • Acquire local as far as possible to found land issue on historical maps/ files • Ensure maximum and effective participation of all stakeholders (particularly local communities, poor and marginalised groups including women)
The risk of legal clarity on carbon rights (property, credit, benefit, management), tenure rights may lead to competing claims	• Low	• Low	• Clarify and legalize carbon/ tenure rights; work in progress by REDD+ / MOCC
Conflict on land reclamation / delineation and encroachment	• Medium	• High	• Devised a conflict mediation strategy (a tribunal to analyse objections and dispose-off applications) • In cases where Sindh Forest department already has strong data (e.g., maps) – use these to reduce the chances of manipulation. • Remove gaps in monitoring system to block the door for the future.
Coordination challenges among stakeholders due to lack of interest / trust	• Medium	• Medium	• Acquire support from a higher authority • Ensure structural mechanism for maximum and effective participation of all stakeholders (including communities, departments) • Role and constitution of PRMC strengthened to instil stronger coordination
A centralized technology-oriented monitoring system is misperceived as an attempt to centralize forest resources.	• High	• Low	• Communicate with stakeholders why this is necessary • Empower and equip circle level offices with monitoring units to serve as a feeder to the province. • Engaged com **to be taken by REDD+ Cell in the province** munities in this task for local monitoring (especially encroachment)
Limited scope of NTFP / market access	• Medium	• Medium	• Identify hotspots for a focused intervention on NTFP (lots of secondary knowledge) • Engage herbal pharmaceutical and potential buyers in this task
Over exploitation of NTFP (e.g. Guggal)	• Medium	• High	• Prepare guidelines for the collectors • Strict ground monitoring

23 Likelihood Chances of this risk becoming real. The impact refers to extent to which this will sabotage REDD+ implementation and its effectiveness

Risks	Likelihood[23]	Impact	Mitigation measure to be taken by REDD+ Cell in the province
			• Include SOPs in the PFMP • Self-learning curricula of NTFP collection • Local monitoring by organised communities and local forest staff

5.3 Addressing drivers of forest degradation

This section documents actions for addressing direct and indirect drivers of forest degradation. An action plan is given in Table 14. A solution tree with strategic options to address drivers of forest degradation is presented in Figure 10.

5.3.1 Overall actions necessary to address underlying causes of forest degradation

Overall, Capacity development in participatory forest management and monitoring for all the actors involved in forest management and users is essential for reducing the rate of forest degradation in Sindh. Communities may also act as a strong force to counter drivers of deforestation and support enhancement activities. This may include dealing with natural atrocities (such as droughts, water scarcity, salinity and waterlogging that assert further pressure on resources). REDD+ measures require sound monitoring system with community participation. It may become efficient and effective when both government and forest users become part of the system.

Forestry in Sindh is complex due to natural disasters, droughts, desertification and significance of coastal zones for marine life. Implications of these factors for natural resources are mutual. Strong collaboration among multiple stakeholders in the province is therefore inevitable to act together and manage multiple negative forces in favour of people and resources.

5.3.2 Alternative and efficient energy sources

Alternative sources of energy may reduce the demand for fuelwood and contribute to improving wellbeing of the communities depending on natural resources. Where alternative energy options are not feasible, fuel-efficient cook stoves may be helpful to reduce pressure on forests and drudgery for fuelwood collectors. The introduction of alternative energy sources, cook stoves and kilns must be designed jointly with the end-users because no one single model can provide a feasible solution for energy needs in all areas. It is important to highlight that fuel efficient stoves are considered as a high priority mitigation alternative in Pakistan's Nationally Determined Contribution to UNFCCC. Other alternative clean energy options may include solar panels and wind energy (already initiated in Sindh).

- Alternative and more efficient energy sources promoted at market level
- Training technician for managing alternate energy sources
- Promote private sector CSR to promote alternate energy sources and technology
- Energy / fodder plantations raised at suitable sites to meet local energy demands including farm forestry option with incentive to the owners and coordinated plantations with other departments (e.g. railway, irrigation)
- Policy incentives provided for markets and private investment in forestry sector
- Value chains of local products and NTFPs promoted
- Eco-tourism and cottage industry promoted as an alternate employment
- Pilot PES schemes for Mangroves implemented as test case for potential replication (case study 2)

5.3.3 Drought mitigation and freshwater management / conservation

Sindh suffers frequent droughts of serious / acute nature which has implication for livelihoods as well as a challenge for resource management. Coastal areas suffer reduced supply of fresh water which is necessary for supporting mangroves. Similarly, inlands suffer acute droughts which exacerbate desertification. Appropriate measures are needed to manage drought including dry afforestation techniques, water conservation and upstream watershed management to improve freshwater flows.

- Provincial climate change policy with strong emphasis on drought mitigation
- High level aggressive campaign for water efficient behaviours and techniques (including in domestic water use in urban areas)
- Coordinated watershed management upstream to improve freshwater balance in coastal areas.
- Promoting dryland afforestation / seeding techniques
- Promote fodder shrubs in dry areas (IPC 3 and above) to improve micro-climate and fodder supply
- Institutional capacity of technical staff enhanced on integrated watershed management

5.3.4 Contribute to reclaiming saline and water-logged lands

Land is too precious to be lost to salinity and waterlogging. Saline and water-logged lands may best be reclaimed by appropriate land management and planting suitable tree cover crops to reduce the effects of salinity and water logging. Incentive-based schemes for raising energy plantations (farm forestry, block plantations in saline / water-logged areas) and along railway lines / roadsides / canals may help reducing supply and demand gaps for energy wood.

- Drainage system in water-logged/ saline areas developed/ improved to reclaim saline soils through creation of surface and internal drainage to leach out salts
- Plant tree species resistant to salinity and water-logged conditions
- Tile drainage and open ditches in the field introduced
- Sewage water treated and diverted to water-logged/ saline areas
- Identify means to improve quality of irrigation water provided
- Awareness raising of farmers on optimal use of irrigation water and avoid over irrigation

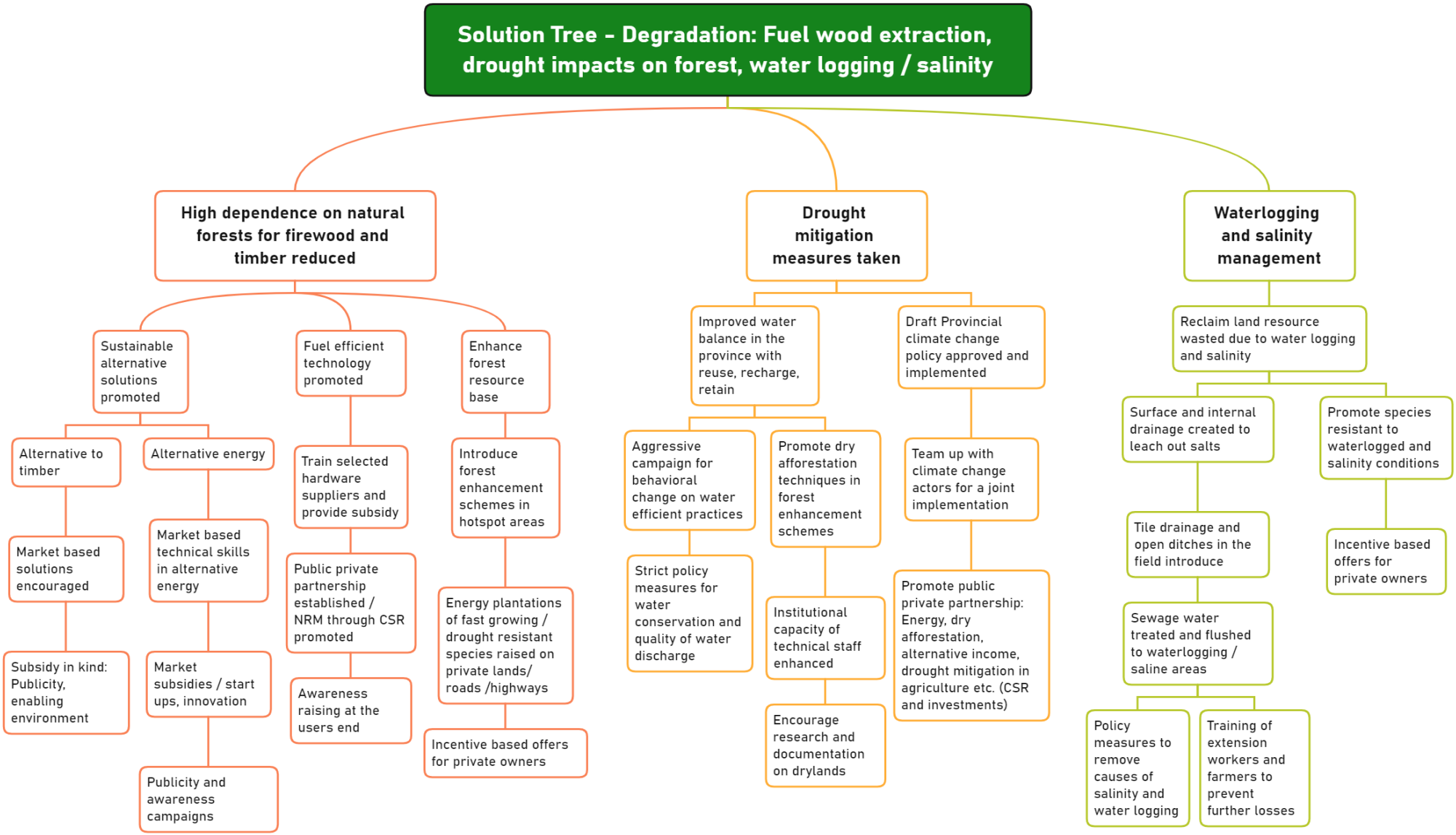


Figure 9: Solution tree of forest degradation

Table 14: Action plan to address drivers of forest degradation

Driver	Key underlying causes	Proposed Actions to address the underlying causes	Indicative Timeframe			Responsible Agencies/Actors		Indicative targets	Indicative Budget (Rs. mill.)
			Short term (1-3 yrs)	Medium term (1-7 yrs)	Long term (1-10 yrs)	Lead	Support		
High demand for energy wood, timber	High dependence on forest for fuelwood and timber	Enhance forest based with afforestation schemes in collaboration with local communities Promote farm and energy forestry management • Fast growing species with fuel and fodder value with appropriate species • Incentives / awards for private owners	✓	✓	✓	Forest department	Communities	• 05 corporate partnerships to support; • 10,000,000 plants (30% dry afforestation)	200
		Improve fuel efficiency of cooking appliances • Identify hardware vendors + train hardware • Encourage energy solutions with incentives Identify incentive policy to promote energy plantation	✓			Forest department	Landowners, farmers, communities	• 300 hardware stores • 25% fuelwood efficiency	25
		Promote sustainable alternative energy sources • Market-based solutions and technical skills • Encourage start-ups and innovation • Awareness raising and publicity		✓	✓	Energy, power departments	Private sector, engineering universities, Forest department	• 60% HH switch to energy mix • 50 service providers trained • 5 start-ups • Awareness campaigns	70
		Encourage alternative to timber • Encourage market-based solutions • Subsidies in kind for alternative energy	✓			Forest department	Private sector	Subsidy / free publicity	15
	Weak forest monitoring system	• Establish Provincial Forest Monitoring and MRV System • Implement participatory forest management and monitoring practices	✓			Forest department,			75
	Community participation not institutionalized	• Institutionalize community participation in forest management practices in Sind • Conduct and implement PFMPs • Capacity building of communities and forest department staff on participatory approach	✓	✓	✓	Forest department	Communities Agriculture District administration	60% of reserve and protected forests covered under PFMP (at least 10 PFMPs)	925

Driver	Key underlying causes	Proposed Actions to address the underlying causes	Indicative Timeframe			Responsible Agencies/Actors		Indicative targets	Indicative Budget (Rs. mill.)
			Short term (1-3 yrs)	Medium term (1-7 yrs)	Long term (1-10 yrs)	Lead	Support		
Climate change induced droughts and freshwater scarcity	Lack of systematic drought mitigation strategy / actions	• Draft climate change policy approved, implemented • Team up with Climate Change and Forest actors on implementation of drought mitigation /response • Promote public private partnership for: o Energy, dry afforestation, alternative income, drought mitigation in agriculture etc. (CSR and investments)	✓			Forest department	Legal right holders; communities; Revenue department	• Climate change policy approval • 05 corporate partnerships.	25
	Poor watershed management as a strategy to manage drought	• Improved water balance in the province o Lobby for upstream watershed management o Aggressive campaign for behavioural change o Strict policy measures to conserve water and assure water quality discharge (including industry)	✓	✓	✓			• Awareness campaign for water conservation • SOPs wastewater (industry, domestic	25
		• Promote dry afforestation techniques and promote drought friendly species • Build capacity of staff / actors • Encourage research		✓	✓	Forest department	FBR, private sector	Land reclaimed, greened	40
Water logging and salinity management	Poor land management for agriculture	• Reclaim saline / water-logged soils through planting activities • Incentives based schemes in saline, water-logged areas		✓	✓	Forest department	Communities	30% saline and water-logged soils	40
		• Drainage to leach out salts and physical reclamation	✓	✓	✓	Irrigation department	Forest department; Agriculture department	Schemes from Irrigation and Agriculture departments	100
		• Farmers and extension workers' awareness / training to prevent further losses • Policy measures to remove causes of salinity and water logging	✓	✓		Agriculture department	Forest department; communities, Irrigation department		40

5.4 Social and environmental risks and safeguards

This section provides an analysis of likely social and environmental harm on people or resources from the proposed actions. Major social and environmental risks associated with implementation of PRAP actions and potential mitigation options are given in Table 15:

Table 15: Major social and environmental risks associated with implementation of PRAP in Sindh

Risk	Likelihood[24]	Impact	Mitigation measure to be taken by REDD+ Cell in the province
The risk of legal clarity on carbon rights (property, credit, benefit, management), tenure rights may lead to competing claims	• Low	• Low	• Clarify and legalize carbon/ tenure rights; work in progress by REDD+ / MOCC
The risk of elite capture in selection of private lands for incentive-based farm forestry / woodlot schemes; Women might have less access to such schemes	• Medium	• Low	• Transparent selection based on criteria – even better if this selection is based through organised communities under the PFMP • Community engagement in selection process for energy plantations • Sign ToP with community to avoid non-party forces capture benefits.
Conflict on land reclamation / delineation and encroachment	• Medium	• High	• Devised a conflict mediation strategy (a tribunal to dispose-off applications) • In cases where Sindh Forest department already has strong data (e.g., maps) – use these to reduce the chances of manipulation. • Remove gaps in monitoring system to block the door for the future.
Alternative energy is expensive to afford by common people and their hardship increases	• Low	• Medium	• Encourage crafting low-cost alternative energy options for extremely poor and rural communities (e.g., bio-bricks, fuel efficient stoves) • Provide incentives by policies to market players and regulate market prices • Forge PPP to acquire finances and technological innovation
Rebound effect of unsustainable energy options with high emission risks	• Medium	• Low	• Together with energy actors, carefully analyse possible alternatives and encourage cleaner options with providing market support and encouraging smart start-ups.
Coordination issues among actors; trust deficit	• Medium	• Medium	• Acquire support from a higher authority in Sindh • Ensure structural mechanism for effective participation (communities, other stakeholders) • Role and constitution of PRMC strengthened to instil stronger coordination
Introduction and spread of invasive species in energy plantations	• Low	• Low	Prioritize indigenous tree species and include recommended species in the technical guidance on farm forestry / wood lots.
Apprehension by farmers on integrating trees on farm	• Low	• Low	Awareness raising of farmers on pros and cons of tree integration A larger focus on saline and waterlogged areas for tree planting for multiple benefits (economics, sol reclamation of a marginal land)

24 Likelihood Chances of this risk becoming real. The impact refers to extent to which this will sabotage REDD+ implementation and its effectiveness

Risk	Likelihood[24]	Impact	Mitigation measure to be taken by REDD+ Cell in the province
Rising expectations of communities from PFMP	• Medium	• Low	Transparent and clear communication with communities.
Skill deficit in the Sindh Forest department	• Medium	• High	• Regular training needs assessment and capacity building initiatives • Staffing completed at least for crucial positions
A centralized technology-oriented monitoring system is misperceived as an attempt to centralize forest resources.	• High	• Low	• Communicate with stakeholders • Empower /equip Circle offices with monitoring units to serve as a feeder to the province. • Engaged communities in this task for local monitoring (especially encroachment)

5.5 Removing barriers to enhancement activities

A number of measures were identified to remove potential barriers to enhancement activities. Some of these measures overlap with the solution pathways for addressing underlying causes of deforestation and forest degradation and thus have already been explained in the earlier section and compiled in Table 16 and Figure 11.

Table 16: Actions identified for addressing barriers to enhancement

Inclusive and transparent forest management, monitoring systems	Incentives based schemes in forest policies promoted	Community based forest management promoted
• Adequate provision of geo-spatial monitoring tools ensured • Provincial and Circle level forest monitoring system established to cater for monitoring results of action against drivers of deforestation, forest degradation, and impact of enhancement activities • Inter-departmental coordination among forest, land revenue, tourism, agriculture, and law department to flag any contradictory developments • Capacity building of department on monitoring and policy implementation	• Implement participatory forest management plans with site specific measures and establish incentive-based system. • Define clear Benefit Sharing Mechanism in REDD+ • In addition, encourage pilots which showcase enhancement of forest resources through incentive schemes: o Tree planting on wastelands / drylands / private lands o Promote / encourage technological start-ups on water conservation.	• Encourage community institutions and mainstream them in forest management • Participatory forest mgt. planning • Appropriate participatory grazing system adopted and regulated • Scope of TBTTP expanded and strengthened to support farmlands, rangelands, and barren lands. • Capacity building of communities on forest enhancement, monitoring, and nature-based solutions (floods, droughts) • Institutionalize community participation in managing forests looking at successful experiences (Pakistan and outside)[25]

[25] https://kpcode.kp.gov.pk/homepage/RuleDetails/291

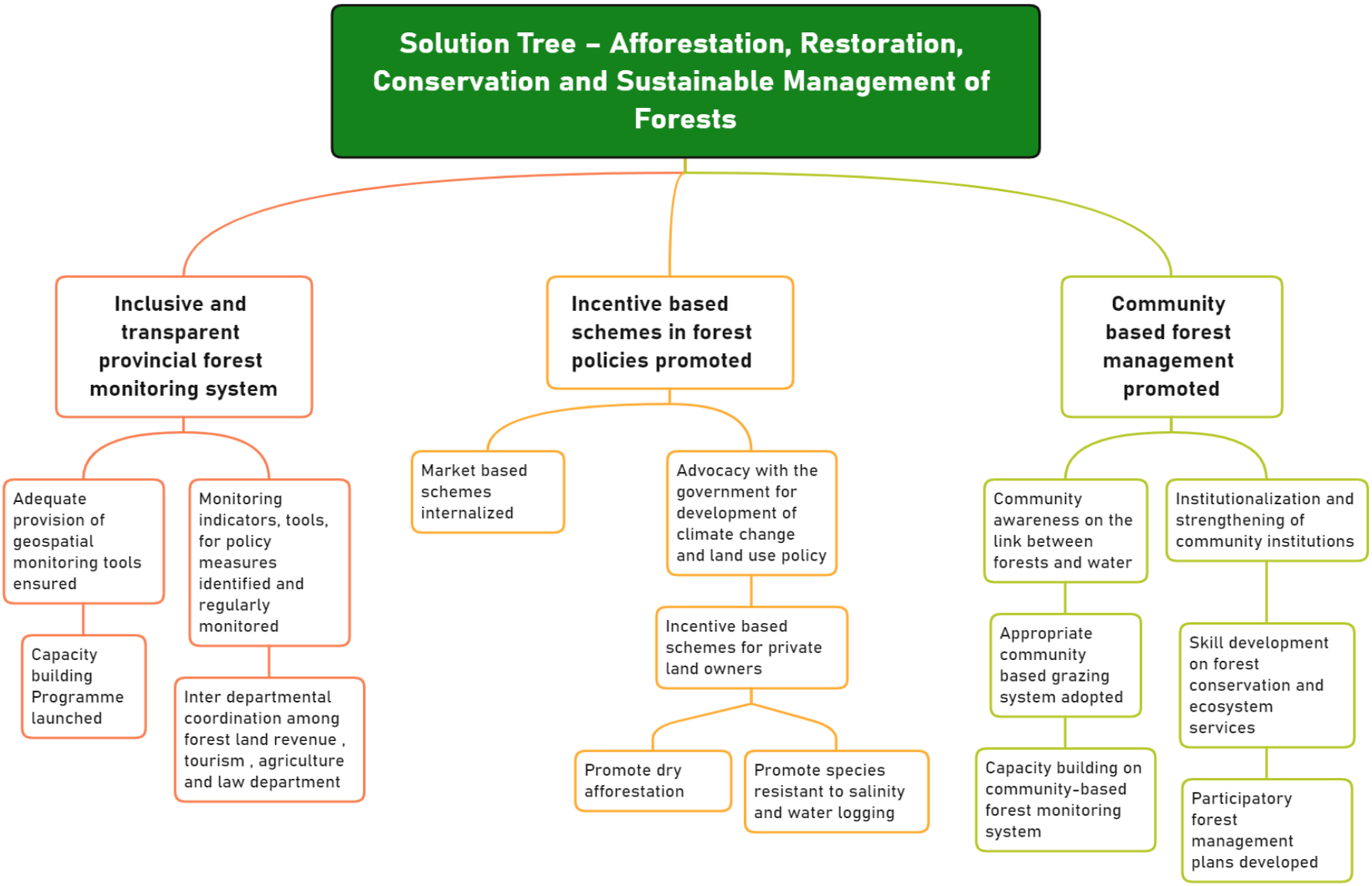


Figure 10: Solution tree of barriers to enhancement of forest carbon stocks

5.6 Examples from proposed actions

Case study 1: Vertical Farming

Vertical vegetable farming is a climate and space smart technique, particularly designed for women, elderly and people with disabilities. It is highly resilient to climate extreme events, provides a great source of nutrition, good for household income, and has a low carbon footprint compared to conventional vegetable farming.

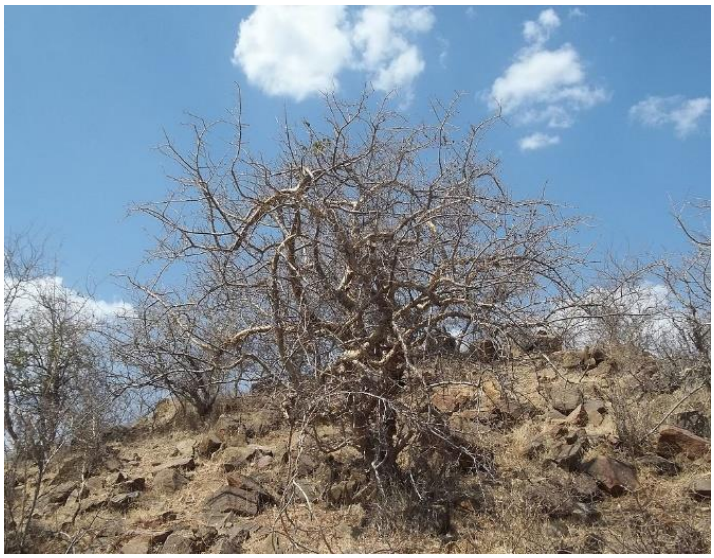
Picture 5: Vertical farming – low on space and water

- Optimized land use: 4 times more production from the same land
- 50% reduced demand for water
- Designed to address climate shocks (drought, storm, intense rain, or thunderstorm)
- Low cost and founded on local knowledge
- The plants receive adequate sunlight and nutrition. In case of excessive heat, the tunnel can be covered with a net cloth which reduces direct exposure.
- Several cycles of picking are possible with an extended season
- Mulching sheet controls infestation of pests and weeds
- Fruit picking is easy

This technique has not yet been experimented in Sindh. It has been tried in dry areas of Southern KP successfully and may be replicated in Sindh for home gardening. The impact of vertical farming on reduced deforestation and forest degradation has not been documented. However, this is a proven technique to improve livelihood and income from minimum land for small farmer who are also dependent on forests for livelihoods and cash income. Vertical farming also reduces the demand for converting larger pieces of land to agriculture.

Case study 2: *Commiphora wightii* – an important non timber product for alternative livelihoods

Commiphora wightii (Local: Guggal or Mukul) is sought for its gummy resin, which is harvested from the plant's bark through the process of tapping. The impact of successful NTFP value chains on reduced deforestation and forest degradation is proven and well documented.



Picture 6: *Commiphora wightii* – an important non timber product for alternative livelihoods

In India and Pakistan, guggul is cultivated commercially. The resin known as *gum Guggal*, has a fragrance similar to that of myrrh and is commonly used in incense and perfumes. It is the same product that was known in Hebrew, ancient Greek and Latin sources as bdellium.

Guggul is used in Ayurveda remedies, and it is mentioned in Ayurvedic texts dating back to 600 BC. It is often sold as a herbal supplement. The gum may be purchased in a loosely packed form called *dhoop*, an incense from India, which is burned over hot coals. This produces a fragrant, dense smoke. It is also sold in the form of incense sticks and dhoop cones which can be burned directly.

Case study 3: Mangroves: A source of food and livelihoods

Ketibundar and Kharochaan in Thatta district are among the areas vulnerable to climate change the study generated information using variety of tools including, consultations with stakeholders. Severe deterioration of mangrove forests triggered sea intrusion, cyclone, floods and reduced downstream freshwater flow have triggered degradation of the coast. These factors impact livelihoods of fishing communities. 19% inhabitants in Ketibundar practice agriculture and 23% are associated with fishing. The survival of fishing communities and inhabitants in general is associated with mangroves. This is a foundation to a high degree of cooperation extended by Ketibandar community organizing and teaming up with conservation NGOs and Forest department to restore mangroves. Currently the community is looking into alternative livelihoods such as crab fattening, handicrafts and other traits so that they reduce their sole reliance on one means of livelihood and also reduce their demand on forests.

Picture 7: Mangroves: A source of food and livelihoods

5.7 Indicative budget

A total indicative budget for the actions identified in the Provincial REDD+ Action Plan is PKR 2,220 million. This may include public funding as well private investment (including projects financed by international donors and NGOs to support PRAP actions). **Table 17** summarizes the Action Plan budget for short term, medium term and long-term activities. Indicative budget proportions (short term, medium term, long-term) are given in **Figure 12**.

Table 17: Indicative budget for PRAP actions (2022-2031)

	Indicative Budget (PKR mill.)			
	Short term (1-3 years)	**Medium term** (1-7 years)	**Long term** (1-10 years)	**Total**
Forest enhancement / afforestation schemes	100	100	100	300
Improve agriculture productivity & agroforestry	0	75	90	165
Alternative livelihoods (NTFP, vocational skills)	55	55	55	165
Payment for Eco-system Services schemes	35	55	0	90
Establish Provincial Forest Monitoring and MRV System	30	35	10	75
Land use policy, mapping and enforcement	25	35	0	60
Improve coordination among departments	3	4	3	10
Promote sustainable energy including alternative energy sources	0	30	40	70
Encourage alternative to timber	15	0	0	15
Promote farm and energy forestry management	20	15	15	50
Implement participatory forest mgt. & monitoring	200	325	400	925
Systematic drought mitigation strategy / actions	25	25	0	50
Improved water balance in the province	10	30	25	65
Treat and prevent salinity and water-logging	40	70	70	180
Total	558	854	808	2220

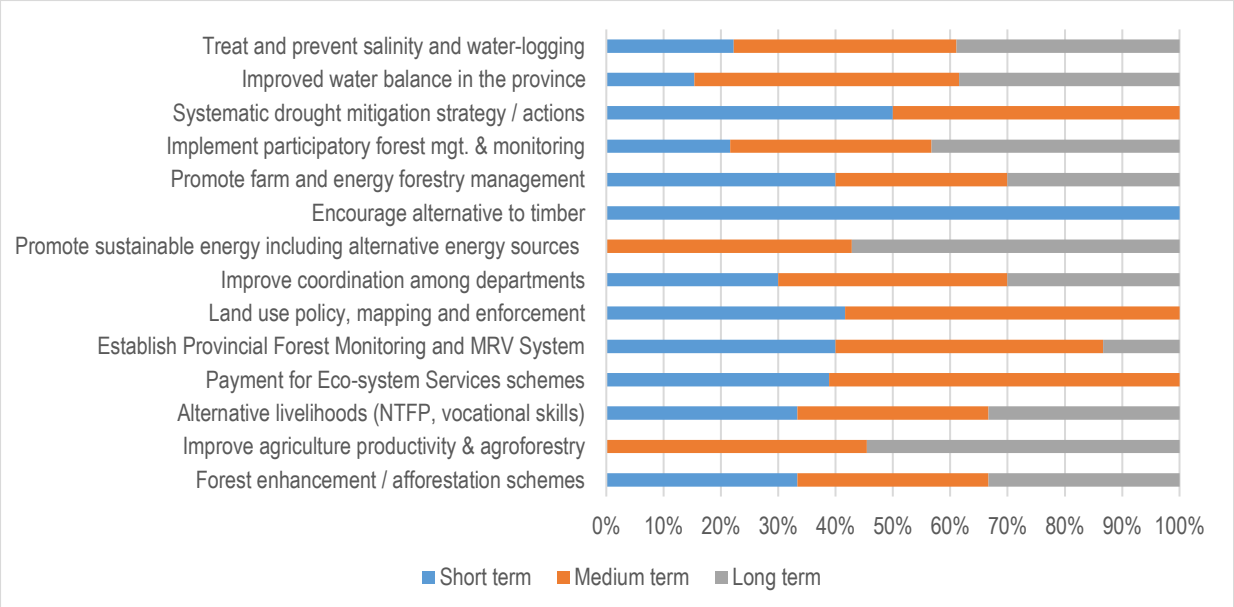


Figure 11: Indicative Budget proportions Sindh PRAP (%)

6 BENEFIT SHARING MECHANISM

A benefit sharing mechanism for Sindh was proposed for pilot PES design of mangrove forests[26] which was further discussed and analyzed during multi-stakeholder workshop in terms of its adoption for Sindh PRAP. The stakeholders emphasized to adopt the same benefit sharing mechanism as it was designed and agreed through rigorous multi-stakeholder consultation process.

A benefit sharing mechanism for Sindh was proposed for pilot PES design of Mangrove forests[27] which was further discussed and analyzed during multi-stakeholder workshop in terms of its adoption for Sindh PRAP (Figure 13). The stakeholders emphasized to adopt the same benefit sharing mechanism as it was designed and agreed through rigorous multi-stakeholder consultation process. The main purpose of the benefit sharing mechanism is to ensure that the forest users find an incentive in REDD+ measures and cooperate with the programme.

1. Reserved forests

The carbon and non-carbon benefits would be divided into two heads i.e. government and customary forest users as follows (Figure 6):

i. 80% proceeds is for government of Sindh. Out of this, 10% will be retained by the government; 5% will be allocated for the MoCC on case-to-case basis. The remaining share (85%) will come to the Forest department.
ii. 20% of the proceed will go the customary forest users / right holders, which will be spent in community village development activities geared to reducing drivers of deforestation and forest degradation, preferably through Participatory Forest Management Plans.

2. Protected forests

The carbon and non-carbon benefits from REDD+ activities would be divided into three heads, i.e., government, and customary forest users as follows:

i. 80% proceeds is for government of Sindh. Out of this, 10% will be retained by the government; 5% will be allocated for the MoCC on case-to-case basis. The remaining share (85%) will come to the Forest department.
ii. 20% of the proceed will go the customary forest users / right holders. 100% of this amount will be spent in community village development activities geared to reducing drivers of deforestation and forest degradation, preferably through Participatory Forest Management Plans.

The government share and developmental share may be utilized for execution of forest enhancement activities, designating grazing areas, investing in REDD+ site specific plans and to provide livelihood trade-offs to the local communities (especially the non-owner and other deprived segments like poor and women).

26 https://www.redd-pakistan.org/wp-content/uploads/2019/02/Final-PES-Design-Document-Mangroves.pdf
27 https://www.redd-pakistan.org/wp-content/uploads/2019/02/Final-PES-Design-Document-Mangroves.pdf

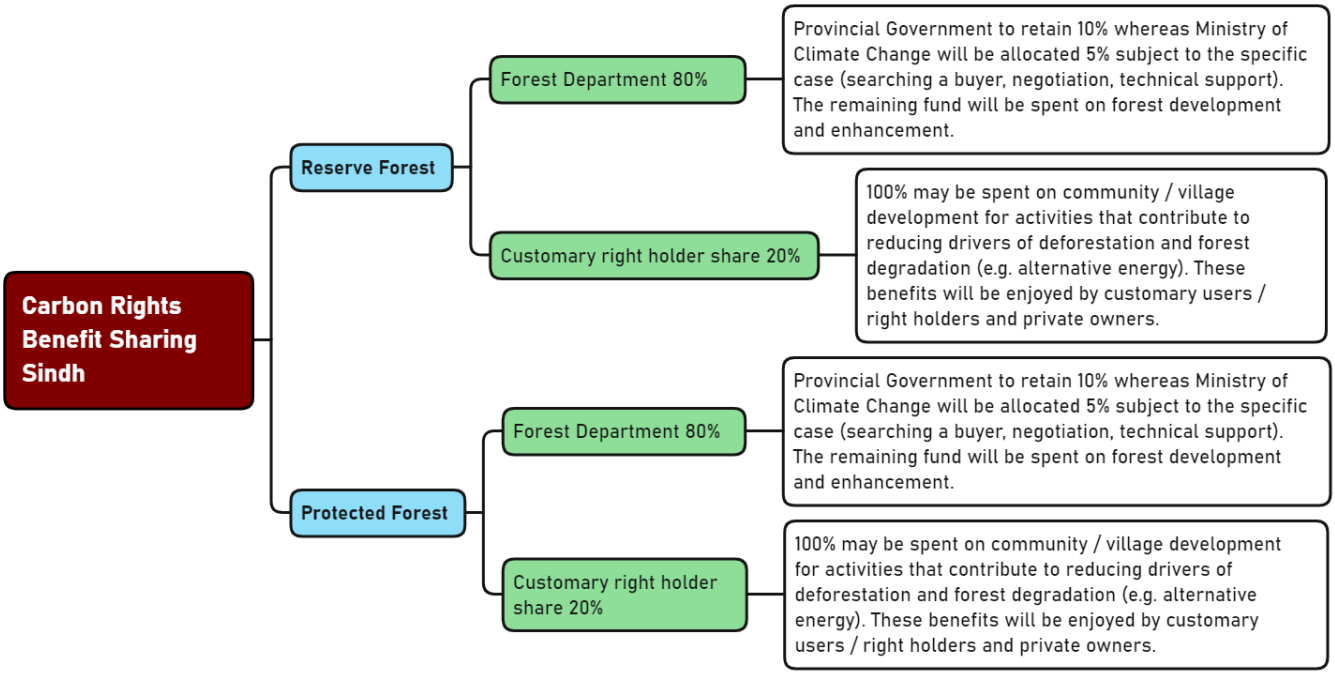


Figure 12: Flow Chart of Carbon and non-Carbon Benefit Sharing Accrued from REDD+ Programme

The government share and developmental share may be utilized for execution of REDD+ plans to improve livelihood of locals (especially the non-owner and other deprived segments like poor and women). Each REDD+ plan (through its management committee) will define its Yearly Plan of Operation (YPO) for grant of annual funds and submit receipts for the expenditures of the same to the quarter concerned (divisional office). The plan must also balance the human use rights with stress on environment and will ensure sustainable use of resources.

7 INSTITUTIONAL ARRANGEMENTS FOR IMPLEMENTATION OF SINDH PRAP

7.1 Institutional anchorage of REDD+ and responsibilities

The NRS established REDD+ institutions at national and sub-national level. However, during consultative workshop, the participants proposed the establishment of a number of other institutional set-ups at provincial level, regional/forest circle and district/local levels. In addition, it also proposes establishment of certain thematic working groups to guide implementation of various technical aspects of the strategy. For synchronizing the PRAP with NRS, the organogram for REDD+ Implementation in Sindh as envisioned in NRS is shown in **Figure 14**.

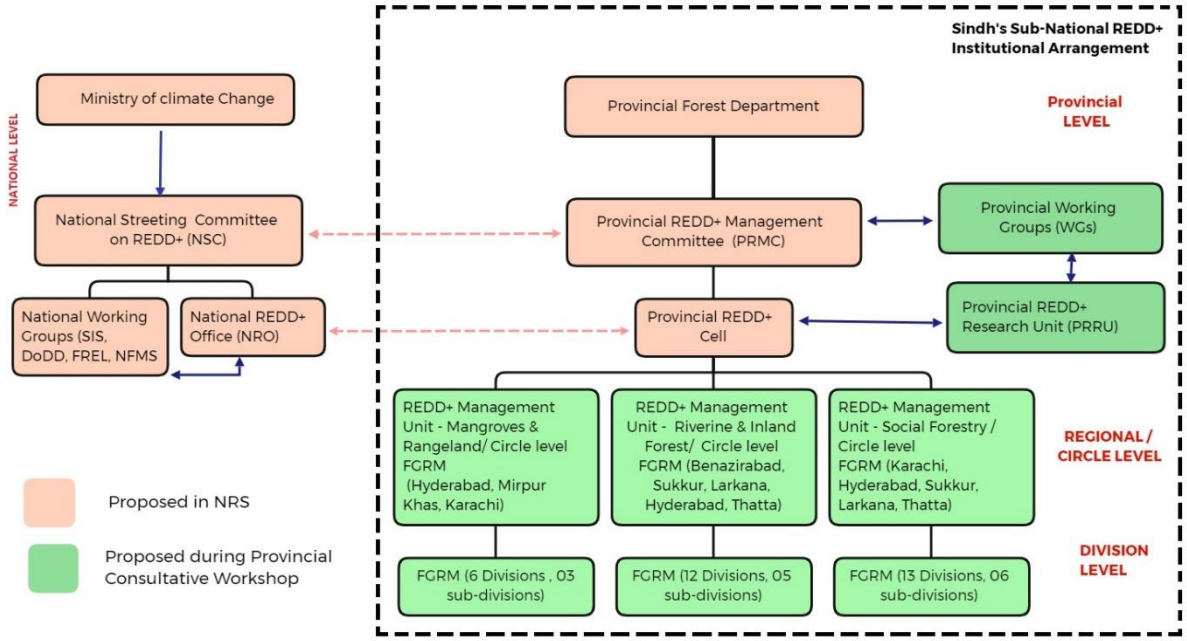


Figure 13: Sub national REDD+ Institutional arrangements for Sindh

1. **Provincial REDD+ Management Committee:** This committee will be headed by the Secretary Forests and will perform as an advisory and steering body in preparation of REDD+ policies, plans, laws, and institutional mechanisms in addition to carrying out previously determined mandate and supervisory functions.

2. **Provincial REDD+ Thematic Working Group:** Four groups are proposed to provide technical guidance as follows:
    a. Technical working group on FREL/FRL.
    b. Technical working group on Provincial Forest Inventory and MRV.
    c. Technical working group on REDD+ Social and Environmental Safeguards and Grievance Redress Mechanism.
    d. Technical working group on REDD+ Finance

3. **Provincial REDD+ Cell:** This unit will be responsible for designing and implementation of REDD+ strategies and action plans at the provincial, administrative, and regional/ circle level in consonance with the national and international framework. The provincial REDD+ Cell will be headed by the Project Director/ Provincial REDD+ Coordinator/ REDD+ focal person of Sindh REDD+ Programme.
4. **Provincial REDD+ Research Unit/ Committee:** The provincial REDD+ research unit will be based in Director Research Education and NTFPs. A research committee will be formed representative of all administrative units to promote and coordinate research on REDD+ related thematic areas. This committee will also perform Quality Control checks on satellite based and forest inventories.

5. **REDD+ Management Units:** The REDD+ Management Units (RMUs) will be established in Karachi and Hyderabad. These regional units will (i) support the provincial REDD+ Cell and oversee field and implementation activities of the pilot REDD+ project sites, (ii) undertake awareness raising/capacity building activities for forest staff and local communities, and (iii) collaborate with forest circles and divisions.

6. **Forest Circle Level REDD+ Social and Environmental Safeguards (SES) and Grievance Redress Mechanism (FGRM):** The circle level SES and GRM will be coordinated by the respective Conservator of Forests and will ensure adherence to the Social and Environmental Safeguards.

7. **Forest Division Level REDD+ SES and FGRM:** The division level SES and FGRM will be chaired by the Divisional Forest Officer of the Forest Division concerned. It will work as feedback providing link and resource pool for the Provincial REDD+ Management Committee. It will also serve as platform for discussions on and resolution of REDD+ related issues at the district level. It will provide data and information on REDD+ implementation at the district level to the provincial REDD+ Management Committee.

7.2 Feedback grievance and redressal mechanism

A Feedback Grievance Redress Mechanism (FGRM) has been designed[28] at national level as part of national REDD+ readiness process to enable clear and effective handling of complaints or conflicts arising from the implementation of REDD+ activities. The FGRM is designed on the principles of legitimacy, accessibility, predictability equitability, transparency, rights compatibility and enabling continuous learning. The Standard Operating Procedures – SOPs for FGRM are defined and integrated into Safeguard Information System – SIS (www.pakistansis.com). A systematic stepwise procedure will be adopted for FGRM: i) Receipt and registration of feedback, grievance or complaint; ii) Investigation of the grievance or complaint; iii) Resolution to the utmost satisfaction of parties and in accordance with the rules, and; iv) Monitoring of implementation of the agreed resolution. These steps are in accordance with the FCPF guidelines. In total 30 working days are contemplated from the moment the complaint is received until its disposal. A summary of the SOPs of FGRM is given in **(Table 19)**. The aggrieved parties may decide to use the FGRM in preference to other available mechanisms.

The grievance redressal is also part of the existing provincial forest related policies and programmes in which complaint procedures are already defined and platforms to lodge complaints are available. The Sindh has also established its provincial FGRM for REDD+ following guidance from the national FGRM. This action plan proposes the DFO office as the main FDRM since it is locally located and is best known to the forest communities. The DFO office needs to publicize a specific desk, phone number and email address through which written complaints may be registered. If not resolved, the matter will be reported to the higher levels. The system is not operational yet, however, efforts will be made to operationalize this to first sensitize DFO level staff on how to operate FGRM. Mass awareness campaign on REDD+ will also include publicity of FGRM so that they can access platforms made available to them to provide their feedback and lodge complaints.

[28] https://www.redd-pakistan.org/wp-content/uploads/2015/08/Draft-Final-Report_final.pdf.

Table 19: Recommended FGRM mechanism

Steps	Process	Processing days	Responsibility to Receive and Deal with Complaint	Communication Tools/ Channel	Outcome
1st	Receipt and registration of complaint / grievance	5 business days	Divisional level FGRM	**Channels**: Email, complaint box, specific desk, phone number	The Complaint is received, registered, lodged and sent to complaint officer at DFO level
2nd	Investigation	15 business days	Designated Complaint Officer	**Tool**: Diagnostic questions to gather information about relevant actors/ parties, nature of complaint, the request made by claimant and position of other party, violated, or recognised legal rights, supporting witness, evidence, and prayers from parties **Channel**: Complaint officer to contact directly with the claimant and other relevant parties	The complaint is resolved or taken to a relevant level for resolution. Comprehensively document grounds for complaint and record support from rules.
3rd	Resolution	15 business days	Designated Complaint Officer	**Tool**: Written response about decision process **Channel**: Face to face meeting with parties and mutual discussion at appropriate level i.e., district, village, or province	A signed agreement.
4th	Monitoring	3 – 12 months	Provincial REDD+ focal person	**Tool**: The FGRM monitoring database from which the information will be analysed **Channel**: Coordinated FGRM monitoring system between DFO and provincial REDD+ Cell	The patterns of complaints recognized, the causes of the complaint are identified, and the effectiveness of handling of complaints by PRMUs evaluated.

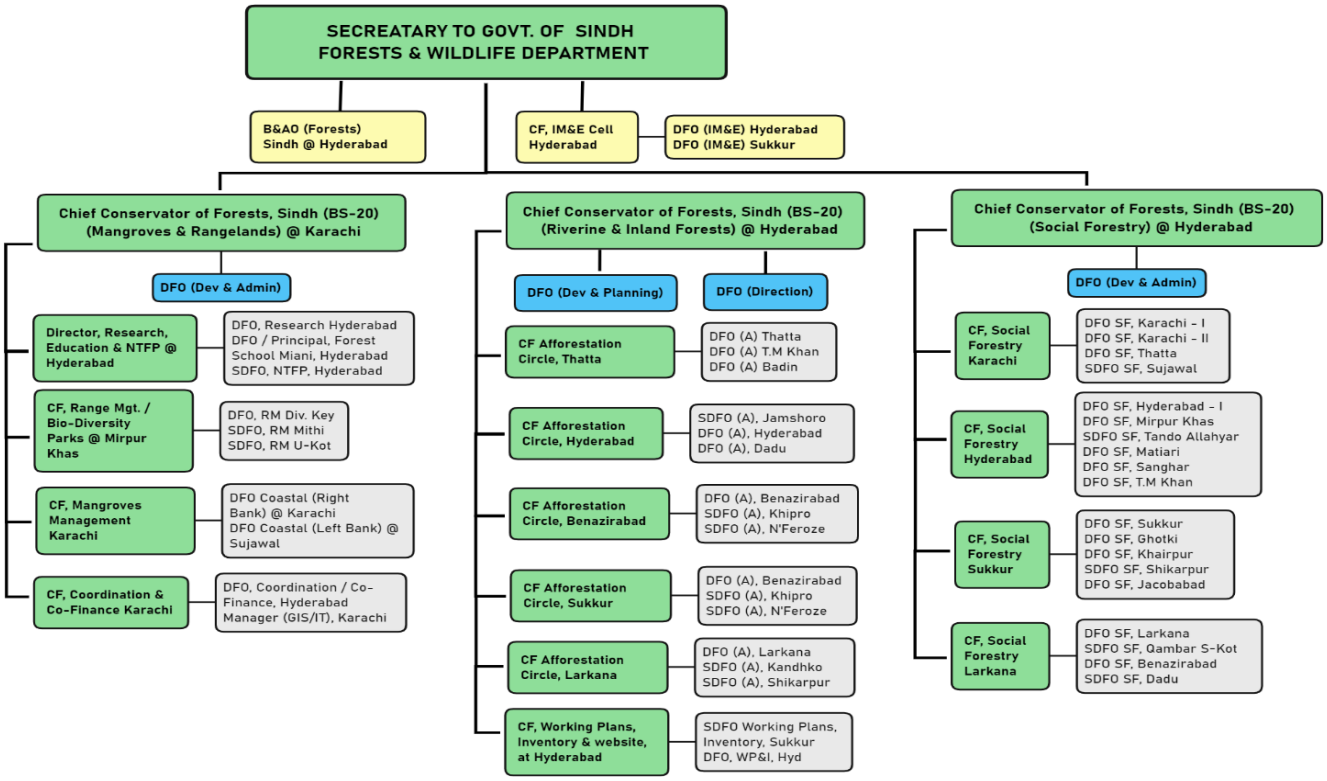


Figure 14: Organization structure of Sindh Forests Department

7.3 Assessment of existing capacities and coordination

This capacity assessment was guided by the following:

1. Capacity-Based Needs Assessment (CBNA) report of 2014[29] (updated in 2017-2018[30]) to ensure consistency and comparability in reporting the capacity gaps;
2. Discussion on department's human and technical capacities during REDD+ Readiness consultations (R-Package)
3. Consultations on assessment of technical and extension systems at sub national level

Based on these primary and secondary information sets, there is a need for capacity building in the following areas:

1. One of the most urgent capacity gaps felt in Sindh is under-staffing. Sindh Forest department operates with limited sanctioned and filled positions. With retirement of some staff, this gap will become even bigger and a threat for REDD+ in the province. Recruiting staff at once to fill the gap will result in staff with no institutional memory. At the same time this is an opportunity for the department to recruit staff with diverse educational backgrounds (e.g., satellite-based monitoring, community forestry) at senior level as opposed to only recruiting staff with Forestry degrees. This mix is necessary for implementing REDD+. The PRAP, therefore, suggests urgent recruitment of staff with a mix of educational backgrounds.

29https://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/pakistan-1129/implementation-technical-including-tors-1845/mrv-and-monitoring-1852/15245-pakistan-nfms-capacity-building-needs-assessment-report.html?path=un-redd-partner-countries-181/asia-the-pacific-333/a-p-partner-countries/pakistan-1129/implementation-technical-including-tors-1845/mrv-and-monitoring-1852

30 https://www.redd-pakistan.org/wp-content/uploads/2019/02/Capacity-Needs-Assessment-Technical-Capacity-Enhancement.pdf

2. Sindh Forest Department do not have full institutional capacity to undertake and implement Satellite based land use change monitoring. Further, there is no operational GIS/RS Lab in the department to undertake satellite-based monitoring of forestry resources. The department has established working cooperation with WWF, IUCN and SUPARCO for acquiring technical expertise and services in the field of satellite-based monitoring of forestry resources. Cooperation with these institutions is although very useful, this cooperation may not be able to provide continued and day to day technical assistance on generating satellite-based data and monitoring for resource. Building in house basic capacity on GIS and satellite-based information will enable the department to acquire quality and speedy services from others.

3. Sindh needs full time dedicated REDD+ staff to ensure effective implementation. REDD+ is no longer a part time job that may be performed by already over-occupied staff in the department. This REDD+ staff needs proper training, a full-fledged monitoring unit and an effective communication and coordination unit for an effective outreach.

4. Necessary technical knowledge needs to be built to make PRAP and PFMP implementation processes more effective and measurable. Allometric equations and/ or biomass expansion factors are not available for any forest type or forest tree species. Understanding of processes influencing terrestrial carbon stocks is missing. Expertise on forest carbon stock assessment is missing. Expertise dealing with technical challenges of sample design and plot configuration is limited. The knowledge and understanding of IPCC guidance and REDD+ relevant national and international negotiations and UNFCCC decisions is limited.

5. The department is confident that the human resource capacity exists in the province and is being enhanced with the passage of time through projects. Sindh, however, lacks resources for forest monitoring, e.g., a major constraint is to acquire relevant images and software, which, requires resources. Regular / periodic monitoring requires high resolution images and a continuous upgradation for which finances are required. People need to be guided to take the right initiative to optimise results. There is a need for allometric equations for prioritised species and eco-system databases for a continuous monitoring. A good sub national monitoring capacity will improve province's qualification for third party interested to invest in the Carbon pools.

6. Sindh does not have community owned or private forests. Even though, the province has a history of participatory nature conservation led by international conservation NGOs, there is no legacy and legal framework for community-based forest management or joint forest management. The departmental capacity therefore in this area needs to be built including institution building of communities, skills among field staff on new concepts and extension methodologies, and necessary frame conditions to create an enabling environment for community participation.

The PRAP identifies the need for conducting a training and capacity needs assessment of the department and allocate resources to mitigate gaps.

7.4 Alignment with policy

National REDD+ Strategy

The NRS provides the overall guiding framework for implementing REDD+ at national and sub-national level. The Sindh PRAP is aligned with the NRS REDD+ vision of optimizing forest ecosystem services and livelihood support on a sustainable basis and is consistent with the goals and objectives of NRS.

National Forest policy (2016)

The approved National Forest Policy 2016 has two main policy objectives i.e. (i) the expansion of forest cover and (ii) the curbing of deforestation and promotion of forest conservation. Under these objectives, the Policy envisages for both the implementation of REDD+ and the full transfer of benefits arising therefrom, such as payments for preserving carbon stock, to forest owners and right-holders. The Sindh PRAP is designed to contribute to the objectives of National Forest Policy through implementation of REDD+ at sub-national level.

Alignment with Provincial Sectoral Development Planning

This PRAP encompasses multi-sectors and related issues e.g., agriculture, infrastructure, energy, tourism, livestock, economic growth and poverty reduction. The prioritized actions are closely aligned with provincial sectoral development plans and promote co-ordination and cooperation with all relevant stakeholders. Also, as already mentioned the PRAP is not a static document and would require periodic revision taking inputs of the relevant provincial institutions and other stakeholders in the light of the experience gained from implementing the actions.

7.5 Monitoring needs

Monitoring of actions is a critical aspect of this PRAP that helps to ensure effective implementation of the actions and tracking any undesirable change in time for alerting possible remedies. Regular monitoring must be in place with trained human resources. The PRAP proposes Provincial REDD+ Monitoring Unit (PRMU) in Sindh and Circle level monitoring units. Monitoring of PRAPs will take place at three levels:

1. Individual actions at intervention and output level to address drivers / underlying causes – recurring monitoring
2. Monitoring of safeguards remedies to assure there are no social or environmental implications – project / action-based monitoring while assuring that grievances are addressed and agreed solutions are implemented. For this FGRM has been set up at divisional and circle level that will report to provincial REDD+ management unit for further incorporation into provincial forest monitoring system.
3. Overall impact of actions on forest health and drivers of deforestation and forest degradation – medium and long-term monitoring

Currently, monitoring indicators for REDD+ related activities are being defined as part of sub-national forest monitoring system. However, forests have been monitored as per the standard methods/ protocols of working plans in addition of regular field staff visits and reporting. There is need of standardization and consistency in the procedures and methods for forest (including natural forests) monitoring at provincial and national level. Several forest related monitoring tools already exist which need to be harmonized with new tools required for monitoring of PRAP. The current forest monitoring indicators and tools related to REDD+ activities being used at the federal and provincial level are given in Table 20. This PRAP will help Sindh to formally, permanently and firmly embed the provincial level forest monitoring indicators into existing national forest monitoring framework.

Since land and forest management within Sindh is the responsibility of multiple government institutions (departments of agriculture, forestry, tourism, livestock, land revenue, planning and finance etc.) depending on the land cover specifications, a monitoring system that caters for all the aforementioned three levels is necessary to be designed by REDD+ management unit. There is a need to establish a thorough process for planning, collecting, processing, analyzing, reporting and verifying data, based on required capacities, guiding methodologies and tools which the Sindh government recognizes as a need for adequate and sustainable institutional arrangements for forest monitoring system at provincial level.

Table 20: Forest monitoring indicators and tools/ mechanisms at federal and provincial level

	Summary of proposed indicators	National monitoring indicators	Provincial monitoring indicators	National monitoring tools	Provincial monitoring tools
Deforestation	Reduced expansion of agriculture by strong monitoring in place, clear mapped and digitized land demarcation, and alternative income opportunities to reduce tendency for low productive agriculture eon marginal lands Stricter rules for mining expansion with strong emphasis on do no harm approach Community based monitoring in place to track encroachment first and act – for this empower them with knowledge on rules	Changes in national forest cover and land area (ha)	Conversion of forests to mining activities, agricultural lands and infrastructure	NFMS (SLMS) and other international studies e.g., FAO's FRA **Actors:** NRSC, OIGF, NRO, GCISC, Provincial Forest departments, Academia	Satellite based studies by forest department and PFI, field visits and surveys/ staff surveillance, community reporting **Actors:** PRMC, Provincial REDD+ management unit, Academia
Forest Degradation	Manage energy provision through alternative means in collaboration with relevant actors Combine drought mitigation agenda in reduced degradation strategies – e.g. drylands afforestation through PPP and community participation Exploit the opportunity to reclaim waterlogged and saline areas to build resource and reduce pressure on peripheries with forests	Decrease in forest density (percentage of forest cover), soil land degradation/ Erosion, grazing, forest fires	Firewood and timber collection (legal and illegal), effects of drought, overgrazing	NFMS (SLMS and NFI) Social/economic surveys **Actors:** NRSC, OIGF, NRO, GCISC, Provincial Forest departments, academia	field visits and surveys/ staff surveillance, community reporting **Actors:** PRMC, Provincial REDD+ management unit, divisional forest offices, communities, academia
Enhancement of Forest Carbon Stocks	Establish Provincial Forest Monitoring and MRV System with required capacities to monitor change Incentive based schemes for communities / citizens for forest enhancement activities Grazing management through community participation	Areas (in ha) afforested/ reforested/ regenerated. No of plants planted each year	Afforestation (area in ha), reforestation (no. of plants/ area reforested in ha), SFM targets	SLMS, NFI, Afforestation/ reforestation plans, annual plantation targets/ reports from provinces, official statistics provided by other institution on plantations **Actors:** NRSC, OIGF, NRO, GCISC, Provincial Forest departments, academia, NGOs	Provincial Forest Monitoring and MRV Systems in which regular staff / community surveillance are integrated; post activity reports; country of trees on regular basis to assess survival percentage. **Actors:** PRMC, Provincial REDD+ management unit, divisional forest offices, communities, NGOs, academia
Conservation	Advocate for climate change policy and also for inclusion of forests role in drought mitigation Institutionalize community participation with necessary rules for their role in conservation Define and operationalize clear benefit sharing mechanism from REDD+	Conservation policies/ laws/ regulations, protected area notifications of government	Effective forest land demarcation, controlled encroachment	Protected area networks, enacted laws/regulations, guided by national Policy guidance **Actors:** NRSC, OIGF, NRO, GCISC, Provincial Forest departments, academia, NGOs	Enforcement of laws/ regulations (enforcement checks); SFM and PES implementation with targets achieved; **Actors:** PRMC, Provincial REDD+ management unit, divisional forest offices, communities, local NGOs, academia
Sustainable Management of Forests	At least 10 Participatory forest Management Plans and their implementation	No of Management Plans at national level	Participatory Forest Management Plans (forest types/ area covered)	Review reports of Implementation progress from provinces **Actors:** NRSC, OIGF, NRO, GCISC, Provincial Forest departments, academia, NGOs	Review of implementation progress of PFMPs (forest area/types covered) **Actors:** PRMC, Provincial REDD+ management unit, divisional forest offices, communities, NGOs, academia

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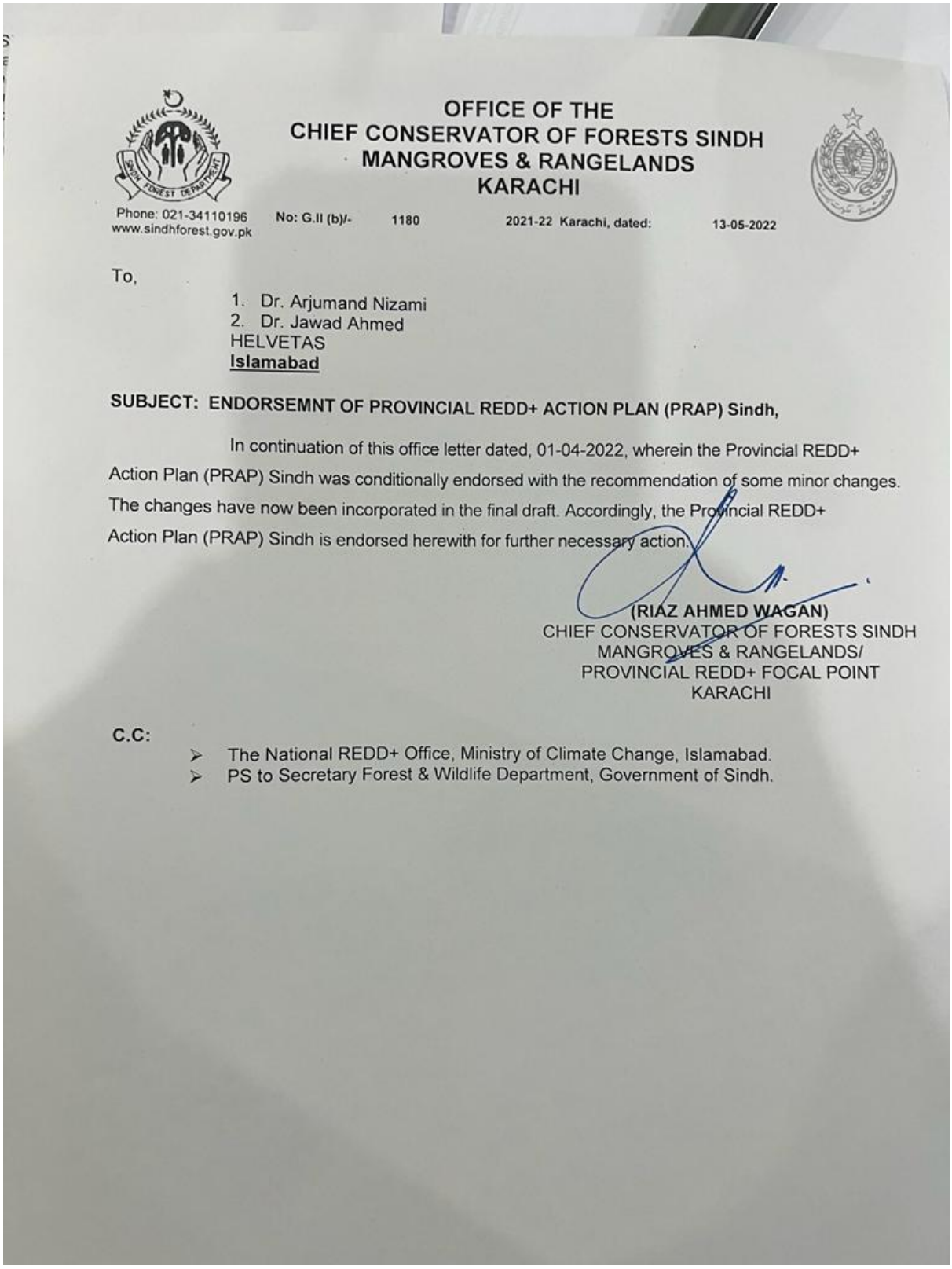
Annex – I: List of participants of provincial workshop

S. No.	Name	Designation	Department
1	Dr. Badar Jameel Mandhro	Secretary	Sindh Forest Department
2	Mr. Riaz Ahmad Wagan	CCF Mangroves / REDD+ Focal Person	Sindh Forest Department
3	Mr. Jabbar Qazi	Chief Conservator Principal	Sindh Forest Department
4	Mr. Aijaz A. Nizamani	CCF, social forestry	Sindh Forest Department
6	Mr. Arif Ali Khokhar	Conservator Forests.	Sindh Forest Department
7	Mr. Shehzad Sadiq Gill	Divisional Forest officer	Sindh Forest Department
8	Mr. Saeen Bux Sheikh	Divisional Forest officer	Sindh Forest Department
9	Mr. Muhammad Saleem	Forest monitoring expert	Sindh Forest Department
10	Mr. Shakeel Ahmad	Community Leader	Ketti Bandar, Sindh
11	Mr. Aijaz Nizamani	Additional Secretary Forest and Wildlife	Forest department Sindh
12	Mr. Hyder Raza Khan	Conservator Social Forestry Hyderabad	Forest department Sindh
13	Mr. Saeed Ahmed Peerani	Conservator Forest/Director Sericulture	Forest department Sindh
14	Mr. Niaz Ahmed Soomro	Conservator Forest Thatta	Forest department Sindh
15	Miss Sadaf Rafique	Sub Divisional Forest Officer, Tando Allahyar	Forest department Sindh
16	Mr. Muhammad Ali under	Divisional Forest Officer, Thatta	Forest department Sindh
17	Mr. Shehzad Gill	Divisional Forest Officer Mangroves Karachi	Forest department Sindh
18	Mr. Tahir Lateef	Divisional Forest Officer Social Forestry II Karachi	Forest department Sindh
19	Mr. Hasnain Raza Baloch	Divisional Forest Officer Tando Muhammad Khan	Forest department Sindh
20	Mr. Saeen Bux Shaikh	Divisional Forest Officer Mangroves Shah Bundar Division	Forest department Sindh
21	Mr. Maqsood Ahmed Memon	Divisional Forest Officer Social Forestry I Karachi	Forest department Sindh
22	Mr. Irfan-Ud-Din Ahmed	Forest Management Expert Sindh	Helvetas
23	Mr. Sadiq Mughal	Provincial Coordinator Sindh	Helvetas
24	Mr. Kamaran Hussain	REDD+ Strategy Expert	Helvetas
25	Usama Anwar	Divisional Forest Officer Admin & Development	Forest department Sindh

Annex – II: Endorsement note from Provincial REDD+ Management Committee Sindh



OFFICE OF THE
CHIEF CONSERVATOR OF FORESTS SINDH
MANGROVES & RANGELANDS
KARACHI

Phone: 021-34110196
www.sindhforest.gov.pk

No: G.II (b)/- 1180 2021-22 Karachi, dated: 13-05-2022

To,

1. Dr. Arjumand Nizami
2. Dr. Jawad Ahmed

HELVETAS
Islamabad

SUBJECT: ENDORSEMNT OF PROVINCIAL REDD+ ACTION PLAN (PRAP) Sindh,

In continuation of this office letter dated, 01-04-2022, wherein the Provincial REDD+ Action Plan (PRAP) Sindh was conditionally endorsed with the recommendation of some minor changes. The changes have now been incorporated in the final draft. Accordingly, the Provincial REDD+ Action Plan (PRAP) Sindh is endorsed herewith for further necessary action.

(RIAZ AHMED WAGAN)
CHIEF CONSERVATOR OF FORESTS SINDH
MANGROVES & RANGELANDS/
PROVINCIAL REDD+ FOCAL POINT
KARACHI

C.C:

- The National REDD+ Office, Ministry of Climate Change, Islamabad.
- PS to Secretary Forest & Wildlife Department, Government of Sindh.

Provincial REDD+ ACTION PLAN

Sindh

2022-2031

REDD+ Pakistan

Prepared under the REDD+ Readiness Preparation Project for Pakistan financed by Forest Carbon Partnership Facility (FPCF), implemented by Federal Ministry of Climate Change (MoCC) through National REDD+ Office (NRO), Islamabad.